An econometric model of the balance of payments of Venezuela

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AN ECONOMETRIC MODEL OF THE

~~VENEZUELAN~~ BALANCE OF PAYMENTS

OF VENEZUELA

by

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ABSTRACT

The fundamental purpose of this study is to build an econometric model of the Venezuelan Economy to concentrate primarely on the following: first, to analyse the effects of monetary, fiscal and external disturbances on expenditures, prices and on the Balance of Payments during the period 1955-1984, a period of fixed exchange rate; second, to approximate an optomal policy 'mix' necessary to achieve certain macroeconomic objectives, i.e, steady economic growth, price stability and balance of payments equilibrium; thirdly, to provide a simple well integrated macroeconometric model of the Venezuelan Economy.
The resulted model is a generalised income determination model where a short to medium term analysis of balance of payments can be exercised. The model belongs to the vintage of general keynesian type where the monetray and financial sector enters in a stock-flow fashion. Explicit recognition of the government budget constraint guarantees the integration of both sectors of the Venezuelan Economy as well as of the policy shocks.
The empirical section of this dissertation is carried out using least squares method to estimate the structural parameters under the carefully scrutiny of the Econometric Modelling strategy developed by Professor David Hendry and associates and which has becoming standard in the econometric modelling practice in the United Kingdom.

From the analysis of the dynamic multipliers emerges some already standard results. It has been demonstrated that the impact of the budget deficit on the economy diverges depending on which method is used to finance the deficit. Money financing shows a strong impulse in economic growth with a large disequilibrium in the balance of payments. Multipliers are negative. Exchange rate multipliers are positive with respect to the balace of payments following its direct effect on the current account and its induced effect on economic growth. Price are sticky according to the manner they are incorporated, as well as for its Non-Granger causality with money. No empirical basis was found to accept the money-price causality.

Pure monetary policy did show ambiguous results, however, financial liberalization produce strong economic growth and corresponding balance of payments deficit.

Using these results we could inferr a plausible optimal combination of policies targeted towards equilibria in the external accounts with steady economic growth.

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER I

Motivation and General Background

1.1 INTRODUCTION

This thesis is concerned with the building of an empirical model of a particular developing country, Venezuela. The emphasis is on studying the determinants of the balance of payments, a standard analysis of income determination lies at the heart of the model. The first attempt was to emphasise short-run behaviour using quarterly data but data constraints did not allow us to do so. Instead We switched to annual data where the emphasis was put on medium term behaviour.

The justification for a medium term analysis is, to some extent, to trace the long to medium term structural transformation and the economic development in Venezuela even though we do not rule out, in some respects, the short-run problems, including the economic stabilisation problems of Venezuela particularly the twin problems, i.e the balance of payments deficit and the budget deficit, that have recurred in the past and appear to be destined to remain in the foreseeable future.

Balance of payments disequilibria in less developed economies is one of the most important concerns and constraints on the way towards economic maturity. The issue has become particularly important and controversial since the appearance of the debt crisis. The problem generated by these disequilibria have been intensified since the abandonment of the fixed exchange regime by developed countries which had mixed repercussions in less developed economies depending on the degree of adaptation (flexibility) of the prevailing exchange rate systems to the perturbations generated in world markets.

The case so far has been for developed countries in particular to apply the best policy options (adjustments) while maintaining its steady state economic development. Note that the usual policy prescriptions have been absorption reduction and ~~expenditures~~ switching. In ~~a~~ particular situations, such as that of an oil exporting economy like Venezuela's recent history records two important economic phenomena most commonly denominated as first and second oil shock. In each case the enormous volume of foreign exchange revenues involved in each of those shocks did not eliminate, in the long run, the endemic disequilibrium in the balance of payments. This can be seen from our discussion of the empirical results in Chapters V and VI below. To emphasise the above statement let us mention that both oil shocks did not attenuate the increasing demand for external borrowings in Venezuela. On the contrary the period for which both oil shocks are recorded coincides with the increasing trend in the accumulation of foreign liabilities.

These aspects emphasise the crucial importance of having a sound understanding of the balance of payments adjustment in order to define the framework for economic policy. Those concerns make Venezuela a particularly interesting case study due to the high degree of openness, as well as for the restrictions reflected by the share of oil exports during the last forty years. In some respects we deal with an economy where the terms of trade are exogenous in about 90% in average for the period mentioned above. These are features which emerge from a careful study of the balance of payments in the framework of the Dutch Disease phenomenon. Even though we will not deal with this particular issue, during the discussion of this thesis the Dutch Disease phenomenon is apparent. In general, the theoretical framework used in analysing the balance of payments is based on both Keynesian and monetary approach. The former usually concentrates on the adjustment of export and import volumes with respect to their prices elasticities. Such a model is consequently extended into a more general IS-LM model but where the supply (cost) function is constant.

At the other extreme the monetary approach emphasises the money market whereby a money supply disequilibrium leads to a portfolio adjustment with consequences on the reserve flows. In its extreme version it assumes that perfect arbitrage between prices and interest rate exists, full employment, wage price flexibility even though wage rigidity is considered as well (Johnson 1976).

On the empirical side, the monetary approach usually relies on the econometric estimates of the reserve flow equation. Most of these models take the above assumptions for granted. The most crucial assumption, however, is concerned with the absence of sterilisation of the reserve flow by monetary authorities. Darby (1983) explicitly incorporated a monetary authorities' reaction function. (See our review in Chapter III) Working on the strength and weakness of the two approaches, recent works have attempted to reconcile them by defining a more general context, e.g. Aghlevly and Khan (1980), Branson (1983) and Frankel et al (1980). However, most of the literature concerned with the balance of payments, whether theory and policy analysis, has ignored the implications of the government budget constraint. Below, in Chapter IV we deal with this aspect extensively.

The important aspect of the recognition of the government budget constraints is brought into the analysis in that the conventional results do not hold[1]. Accordingly the literature dealing with the balance of payments has reconsidered the following major aspects: first, the assignment problem of fiscal and monetary policies and their short and long-run effectiveness; second, the effects of other policies of balance of payments correction as devaluation, tariffs and other traditionally non-monetary instruments; and third, the important issue of the economic growth and its association with balance of payments disequilibria.

These theoretical aspects acquire relevance in the developing of the empirical work, particularly for a country - oil exporter - where, after the first oil shock the economic growth has been affected by fiscal, monetary and exchange rate policy. We clearly distinguish two periods in the Venezuelan economic development (economic growth) in which balance of payments disequilibria has been an important constraint, e.g. before the first oil shock and after it. During the sixties import substitution policies were introduced which required a certain level of protection of domestic industrie. Usually tariffs, barriers and duties were the instruments of these policies. The exchange rate policy, consisted simply in holding it unchanged so that tariffs and barriers could play the role of surrogate for exchange rate devaluation in the goods markets.

After the second oil shock the balance of payments were largely "liberalised" so that imports could "sterilise" the money stock when the stabilisation programmes following the explosion of foreign exchange receipts concentrated on the fight against the accelerating inflation. The result, after overlapping those two periods was the collapse of the inward looking strategy. However no alternative long run policy strategy was set, so that when the oil markets started weakening the balance of payments disequilibria started to materialise again. It is interesting to note that during those byegone days the exchange rate did not vary.[2]

This background is used to analyse to what extent the policies applied were affected as well as to study the effect of each policy on the balance of payment and on expenditures. Finally an additional motivation is that, to the best of my knowledge no empirical analysis of the Venezuelan balance of payments in the framework of a macromodel exists to date. Thus, this is the first econometric model of Venezuelan economy designed to investigate, among other aspects, the determinants of the balance of payments[3].

1.2 OBJECTIVES AND METHOD OF THIS STUDY

This study attempts to examine, empirically, the issues mentioned above. Thus, we attempt to analyse changes in the balance of payments and on its main components, on income and on prices as a result of foreign shocks, and as a result of changes in fiscal monetary and other non-monetary policies for balance of payments correction as devaluation and tariffs. Accordingly we want to ask the question of: what policy combinations are most appropriate for moving the economy towards its steady state growth, and how great is the effectiveness of these policies in terms of its influence on real income and on the balance of payments?

In other words, we want to investigate, empirically, to what extent the growth of income will produce a balance of payments disequilibrium. Note that in that respect both Keynesian and monetary approach implies theoretically and empirically different results.[4] For instance the monetary approach argues that:

- if income rises the balance of payments improves for given price and interest rate.
- if prices rise the balance of payments improves for given income and interest rate.

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- if interest rate rises, the balance of payments deteriorates for given income and prices.
- if exchange rate rises (devaluation), the balance of payments does not change unless income, price and the balance of payments change by the same amount.

On the other hand Keynesians argue that:

- if income rises the balance of payments deteriorates, given price and interest rate.
- if exchange rate devaluates, the balance of payments improves; given income, price and interest rate, and
- if domestic credit rises no change is recorded on balance of payments, but if income price or interest rate vary the balance of payments do so.

Our study takes all these suggestions into consideration by building an econometric model in which all those variables are not predetermined. Thus we will be able to accept (reject) some of the propositions above in the context of any extended or integrated model.

The discussion above leads us to the basic objective of this thesis, the construction of an empirical tool useful to an effective analysis of the balance of payments in Venezuela. One important corollary objective is to undertake the mentioned economic modelling exercise to present a well integrated view of the balance of payments in which there is demonstrated that policies other than monetary do have important effects on the balance of payments. Even though we do not undertake a whole proof of any of the earlier mentioned theories it is apparent through the discussion of simulations in Chapter VI that such enterprise can be easily attempted.

Our empirical enquiry will therefore be delineated in terms of the following propositions:

- fiscal policy can have a permanent effect on the balance of payments similar to devaluation of exchange rate.

- the volume and price of exports and imports, as well as capital flows, are vital elements in determining the steady state growth of the economy and of the balance of payments and international reserves.
- the stock and flow relationship between real and monetary sector embraces the transmission mechanism from the effects of policies and shocks on the balance of payments.

Our approach is basically empirical for several reasons. Firstly there was a need to build up an empirical model which could reproduce the working of the economy by allowing actual data to express the characteristics of the Venezuelan economy. Secondly an analytical model in which we could incorporate most of the elements that are identified to play an important role on the economy become rather complex and difficult to manipulate, even though we have presented a simplified analytical model in which we do achieve some important analytical results. By constructing an empirical macromodel the solution is easily achieved through numerical methods, i.e. dynamic simulations, once the structural parameters of the model have been estimated. Note that even an empirical model also presents limitations because operational economic modelling is seriously constrained by the data base, data quality and estimation difficulties. These limitations in the data base posit important constraints since important transmission mechanisms and links just cannot be embedded in the model.

Our hypothesis, with respect to the policy analysis, adjustment, disequilibrium dynamics, price sensitivity in the external sector, exports and imports, are examined by simulating the model according to the contents of each policy scenario. The components of the model and the estimation of structural equation is done equation by equation. Each sector (equation) represents an economic (macroeconomic) relationship which is examined under alternative theoretical frameworks, following the econometric modelling methodology developed by Professor D Hendry and associates. OLS estimates are reported for every estimated equation, using PC-GIVE and DFIT. Simulation is undertaken using SORITEC and TSP, using a microcomputer environment.

The main contribution of this study will be to study the balance of payments adjustment under a unified and more general equilibrium.

framework, even though the analysis holds its partial ceteras paribus character. With some qualifications to suit the Venezuelan economy the econometric model will be applied to the empirical study for the case of Venezuela.

1.3 ORGANISATION OF THE STUDY

The usual way of organising a thesis is to present a literature survey of relevant theoretical material. We do this presentation in Chapter III. The theoretical background for this study is very diverse since various theoretical frameworks are reviewed and in cases combined to explain the balance of payments adjustment. Because of this we present the relevant theoretical surveys separately in Chapter III.

The study starts in Chapter II with a brief review of the behaviour of main macroeconomic variables of the Venezuelan economy and particularly of the balance of payments during the sample period in which we carry out the empirical work, i.e. 1955-1984.

In Chapter IV we review the macroeconomic contents of the Mundell-Fleming model and the balance of payments adjustment and the process on which the model is eventually completed by recognising the government budget constraints changing most of earlier results. Chapter V has been written in such a way that the basic facts about the economic development are incorporated with the description of the steps of the model building itself. Structural parameters of the model are estimated in this chapter. We have decided to present the empirical estimates of every equation (sector) after surveying the theoretical and empirical literature in that particular macroeconomic relationship. Finally, at the end of each section there is a comparative analysis when alternative or rival estimations exist.

In Chapter VI we present the dynamical simulation and model validation according to the policy scenarios. The concluding chapter will summarise some the the analytical and empirical findings of this thesis and indicate the shortcomings and the limitations as well as the suggested path for future research.

Finally the sources and data description, method in compiling some variables, as for instance disposable income is explained in Appendix 1. Appendix 2 contains the econometric methodology used in the estimation of constructural parameters. Appendix 3 contains the mathematical method used to solve the analytical model of Chapter IV and Appendix 4 will contain a listing of estimated equations and Appendix 5 the data used in the estimation and simulations.

CHAPTER II

Venezuelan Balance of Payments and the size of foreign sector. An Overview.

2.1 INTRODUCTION

This chapter concerns the evolution of the Venezuelan balance of payments during the last three decades. We attempt to discuss the most relevant features of the balance of payments in both aggregated and on its major components. The discussion keeps as simple as possible since a more detailed analysis is presented in Chapter V where the structural parameters of most important macroeconomic variables involved are estimated. The attention is drawn to the long term evolution of the balance of payments, trade and finance and the opening of the Venezuelan economy for the last three decades.

As can be seen from Table 5.1, between 1960 and 1984 the international integration of the Venezuelan economic system has not increased even in moderate terms. On average imports constitute a fourth part of gross domestic product, whilst export share is about 30%. The striking feature is that during three decades these shares have varied very little. On the imports side, the variations reflect during the sixties a reduction due to the execution of import substitution, industrialisation and the variation in the value of oil exports. These shares do not seem to reflect any structural change in the international integration of the Venezuelan economy. However, as can be seen below, the structure of Venezuelan exports reflect clearly certain important economic transformations. A discussion of these aspects is contained in Section 1.

In section 2 we discuss briefly the most important aspect of the terms of trade. Finally, Section 3 contains a discussion of the effects of fiscal, monetary and commercial policies on the balance of payments between 1960 and 1984, particularly after the first and second oil shock.

2.2 THE TERMS OF TRADE[5]

Import prices have always fluctuated during the last two decades, particularly in the seventies, given the world inflationary trend which follows the first oil shock and the general rising of commodity prices. Table 2 presents estimates of prices indices for the period 1965 to 1984 for the most important commodities (coffee, cocoa, iron ore, aluminium, oil and other exports. Commodity (export) prices rose considerably from 1973 to 1980. On the other hand import prices of Venezuelan imports (final products, intermediate inputs and capital goods) rose considerably during the same period.

The terms of trade indices should be considered separately. First we have a non-oil terms of trade index as a ratio of export prices (non-oil exports) to import prices which shows there is valuable information which can be drawn from the effects of changes in the terms of trade. First and most obvious effect is in the size and composition of exports and exports which to some extent are affected by fluctuations in prices and uncertainties. Secondly, we can refer to welfare gains and losses since exports provides us with the foreign exchange needed to pay imports, so a given amount of exports can generate less or more imports, depending if import and export prices do (do not) change by the same rate. On the other hand, if foreign resources are used to finance imports (balance of trade deficit) there will be a loss involved to the extent that those flows which could be determined before import prices rise will pay for less imports as a result; however gains can be involved again if interest rate is fixed, since a rise in import prices implies that the real cost of interest payments decreases. The net gain (loss) should consider the above mentioned cases.

In practice a good deal of trade statistic is necessary to compute those terms of trade effects as well as by definition they involve a ceteris paribus condition. Thus we will now carry out such analysis, even though a lot can be inferred of reported export price index in Table 5.2.[6]

2.3 THE BALANCE OF TRADE, THE INWARD LOOKING STRATEGY AND THE BACKGROUND OF THE BALANCE OF PAYMENTS CRISIS.

There is a tradition to discuss the Venezuelan economy development through the narrow view of the pre- and post-oil shock era, without regarding the major transformations undergoing in the Venezuelan economy before the oil shocks. Even though we will refer to these oil shocks (1973, 1980), I will mainly concentrate on the underlying trends of the main variables of the Venezuelan balance of payments during the last 25 years (1960-1984).

It is sometimes argued that due to the first oil shock the Venezuelan economy has had an extraordinary amount of financial resources with which to finance a policy strategy for long run economic growth. Although this section is not concerned with the macroeconomics of the whole economy, there will be references to the global macroeconomic relationships which cointegrates with the behaviour of the payments position of the nation. In that respect we will discuss the policies which were inaugurated shortly after 1958 when the inward economy strategy was outlined.

Indeed the process of import substitution industrialisation outlined by the inward looking industrialisation strategy did not materialise. Table 1 above shows the percentage of gross domestic product represented by exports and imports. Over the years of our sample period trade, exports and imports remain constant. On the one hand exports share of gross domestic product shows some variability following the movement of oil exports which represent more than 90% of total exports in that period. On the other hand, imports share on domestic output remain constant too. However, during the oil shock in 1974, imports rose sharply in 1974. It decelerated immediately in 1975 to its historical levels. These movement show an important aspect of the Venezuelan balance of payments which is characteristic of the period under investigation.

The process of import substitution justified on grounds of a policy for industrialisation was undertaken without taking into account that the volume of imports depends on the volume of foreign exchange generated mainly by the volume of oil exports. In an oil economy such dependence seems even more intense as oil prices tend to be volatile in the short and in the medium term, but steady in the long run. In real terms oil prices tend to converge to its historically low levels.

The inward looking strategy typical of the mentioned industrialisation policy was conducted by protecting the "newborn" industry in an economy with historically low levels of domestic prices and with fixed exchange rate. The fixed exchange rate in addition to the effects of other instruments of commercial and industrial policy, had the mission of holding at low level the inflationary pressures of imported inflation. The results were typical of such industrialisation strategy which involved a domestic market bias. The literature which has studied the rationale behind such industrialisation strategy usually argues that distortions and constraints caused by volatility of exports, deteriorations in terms of trade biases the industrialisation policy towards domestic market.[7] However, note that supporters of this industrialisation policy (structuralist, for instance) sub-estimate the variability in exports and its effect on the balance of trade and on the payment position, and that export volatility characteristics of less developed countries, including oil exporter economies require an industrialisation strategy on which, by widening the exports base, diminishes the variability of exports through a process of export diversification. Indeed we could argue that by emphasising the diversification of exports, import substitution effects can be more effective in the long run. Aggregating the behaviour of the balance of trade components in Venezuela we could assert that the balance of payments record for most of the period before and after the first oil shock characterises the recurrent balance of trade imbalances. Even though there is no accumulative trade deficit during that period, the volatility in oil exports had similar effects, producing the recurrences of balance of trade deficits. In a little more detail, and following Greenaway and Nam's (1987) classification, let us review in some detail the Venezuelan trade and industrialisation strategy during the period which is the subject of this study.

One of the main features of the industrialisation policies of that period was the dampening of inflationary pressures. Supply side bottlenecks were compensated by subsidies of all kinds and particularly by unchanged nominal exchange rate. An accumulating balance of trade surplus and foreign borrowing allowed exchange rate to remain unchanged even after the first oil shock when international reserves doubled. Indeed this policy of fixed exchange rate dampened the import substitution effects since, for instance, as can be seen from Table 5.3, import of consumption goods did not significantly reduce as expected, even its share on total imports increased, before and after the first oil shock. Supposedly the import substitution strategy would be based in the substitution of imports of consumption goods in its first phase and on intermediate inputs in the next phase. The overall effects indicate that the intermediate introduction of protection and liberalisation measures had perverse effects on the balance of trade; since a fixed exchange rate policy could not survive with an import substitution strategy without collapsing either one or the other. The exchange rate remained unchanged until the balance of payments crises in 1983.

There is a widely spread belief that even if the import substitution strategy reverts into export promotion policies, the exchange rate might have not remained unchanged if competitiveness is to be maintained.

In summary, Venezuelan trade and industrialisation can be analysed along the lines of the following indicators. First, the intensity of effective protection during the period cannot be measured by the level of nominal exchange rate, but with other instruments such as subsides and price control for imports of consumption goods, capital goods and raw materials. Second, quotas and import licences have been widely used; even though they were seldom eliminated when facing inflationary pressures. Thirdly, import substitution policies biased the implantation of export oriented incentives. Indeed they are absent. The presence of supply side constraints (bottleneck) precluded the introduction of export incentives; however the main instruments constitute the unchanged nominal exchange rate which affected the competitiveness of domestic production. In fact most of the period before and after the first shock is characterised by an over-evaluation in the exchange rate (real rate), showing to some extent the effects of the so called Dutch Disease.

This can be observed from the structure of total exports in Table 5.4. Oil exports make on average, from the whole period, a 90% of total exports.[8] The remainder 10% is made as well by commodities (coffee, cocoa, iron ore, aluminium).

One important characteristic emerges. The invariant share of oil exports correlates with the unchanged nominal exchange rate. The deterioration of relative prices after 1974 implies a revaluation in the real exchange rate.[9]

As a consequence of the first oil shock the value of oil exports doubled, even though a considerable part of these revenues were sterilised, imports reacted vigorously, growing by 50% from 1973 to 1984. Inflationary pressures were relieved by system wide subsidies and price control, as well as by holding exchange rate invariant. The elimination of protectionistic measures, barriers, tariffs and other restrictions in order to stabilise prices, was reverted three periods later between 1977 and 1978 when a large balance of payments deficit was recorded. Accumulated reserves from past balance of trade surpluses made possible the financing of that balance of payments deficit. Note also that large borrowings are recorded in both private and public sectors during that period. On the public sector side large investment projects were introduced as part of the V Development Plan of the basic industries. Obviously, even an oil exporter country such as Venezuela does not possess enough domestic savings to carry out the economic transformation that characterised Venezuela during these years.

The balance of payment that survived that short crisis was expected to collapse in 1979, but the second oil shock prevented that crisis. Note that the government at the beginning of 1979 brought in a stabilisation programme with large expenditure cuts, and high interest rates as policies to integrate the inflationary expectations. However, the second oil shock of 1979-1980 reverted the process. Eventually in 1983 the balance of payments collapsed and with it the exchange rate for the first time in 25 years.

2.4 FISCAL AND MONETARY POLICIES AND THE BALANCE OF PAYMENTS

From the last section we could easily learn that oil exports provide more than 90% of foreign exchange for the whole sample period.
In a similar manner and following some institutional factors, oil provides approximately 68% of government ordinary revenues (oil tax income plus royalties) (See Chapter V). The budget is accordingly one of the most important channels though which oil revenues affect aggregate demand. The other channel is constituted by the wealth effects which follow and surplus (deficit) in the balance of payments or changes in international reserves. In this respect the money multiplier provides an important

policy instrument through which monetary authorities can stabilise and compensate the effects of government expenditures. In both cases, both government expenditure and money supply, oil revenues (foreign exchange) is the main contributor. In fact, the domestic component of the monetary base has always been negative, indicating that government reduces the amount of money supply; of which foreign exchange is the larger component, by integrating its expenditure policy with the level of monetary base. Indeed some accounts in the money base aggregate remain "frozen" as governments "sterilise" them in the Central Bank.[10]

Fiscal policy is driven by oil revenues in the following way. If oil prices rise so do government expenditure, even though a deficit can be recorded in any period. Treasury reserves could increase following an increase in oil prices and/or in oil taxes and royalties on the oil industry. Up to 1973 oil prices remained steady without any major increase. See oil exports from Table 4 where it can be seen that during most of the period before the oil shock they remained constant indeed. However this does not mean that government expenditures would not increase substantially without having a large budget deficit. The mechanism for increasing government expenditures was the increase in oil income tax and other royalties from the oil industry.[11]

After the first oil shock, fiscal policy is exercised over new dimensions. Government revenues almost trebled in 1974, even though not all revenues were expent since a large proportion - such as mentioned earlier - is sterilized by means of institutional changes. A part of government revenue were exported and its corresponding national counterpart demonetised. The large expenditures of that year also increased exports and increase domestic product considerably. Imports reacted vigorously, showing the large marginal propensity to import in a small and open economy such as Venezuela. An important feature of such a period before and after the oil shock is the complete currency convertibility and the lack of constraints on the capital account, which made it easy for government and monetary authorities to stabilise the money supply by "suggesting" private sector capital outflows. I will return to this aspect later on. The strong increase in aggregate demand during these years brought about partially by fiscal expansion and partially by the wealth effects of increased high powered money, produced a substantial growth in domestic output, during 1974 to 1977.

This sharp increase in domestic output exercised strong pressure on balance of payments (current account) by intensifying the demand for imports. Note that in 1974 imports constituted a 43% of gross domestic product. In 1973 this ratio was of 30% even though between 1975 and 76 it lowered and its historical level was achieved in 1977. Restrictive fiscal polices by cutting government expenditures in addition to a restrictive monetary policy as part of a stabilisation package was enforced in 1979, since the balance of payments had worsened dangerously in 1978 due to a reduction in oil prices. However, these policies were reverted rapidly following the effects of a second oil shock. The inflation and the stagnation of 1979 and 1980 was followed by an expansionary fiscal policy which eventually collapsed when the oil prices again recessed in 1983. The net result following these domestic and foreign shocks was the balance of payments crises of 1983 and 198 , where the exchange rate which prevailed for more than 30 years eventually collapsed. A maxidivaluation 25 of the exchange rate was exercised as part of an adjustment policy earlier package. The crisis in the balance of payments was accelerated by the rationing of foreign credit in 1982 when a weakening in the payments position was expected.

The nature of both economic and institutional aspects of fiscal monetary policy requires some comments.

Before and after the first oil shock Venezuela does not record large budget deficits which would have followed an expansionary fiscal policy. In practice government expenditures have increased following an increase in taxes on oil companies or an increase in oil prices. Note that both cases constitute the same thing from a government ordinary revenue point of view. Fiscal expansion on this conditions is just an expression of higher government ordinary revenues and rarely a policy of an apriory budget deficit. In practice, if all new government ordinary expent it implies a restrictive fiscal policy since part of revenues resources are demonetised. The contrary is not always true, since a budget deficit in the current period could mean that higher oil prices produce in practice a contraction in government expenditures, because part of those resources can be demonetised as special accounts in Central Bank, or even increase

Treasury reserves which do not form part of high powered money. On the other hand monetary policy has been defined by default expansive since interest rate has artificial ceilings. Monetary authorities have exercised its policy options by reducing (increasing) credit (borrowed reserves) to commercial banks and other institutions. It is interesting to note that the domestic component of high powered money is negative, reflecting a contractionary monetary policy. Indeed monetary authorities and the Treasury sterilise part of the foreign component of high powered money.

2.5 SUMMARY

In this chapter we have attempted to discuss the most relevant aspect in the history of the Venezuelan balance of payments and its relation to the economy's transformation of the last three decades. As mentioned above, we have found that the international integration of the Venezuelan economy has been constrained by the relative no expansion of the non-oil sector. The reasons being that non-oil exports are made of other commodities (coffee, cocoa, iron ore, aluminium) whose production is determined by foreign demand. However domestic production for these commodities has not risen considerable according with the increase in foreign demand. A first conclusion which emerges is that there are negative substitution effects in the structure of the Venezuelan exports. We would clearly distinguish a first degree of Dutch Disease. Total exports have fluctuated according to the variability of oil exports, however its share on gross domestic product has remained unchanged for nearly three decades. Severe supply side restrictions impeded the diversification of the Venezuelan exports.

CHAPTER III

Approaches to the balance of payments problem. A survey of the theoretical and empirical literature.

3.1 INTRODUCTION

Recurrent balance of payments problems have been a common feature of semi-industrialised and less developed economies. With respect to the developed countries the problem has been focused on the balance of payments adjustment under both classical and monetary approaches, particularly in conditions of increasing unemployment and on the contingencies of passing from a fixed exchange rate regime to a flexible regime.

This matter has been investigated to a great extent since the Great Depression. As a result there is a sizeable literature dealing with monetary and non-monetary (structural) aspects of balance of payment in general and in particular on its adjustment.

The official or prevailing balance of payment theory up to the last depression is known to us as the price-specie-flow propositions, which originated in David Hume's price-specie-flow mechanism based on the classical premise of an automatic self-correcting behaviour to mitigate balance of payments disequilibria. This proposition developed into the new monetary approach in which the emphasis is on the influence of excess demand (supply) of money on the balance between income (outputs) and expenditure. Walras'law is invocated in order to understand this general equilibrium approach.

On the other hand the classical (orthodox) approach produces a theoretical framework in which balance of payment equilibria could be achieved through devaluation (appreciation) policies. Thus, with a devaluation the trade balance (terms of trade) improve only if imports and exports elasticities are infinite. The instance of unemployment in the domestic economy appears as an important condition. The relationships embodied in the infinite elasticities of trade are best known as the Marshall-Lerner-Robinson conditions. The above conditions require that the domestic market be separated from the world market. This follows from the fact that import prices are expressed in foreign currency and are not affected by domestic exchange rate changes (See Thirlwall 1980). He interprets these conditions as the stability conditions of the foreign exchange market under a fixed exchange rate regime. No capital mobility is recognised in this abstraction.

A salient feature of the elasticity approach is that it ignores any trade disturbances which could affect monetary and financial markets since it deals only with the trade balance of the current account balance.

Another important aspect relating to the balance of payments correction (trade balance) are the feedback effect on the balance of payment adjustments which an exchange rate devaluation (appreciation) has on domestic prices and income. The partial equilibrium approach characteristic of the elasticity approach is extended with the development of the so called absorption approach to the balance of payments.

This theoretical apparatus assumes that the balance of payment adjustment could be analysed in order to diagnose and evaluate the policies which participate in the adjustment to a new equilibrium. Thus the emphasis is to consider the balance of trade and the functioning of the economy as a whole. In this approach the balance of payments is the result of difference between expenditures and output. Furthermore balance of payment equilibria will not be restored if expenditures have changed with respect to income. (see below for a formal setting).

Most of the theoretical development on balance of payments theory has emerged on less restricted economic and financial integration, thus the results in many cases have no direct application to more restricted economic environment typical of less developed economies. However and with some theoretical 'adjustments' the literature on both theories and empirical works has been growing at very fast rate. The main focus has been on the two more general approaches, one from each strand in the literature: the monetary approach to balance of payments, and the so-called two-gap model.

As mentioned above the monetary approach describes balance of payment disequilibria as a pure consequence of excess demand or supply of money, which must be treated as instruments for the theoretical apparatus of monetary theory.

The MABOP argues that balance of payment disequilibria involves flows of foreign currency (money) where the behaviour of monetary authorities is regarded as crucial. On the other hand the so called two-gap model (structural approach) embodies the proposition that structural disequibrilium is the main aspect of that matter and is dependent on several factors, technological progress and trade elasticities among them. The model is constructed under the assumption that the chronic excess demand for foreign currency in less developed economies is structural in essence and is a consequence of the domestic supply rigidities. With this proposition in mind, advocates of the two-gap model find monetary policies - as for MABOP - irrelevant for restoring the desired equilibrium. Both models are presented formally and with more details below.

Before surveying in detail each one of the different theoretical propositions in the study of balance of payments disequilibria, it is important to mention some relevant relationships between the different approaches.

In this regard it is important to recognise that the elaborate theoretical and empirical aspects of the 'new' monetary approach were provided by the 'ineffectiveness' of the alternative approaches to the balance of payment theory, namely, the "elasticity approach", and the "absorption approach" in dealing with balances of payments adjustment. The advocates of the new monetary approach have refuted the main argument of the orthodox thesis relating to the current account. They argue that both the capital account and the current account matter and that the former should be incorporated in the model as well.

At the outset let us clarify that the concept "monetarism" is basically related to monetary issues and must not be confused with the monetary approach to the balance of payments.

However, the two have common points, in particular due to Johnson's

(1972) propositions that an excess demand or supply for money produced by an increased domestic credit will result in a balance of payments disequilibrium (deficit) if the exchange rate regime is one of fixed rate. Deficits in the BOP are accordingly followed by a fall in international reserves. Two propositions have emerged in order to cope with such BOP disequilibria: one, a restriction in the domestic credit and, second, the concept that balance of payments disequilibria is a product of a stock adjustment process, which emerges due to a disequilibrium between desired and actual supply of money (assets). Thus the stock-flow relationship comes into the analysis of the balance of payments adjustment.

To comprehend of the relationships between stock and flows is conditio sine qua non to understand the competing approaches to balance of payments. Thus, a stock decision corresponds to a once-and-for-all variation in the asset's composition by swapping some assets for others; in this particular case foreign assets for home assets (currency). On the other hand a flow deficit is related to an expenditure decision and does have unlimited duration.

In the above argument the most relevant differences between the classical theories and the new monetary approach to balance of payments lies in that the former are partial equilibrium analysis type and the latter is a general equilibrium alternative in which capital flows are defined into the system. The differences between both type of theoretical apparatus are important from the point of view of policy.

To illustrate this, let's mention that one of the most important objectives assigned to economic policy is the need for predicting the effects due to variations of variables and parameters under control, such as variations in the rate of exchange, i.e. devaluation (revaluation) on the BOP disequilibria under both fixed and flexible exchange rate regimes. Classical theoretical apparatus (i.e. elasticity) has been used to forecast the values of the parameters of the implied model. The prediction procedures and the estimation of the model's parameters are based on the implied proposition that the effects of these changes are small enough to have a significant effect on the economy. The monetary approach claims that such an assumption is not correct since parameters' variations could lead to structural changes in the economy.

Once the questions about exchange rate regime are answered, the MABOP argues that in the case of fixed exchange rate regime the excess demand (supply) for money results in changes in international reserves. If the exchange rate regime is managed or flexible,the equilibrium is restored by depreciation (appreciation) in the rate of exchange rather than by an adjustment in international reserves holdings, thus an excess demand for money due to an increased domestic credit will cause an exchange rate appreciation as a reserve hoarding is in progress. On such basis we can distinguish the important aspects in the MABOP which jointly define the path of an adjustment of the balance of payments; one, the demand for money; second, a money supply dynamic process and, third, a balance of payment surplus (deficit) in case of excess of supply (demand) of money.

The rest of the chapter is organised as follows. Section 3.1 is a theoretical review of the elasticity approach. A survey of the empirical empirical works is included. Section 3.2 deals with the absorption approach. In section 3.3 I survey the monetary approach to the balance of payments, including empirical applications. Section 3.4 is a discussion of the so called two-gap model and its theoretical underpinnings. Finally in section 4.3 a critical discussion is presented.

3.2. The Elasticity approach to the Balance of Payments

The explanation of the balance of payments has fundamentally a microeconomic foundation.

The interaction between the demand and supply schedules of export and import markets[12] is the basis for this approach. Own price elasticities are, in that respect, the key parameters in the balance of payment adjustment. The elasticity approach considers exports and import markets in terms of the microeconomics of supply and demand schedules as functions of the own money price of goods only,since both supply and demand prices have to be expressed in the same currency. As such, exchange rate depreciation will shift the relevant curve and leads to changes in the equilibrium quantities and in prices.

The analysis is made under the assumption of a partial equilibrium, everything else is held constant. All other relevant elasticities (supply of output) are assumed to be infinite so that export prices given domestic currency do not increase as demand holds pressure. On the other hand, export prices of foreign goods do not fall as demand decreases; import prices in foreign money do not fall as the demand for imports drops and finally domestic prices(non traded) do not rise as the demand for import substitutes increases. The above cause originates the following elasticities of supply: elasticity of supply of tradeable exports, elasticity of supply for foreign goods; foreign elasticity of supply of imports, and the elasticity of supply of non traded goods that compete with imports. In order to fulfil the Marshal-Lerner-Robinson conditions all these elasticities must be infinite if depreciation is to be successful.

Thus these conditions impliy that devaluation is successful only if

$$\frac{Ex(\eta_x - 1)}{Ex - \eta_m} + \frac{\eta_m(1+Em)}{Em + \eta_m} > 0 \qquad (3.1)$$

Where Ex, Em are supply elasticities of exports and imports and Nxm and Nm are demand elasticities for exports and imports respectively.
For a small open economy in which Nx and Em approach infinite the conditions become:

$$Ex + \eta_m > 0 \qquad (3.2)$$

Thus, it is assumed that trade is initially balanced and changes in the rate of exchange are very small. The condition states that depreciation improves the balance of payments on current account if

$$Em + Ex > 1 \qquad (3.3)$$

The basic model underlying the traditional elasticities model is derived by first specifying the foreign payments objective of government in terms of trade balance, thus

$$BOP = X\,(e,p) - epM(e,p) \qquad (3.4)$$

$$BOP = X\,(e, P_f/P_d) - e\frac{P_f}{P_d}\,M(e\ P_f/P_d) \qquad (3.5)$$

where X, M are volume of domestic exports and imports respectively. Pf is foreign currency price of importables, Pd is domestic price and is the exchange rate. The terms of trade, Pf, depend only on the rate of exchange and currency depreciation tends to worsen the terms of trade. Exchange rate depreciation will make foreign goods more expensive and conversely domestic goods cheaper to foreign residents, increasing export and reducing imports. However it is well known that a depreciation may result in a deterioration of the current account balance rather than in its improvement. The country raises its exports as domestic goods become more competitive and imports decline. As the domestic economy pays more for its imports the cost effect dominates unless exports and imports are elastics.

The derivation of the Marshall-Lerner condition is as follows: starting from the balance of trade BT = pX - M (in foreign currency)

$$\text{Or} \quad BT = eX - M \tag{3.6}$$

If devaluation is going to be successful

$$\frac{\partial BI}{\partial e} < 0 \tag{3.7}$$

differentiating with respect to change in e we get

$$\frac{\partial BT}{\partial e} = X + e\frac{\partial X}{\partial e} - \frac{\partial M}{\partial e} \tag{3.8}$$

$$= X + \frac{X}{X} e \frac{\partial X}{\partial e} - X \frac{\partial M}{\partial e}\frac{e}{M}\frac{M}{\partial X} \tag{3.9}$$

$$= X + \frac{\partial X}{\partial e}\frac{e}{X} X - \frac{\partial M}{\partial e}\frac{e}{M}\frac{M}{eX} X \tag{3.10}$$

$$= X(1 + \frac{e\partial X}{X\subset e} - \frac{\partial M}{\partial e}\frac{e}{M}\frac{M}{eX}) \tag{3.11}$$

where $\frac{e}{X}\frac{\partial X}{\partial e}$ measures the elasticity of demand for exports (Ex). If Ex > 0 the response with respect to an exchange rate depreciation is positive. If $\eta_m > 0$ $\frac{e}{M}\frac{\partial M}{\partial e} = \eta_m$ measures the elasticity of demand for imports change in exchange rate will decrease import starting from a balanced account the following results apply[13]

$$\frac{\partial BT}{\partial e} = X(1 - Ex - Em) \tag{3.12}$$

$$\frac{\partial BT}{\partial E} = X(1 - (Ex+Em)) \text{ which means that} \tag{3.13}$$

Ex + Em = 1 if we want a depreciation to improves the balance of payments.

The above equation states that a rise in the relative price of imports will improve the trade balance provided the sum of export and import elasticities exceeds unity. Note that one cannot overemphasise the above extreme assumption, since one has to bear in mind that if domestic prices are not affected by the depreciation, then a nominal exchange rate shift is translated into a real exchange rate or terms of trade shift. If the depreciation leads to sterilisation of domestic price increases, relative prices and competitiveness will remain unaltered and depreciation will not have real effect.

The essential element in this analysis is that a devaluation by raising the relative price of traded goods in terms of non-traded goods generates balance of payments surplus. Dornbush (1975)[14] incorporates into the analysis of devaluation effects the need for an 'internal balance' which validates the relative price change by a reduction in absorption.

Thirlwall (1980) incorporates a measure of the percentage improvement in foreign currency revenues which could have resulted due to devaluation. Such percentage improvement will be approximate to the sum of the percentage increase in the volume of imports plus the percentage decrease in the volume of imports less the percentage increases of the exchange rate depreciation (more domestic units for foreign currency). This looks as follows: $\frac{\partial e}{e}\left(\frac{\partial X/X}{\partial e/e} - \frac{\partial M/M}{\partial e/e} - 1\right)$.

Here the Marshall-Lerner-Robinson conditions for an increase in the foreign exchange revenues are

$$EX + Em - 1 > 0 \qquad (3.14)$$

$$Ex + Em > 1 \qquad (3.15)$$

3.3 The elasticity approach and the incorporation of income effects

Larsen & Meltzer (1950), Harberguer (1950) attempt to model the interrelation between income and the balance of payments equilibrium.

Assuming that

$$y - D(y,e) - X(e) = 0 \qquad (3.16)$$

$$x(e) - M(y,e) = 0 \qquad (3.17)$$

where $\frac{\partial D}{\partial X} < 1;\ \frac{\partial D}{\partial e} > 0;\ \frac{\partial X}{\partial e} > 0$

$$0 < \frac{\partial M}{\partial X} < 1 \quad \text{and} \quad \frac{\partial M}{\partial e} < 0 \qquad (3.18)$$

By totally differentiating above:

$$\frac{dy}{de} = \frac{\partial X/\partial e + \partial X/\partial e}{1 - \frac{\partial D}{\partial e}} \qquad (3.19)$$

and $\frac{\partial Y}{\partial e} = M(Em + \frac{X}{Me} Ex - 1)$ (3.20)

where Em, Ex as before.
In equilibrium X = Me and $\frac{\partial Y}{\partial e} = \frac{M(Em + Ex - 1)}{eMy}$ (3.21)

the above equations integrates the Marshall-Lerner-Robinson conditions with the income effects.

$$ED = Y - D(y,e) - X(e) \quad \text{(excess demand)} \qquad (3.22)$$

$$BT = X(e) - eM(y,e) \qquad (3.23)$$

In order to have ED = BT = 0

$$\frac{\partial ED}{\partial Y} = 1 - \frac{\partial D}{\partial Y} > 0 \qquad (3.24)$$

and $\frac{\partial BT}{\partial Ye} + - e\frac{\partial M}{\partial Y} < 0$ (3.25)

For a detailed derivation of the implications between elasticities and income effects see Gondolfo (1980). It has been shown that the incorporation of income shifts due to depreciation does not alter the main result of the Marshall-Lerner-Robinson condition if a successful devaluation occurs. However some results show that the depreciation effect will be of lower magnitude. See Thirlwall (op.cit) for a proof of this result. However the main results shows that since both export and imports are a function of the exchange rate, variations in the latter make exports vary in the same direction as the exchange rate and imports vary in the opposite way. Imports change is induced by changes in income.

Domestic demand is affected as well since it is a function of exchange rate also, as changes in the rate of exchange produce changes in the relative prices of domestic (exportable) and foreign (importable) goods. The line of effects is to make domestic demand shift in the same direction (depreciation of exchange rate). Another result linked to the effects of devaluation described by the elasticity approach is the so called J-curve. Once stability conditions are satisfied, the balance of payments will tend to equilibrium when the exchange rate is depreciated. But a new equilibrium position is achieved only after all adjustments have worked thoroughly.

During the process of adjustment we may find a situation in which an exchange rate depreciation can deteriorate even more the balance of payments position. In this particular case, the perverse effect due to an exchange rate depreciation takes place some time before the new equilibrium is reached. The overall process of such perverse effect starts once relative prices have changed. The adjustment process towards new equilibrium is characterised by the recognition lags, decision lags, deliver lags and production lags. Thus adjustment lags work in both prices and volume. The net effect of these lags in the short-run is the less than proportionate response in imports and exports due to the fall in the value of the national currency.

The above situation presents a disequilibrium in the balance of payments that will be worse than the initial deficit. The Marshall-Lerner-Robinson condition is not fulfilled yet, as price linkages are strong, since devaluation affects the domestic price level by the same amount as the depreciation. This price effect (relative price) of devaluation will itself depend on the extent to which import prices (in domestic currency) rise due to depreciation and on the feedback that prices have on wages.

3.4 Criticisms of the elastic approach

There have been practical problems when measuring the price elasticity of demand for imports and the demand for exportables. The difficulties first mentioned by Orcutt (1950) and Thirlwall (1980) lie in the identification of bias sources when estimating these price elasticities in empirical work.

The factors affecting elasticities are the simultaneous bias, the aggregation bias, the measurement and composition of prices indexes. Simultaneous bias arises because demand depends on prices and since these are indicative of quantities demanded, they are endogeniously determined.

3.4.1 The Two-gap model.

The two-gap model embodies the view that structural disequilibrium at factor level depends on special assumptions concerning the foreign trade price elasticities and the technology changes facing the less developing countries.

In essence the model asserts that the chronic excess demand for foreign exchange in developing economies is structural in origin. Monetary policies to restore external balances equilibrium are therefore considered irrelevant. Such structural excess demand for foreign exchange is essentially a non-monetary phenomenon,where the export capacity does not satisfy the growing requirements of small open economies for imports. This is the focus of the two-gap approach. Thus disequilibria in the foreign exchange is a feature of economic development, since there exist technologically imposed lags in the production of exportables and in the substitution for importables. This leaves any monetary policy as totally irrelevant, money is not seen to have an important role in the discussion of the balance of payments. Early works of McKinnon (1964), Shaw (1965) and Linder (1967) have pointed out the two-gap model's most relevant features discussed below.

This section attempts to explain the two-gap model, along the lines of its originators. From the national accounts we can show that the excess investment over total domestic saving, including government saving, is equivalent to a surplus of imports over exports (trade balance deficit). Thus, the amount of foreign borrowing required to equilibrate national savings is the same whether borrowings-funds are needed for capital formation necessary to fill the investment gap or for imports to compensate the external gap produced by a trade balance deficit. In other words an excess of imports with respect to exports implies an excess of resources utilised by the domestic economy with respect to the resources produced by it. This is the same as excess investment with respect to savings. Since the two gaps are equal ex-post or even ex -ante it has become essential that the binding constraint is the external trade gap, thus M-X>0. In these conditions, economic growth will be constrained by the resulting deficit of foreign exchange produced by the external trade gap. The implied conclusion is that available resources will not be fully used if we find strict complementarity between foreign and domestic goods. See McKinnon(1965), Shaw (1960) and Fry (1988).

Advocates of the two-gap models usually specify the production function to have a constant capital output ratio. In real terms, savings and imports are bound to be positive functions of real output whereas exports are assumed to be exogenously given. Targeting real output growth, saving and investment in real terms should be estimated by the means of the respective function. According to this approach, total investment demand is affected by the desired output and depends on a constant capital output ratio and will exceed savings.

Such excess investment over expected savings will originate the gap if the implied import function becomes lower than the exogenous level of exports. This situation reflects a saving gap. On the other hand, if domestic national saving is not sufficient to meet investment demand, and if the implied input function corresponds to the target output, then an excess over exports is expected and an external trade gap is produced. Ex-post (M-X)>0 is equal to I-S > 0. Foreign capital inflows will to some extent fill the gap. Let us formulate the model in its simplest form before we discuss its most important implications. We start from the national expenditure identity,[15]

$$Y = C + I + X - M \tag{3.26}$$

$$Y = C + S$$

$$M = X + NCF \tag{3.27}$$

where the notation is the usual one.

The implied behavioural saving function is

$$S_t = \alpha_0 + \alpha_1 y_t + \alpha_2 NCF_t + \alpha_3 X \qquad (3.28)$$

Where α_1 is the marginal propensity to save out of the national product; α_2 is the marginal propensity to save out of NCF (foreign borrowings) and α_3 the respective marginal propensity to save out of the export sector.[16] Similarly the imports demand function is specified as

$$M = \beta_0 + \beta_1 Y + \beta_2 I \qquad (3.29)$$

where β_1 is the marginal propensity to import due to the economic growth and β_2 is the implied propensity to import following investment of raw materials and capital goods sensible to be scarce in the domestic economy, the demanded imports should satisfy the existing level of capacity utilisation as well as the corresponding demand for capital goods needed for a sustained rate of growth output.

The essential element in the two-gap approach is the assumption that exports in the less developed economies are deficient in both primary and manufactured goods. On the manufacturing side there have been found limitations due to some protectionist policies of developed and of other less developed countries.

A second important aspect that ought to be mentioned is the model's implied disequilibria in savings and imports that are attributed to the low levels of income in the less developed economies.

The trade gap constraint on the other hand implies that if the minimun level of imports is not attainable then there will be a sub-utilisation of existing capacity and consequently a slow down in the targeted output, since the complementarity assumption implies the demand for imports.

Two major policy conclusions can be derived from the above: the subutilisation of capacity (capital) and the inability of the domestic economy to break the foreign exchange restrictions. When the implied restriction is due to the I-S>0 gap, then domestic capacity utilisation and and import capacity can be totally employed. However, if the foreign trade gap, M-X>0 is the implied constraint then there is capacity subutilisation. Thus imports complement domestic inputs. This asymmetry between imports and domestic capacity is crucial to the two-gap model.

In conclusion, the two-gap model assumes structural rigidities in the economy and does not consider monetary variables to be relevant.
From the policy point of view, this model is well designed to provide a case for foreign aid and external borrowing.[17] In this regard, criticisms have been addressed to the way that policymakers have attempted to control the foreign exchange market, so they can do little to break the supply bottlenecks.

A final remark with respect to the two gap approach is that that this model takes a rigid view of the economy. This emerges from the evidence that the price mechanism cannot allocate the available resources in a optimal way and equilibrate demand and supplies in less developed economies. Since there are serious institutional and structural obstacles in the price mechanism. These are extreme cases, in which the economy faces an exogenous demand for its exports, strictly complementary to import demand and given factor supplies.

3.4.2 Absorption approach.

Alexander (1952, 1957) and Machlup (1955) are the main originators of the absorption approach to balance of payments. The emphasis is on the effects of trade on domestic income, since the trade balance is the difference between aggregate domestic income and aggregate domestic expenditure, instead of the difference between export and import volumes. This approach which was developed in the fifties focuses its analysis on the effects of devaluation and inflationary conditions. For this reason the approach emphasises the effects on domestic absorption through real balances, income distribution and money illusion. (See Thirlwall (1980) op.cit.) Later in 1959 Alexander constructed a synthesis between elasticity approach and absorption approach by operating the working of the effects into two effects temporarily defined. The first step is the devaluation effects on the balance of payments and was termed the "initial effect" which corresponds to the elasticity approach .Sequentially a multiplier effect is incorporated to obtain the changes in domestic aggregate demand and hence the weak changes in the home country imports and exports. Both changes or effects determine the final effect on the balance of payments.

In other words the initial effect is the consequence of exogenous changes in the autonomous components of the balance of payments in the context of a fixed exchange rate regime. The final effect is equal to the initial effect (devaluation) times the multiplier which is the function of absorption propensities, i.e, consumption and import propensities. (See Gandolfo 1980, 1988).

Alexander's system was criticised by Tsiang (1971) since Alexander had only superimposed a multiplier to the elasticity effect of a change in the rate of exchange.

In what follows we discuss formally the main aspects of the absorption approach. The trade balance is described here as the component of aggregate income not generated by domestic sources of expenditure (absorption).
Absorption (A) is defined as:

$$A = C + I + G \tag{3.30}$$

$$CU = TB = Y - M \tag{3.31}$$

$$Y = (X - M) + C + I + G \tag{3.32}$$

$$X - M = Y - (C + I + G) \tag{3.33}$$

$$X - M = Y - A \tag{3.34}$$

$$CU = TB + Y - A \text{ where TB is equal to current (CU) account.} \tag{3.35}$$

As absorption (A) is dependent on income (Y) we can write:

$$A = F(Y) \tag{3.36}$$

linearizing we get:

$$A = Ao + kY \tag{3.37}$$

Accordingly

$$\dot{TB} = (1 - \alpha)\,\dot{y} - \dot{A}o \tag{3.38}$$

This expression allows us to recognise the channels through which the balance of trade can be affected. These channels represent the effects, both direct and indirect. Indirect changes are due to changes in income Y and directly through the variations in the autonomous part of absorption, Ao. The indirect channel is regarded as the Keynesian effect since it is a result of the employment of "idle resources". In this case relative prices or terms of trade effect usually deteriorate if exports are more specialised than imports. The other channel, the change in the autonomous part of Absorption, Ao works directly through the balance effect, income distribution effect, recovery-price illusion effect, (see Machlup (1955) for a detailed discussion of those effects). The simplified model explained above shows the policies aimed at maintaining an increasing income; those policies known as expenditure-switching policies are: depreciation, tariffs, quotas on imports, subsidies on exports and price and quantity adjustment of all varieties. These policies are utilized to increase exports and reduce imports. Policies working in the opposite direction are defined as being expenditure reducing.

Let us show in our simple model the effects of a exchange rate depreciation.

$$\dot{CU} = \dot{TB} = \dot{Y} - \dot{A} \qquad (3.39)$$

devaluation affects income and absorption directly whereas the indirect effect is channelled through the changes in income (xy).

$$\text{Thus as} \quad A = Ao + \alpha Y \qquad (3.40)$$

$$\dot{CU} - \dot{TB} = (1-\alpha)\,\dot{y} - Ao \qquad (3.41)$$

We now recognise the following two cases:

i) direct effect of exchange rate depreciation on income
ii) direct effect of exchange rate depreciation on absorption.

The direct effects on income work through the idle resource effect (Keynesian effect), i.e, terms of trade effect. In the first case, the depreciation will increase income in real terms as domestic production increases due to a switch in demand. The intensity of the demand switch will depend on the degree of import substitution.

In the above equation this can be represented by a $\alpha < 1$, where α is the propensity to absorb. If $\alpha < 1$ it is likely that BOP will worsen.

In the second case of the terms of trade effect, the depreciation of the exchange rate and its effects depends on whether the product of the elasticity of supply of imports and input is larger or less than the product of the demand elasticities. By improving the terms of trade the effect on income and the balance of payment works similarly as in the above idle resource case. Otherwise, real income and balance of payment deteriorate as the propensity to absorb will be less than one; $\alpha < 1$.

On the other hand the effects on absorption of an exchange rate depreciation is materialised according to real balance, income distribution and money illusion effect and can be identified in the following way: Under the real balance effect, the devaluation in the exchange rate will operate according to whether people wish to hold a determined (larger) proportion of income in money. If devaluation affects prices agents will hold more nominal money by reducing its expenditure which finally reduces absorption.

A similar situation is described when the devaluation effects on prices alter the income distribution, since groups with higher marginal propensity to save will be benefited. The money illusion effect, due to devaluation of exchange rate will make people reduce their expenditure (real) since they continue to spend the same quantity (nominal) despite an increase in prices.

Finally let us mention the main criticisms made of the absorption approach. In particular, the criticisms of the absorption approach are that it ignores the monetary side of the balance of payments, and it isolates the current account (trade balance) from the balance of payments. The introduction of money components becomes increasingly important if we recognise that a deficit means excess payments by the home country with respect to the world economy, over receipts by domestic residents from foreign residents. The net effect of such deficit position is regarded as being a purchase of foreign exchange and/or a fall in the international reserves. The domestic effect is one of reduced money balances. The spill-over effect of this position goes through changes in interest rate, domestic credit, and finally aggregate expenditure. All these aspects are reviewed and developed in the next section which introduces the theoretical model of the balance of payments.

3.4.3 The Monetary approach to the BOP (MABOP).

The general feature of the monetary approach is that it consider the balance of payments as a whole,including both the current and the capital account. This general approach treats disequilibria in the balance of payments as changes in foreign assets; wherever such disequilibria exists there will be further disequilibria between demand and supply for money. Thus the money supply process and the money demand function appear to be one of the main focuses and an important theoretical relationship through which this approach develops its analysis of the balance of payments. In this context the balance of payments position of a country is regarded as being a reflection of domestic residents' decisions to accumulate or disaccumulate their stocks of money balances.

According to this proposition the balance of payments is the main means by which private domestic residents of an small open economy adjusts the money stock to their desired money holdings if the rate of exchange is fixed. Thus, deficits and/or surpluses in the balance of payments are in some direct way results of the adjustment process mentioned above. Disequilibria in the foreign exchange market could occur particularly in less developed economies as a product of policies that intend to repress the financial markets and generate excess supply of money.

Such excess demands for money are attributed in general to the underlying determinants of disequilibria in the money and financial markets.

The contemporaneous "classical" model embodying the monetary approach was originated and developed by Mundell (1968) and Johnson (1972). In particular it was Johnson who argued that MABOP recognises the balance of payments as being exclusively a monetary phenomenon. Any deviation in the balance of payments is regarded as the point at which domestic residents adjust their excess money supply .

Among the fundamental assumptions of the MABOP is that the prevailing exchange rate system is fixed (exogenous) and that in the long run there is full employment of factors. The demand for money is stable and it is specified as depending on income flows and on the conditions present in the financial market. Money is neutral and prices and interest rates are exogenous, given world rates of inflation and interest rates. However wages and prices are flexible in the long run, although the price level is pegged to the world price. On the other hand, balance of payments deficits (surpluses) can not be sterilised within a period relevant to policy analysis.

The working of the above assumptions in the context of a small open economy is as follows: given a fixed exchange rate regime, a balance payments deficit (surplus) is the process by which the economy adjusts to an excess of money stock, whilst interest rates in the domestic economy are determined by their world rates, and by domestic prices. The only way in which an economy can return to equilibrium position and adjust to any excess (shortage) of money stock is through the balance of payments. When the exchange rate system is not fixed the adjustment process is followed by an exchange rate change since the economy is insulated from the monetary developments in foreign markets. Under a flexible, or managed exchange rate any excess of money stock is solved through an increase in domestic prices, stabilising the original differential between the acceleration of prices in both domestic and world markets. Below I develop a simplified model of the balance of payments under the monetary approach[18] where the basic theoretical framework and the testable hypothesis are derived. It is known that the balance of payments of a given country includes its trade account, capital account and financial (money account), and that these components have their corresponding counterparts in the commodity market, bond markets and money markets.

Because of the overall budget constraint of the domestic economy, disequilibrium in the goods market and assets market is captured by a stock adjustment (equilibrium) in the money market. Eventually changes in all other markets are reflected in the money market. The monetary approach deals with the behavioural functions of the money market (although the analysis can be extended to the more general asset market (including non-monetary financial assets).

For simplicity of exposition we will specify the pure money market, although we do have domestic and foreign bonds in the model, where money and bonds add to wealth. Two important blocks emerge from the monetary approach. They are, a stable function of demand for money and the money stock process. Here we encompass the usual assumption for a small open economy with fixed exchange rate regime. The equilibrium will be defined as the interaction between the two blocks and together they determine the overall balance of payments, which represent the foreign exchange market equilibrium in regard to domestic country foreign assets (international reserves). So, the determinants of the demand and supply of money are the determinants of the foreign exchange position of the domestic country. Therefore, since variations in the international reserve stock are the same as the net balance of payments, the latter is determined by the variables explaining the international reserves. The demand for real money explains why the nominal money balances (money demand) is homogeneous of degree one in its price level. On the other hand the money stock process appears to be the product of the money multiplier and the high power money of the domestic country. The latter is the sum of their domestic components and the stock of international reserves.

Let Md be the nominal money balance, P be the price level, Y the real income, id the domestic rate of interest, on the money multiplier, DC the domestic component of money base, IR the foreign international reserves and MB the money base. Then the basic structure of the model is:[19]

$$Md/P = L(y, i_d) \qquad P = ex\ Pf \qquad (3.42)$$

$$MS = m(IR+DC) \qquad IR = (Md-Ms)/e \qquad (3.43)$$

$$MS = Md = M \qquad W = \dot{m} + \dot{B}d + \dot{B}f \qquad (3.44)$$

$$IR = BOP \qquad (Bd = f(id, if)W;$$

$$Bf = f(i_d, if)W \qquad (3.45)$$

Equation (1) is the real money demand, (2) is the money supply process and (3) is the money market equilibrium: so the equilibrium W is wealth (financial), Bd domestic bonds and Bf foreign bonds, if, foreign interest rate.

$$m(IR + DC) = L(Y, i_d)P \qquad (3.46)$$

In the market the equilibrium condition given in equation (7) is used to arrive at the reduced form solution for IR.

$$\text{So, } IR = \frac{L(T, i_d)P}{m} - DC \qquad (3.47)$$

The above expression which is derived from the equilibrium condition in the money market, is theoretically valid if the other variables in the model are exogenously given.[20] Money multiplier which is constant and the domestic credit (DC) are regarded as policy variables. With respect to interest rate and domestic prices, their long run steady state values are equivalent to those abroad. Prices are governed in the long run by the law of one price, and interest rates reflect perfect capital mobility. Although the above expression is an equilibrium relationship it is clear that it is not an accounting identity, so we can infer causality from the right to left hand side. Thus the stock of international reserve is determined by those variables that affect the money stock adjustment process (disequilibria), i.e : P, Y, m, id and DC.

One important aspect of the above relationship (1-8) is that monetary authorities cannot hold sterilisation policies. The monetary approach also incorporates the transaction given by capital account. Since IR or BOP are the sum of both current and capital account, the latter is embodied in the assumption of perfect substitution between domestic and foreign assets. In other words:

$$\frac{\dot{B}d}{i_d} = -\frac{\dot{B}f}{i_f} \quad \text{if} \qquad (3.48)$$

This transforms our money demand function to be

$$M = f(id, if, Y) \qquad (3.49)$$

where id=if, so the original specification holds. From the above system it emerges that if demand for money increases, the stock of the international reserves (IR) will increase, and the money markets remain unchanged,ceteris paritus. It follows that a capital inflow is set in to compensate money markets. On the other hand if we enforce a monetary expansion where DC/B =-1, for a given interest rate the demand for the foreign bonds increases, implying that the increase in domestic credit will see an equivalent increase in foreign bonds held by domestic residents. BF/DC = 1, so Bf = DC, where Bf is foreign bonds held by domestic residents. Given the interest rate, increases in DC by one unit lead to an increase of the stock of foreign assets (Bf) by one unit. See DeGrowe (1983, p 235).

The net effect of such expansion in the stock of money is given by an interest rate adjustment. Once the economy achieves a new equilibrium capital stops flowing. The fall in international reserves is translated into an accumulation of foreign bonds.[21]

There are other aspects which could be incorporated in the model. These correspond to a monetary expansion caused by an increase in outside money, coming from a budget deficit financing. In these circumstances the domestic components of money supply increase. No other financial assets (bonds) are affected initially. As wealth (net) is increased we expect an increase in the demand for other assets both domestic and foreign. The same is expected with respect to money demand as money demand increases due to the wealth effect. So

$$\frac{\dot{IR}}{\dot{DC}} = \frac{\dot{B}_f}{\dot{DC}} \qquad (3.50)$$

$$dIR = -dBf \quad \text{and} \quad IR = -Bf \text{ (foreign asset accumulation)} \qquad (3.51)$$

$$\text{or} \quad \frac{\dot{IR}}{B_f} = -1 \qquad (3.52)$$

If a policy of open market operation is enforced by buying domestic bonds the minus sign (-1) implies that the initial money expansion is completely offset by a decrease in the stock of international reserves. This does not allow monetary authorities to affect the equilibrium in the money supply process, since any attempt to increase (decrease) the domestic part of the money is fully compensated by a capital outflow (inflow). We may point out that the above analysis is long-run in essence, since interest rate is assumed to be equal to its world counterpart. One of the preliminary conclusions is that perfect substitutability between assets is needed, otherwise monetary expansion will force domestic residents to accumulate domestic bonds in addition to the foreign ones. These circumstances will reiforce a slowdown in the international reserve outflows. So any attempt by the monetary authorities to eliminate the international reserve flow should be accompanied by a rise in interest rate. These elements introduced by De Growe (op cit) make him include the bonds market, as done above.

But what is general and lies at the focus point of the MABOP is that every monetary expansion is to a large extent compensated by a deficit in the balance of trade of the balance of payment causing a respective fall in the stock of international reserves.

These two aspects can be further analysed by incorporating into our discussion the alternative budget deficit financing procedure: money and/or bond finance. This complicates the model enough but it does not alter the main proposition of the MABOP, that the balance of payments is essentially a monetary phenomenon. If foreign bonds are brought into the analysis at given interest rates, the holding for foreign bonds (Bf) decreases by the same amount as domestic bonds (Bd) increase. This important MABOP proposition implies that shocks are originated in other markets and they affect the balance of payments and the stock of international reserves if there is a variation in the demand for money balances (real). In the case of bond financing of budget deficit the implied wealth effect will affect the demand for money positively.

A final aspect to consider here is the scope for sterilisation and the role of the monetary authorities. The above analysis assumed that monetary authorities do not engage in sterilisation policies. We now relax this assumption, as it might be a more realistic situation. By imposing a compensation policy addressed to offset the monetary effects due to increases (decreases) in international reserves the authorities rely on the adoption of a reaction function, thus assume that $DC = -\emptyset IR = X^*$ where $\emptyset$ is the sterilisation parameter and X^* is any preannounced objective.

When $\varphi = 1$ we get $DC = \quad IR + X^*$, in this case the sterilisation is complete, thus

$$\dot{DC} = \gamma\dot{IR} + \dot{X}^* \tag{3.53}$$

The sterilisation policy compels monetary authorities to increase (decrease) domestic credit (DC) to offset outflows (inflows), since

$$\dot{Ms} = \dot{DC} + \dot{IR} \tag{3.54}$$

$$\dot{IR} = \dot{MS} - \dot{DC} \tag{3.55}$$

The sterilisation process, when $\gamma = 1$ is explained as follows.

By using $\dot{DC} = \gamma\dot{IR} + \dot{DC}$ as above (3.56)

$$\dot{X}^* = \dot{DC} + \gamma\dot{IR} \tag{3.57}$$

Since the sterilisation is complete

$$\dot{X}^* = \dot{DC} + \dot{IR} \tag{3.58}$$

which results in $\dot{MS} = \dot{X}^*$ (3.59)

The conclusion is that changes in the domestic money stock are independent of the balance of payments and are only determined by the domestic objective if sterilisation is complete. The above result does not hold under the MABOP, since it does not recognise sterilisation policies. The reason why we brought in the above result is to present one extreme case against another, such as complete sterilisation against no sterilisation at all.

Treating the system above as if only one asset exists, (i.e, money) in order to keep the analysis manageable, we present the derivation of the reduced form equation common to all versions of the MABOP.

One way of presenting the reduced form equation in an empirically estimable form is to take a logarithmic transformation of equation (7) and then totally differentiate to yield the following results:

$$\frac{IR}{IR+DG}\, d \log IR = \partial \log P + \frac{\partial \log L(y,id)}{\partial \log Y} + \frac{\partial \log L(y,id)}{\partial \log id} \qquad (3.60)$$

$$= d \log M - \left(1 - \frac{IR}{IR+DC}\right) d \log DC \qquad (3.61)$$

Adding an error term to the above expression for estimation purposes, this gives the stochastic estimable equation:

$$Ad \log IR = \varphi_0 + \varphi_1 d \log P_t + \varphi_2 d \log Y_t + \varphi_3 d \log i_d$$
$$+ \varphi_4 d \log M_t + \varphi_5 (1-A) d \log DC_t + u_t \qquad (3.62)$$

Such expression is known as the reserve flow equation of the MABOP where the respective parameter for the explicit right hand side variables are: prices, income and interest elasticity of the demand for money, where the coefficients in the money multiplier and on domestic credit could be called the offset coefficients, due to changes in the money multiplier and domestic credit.

The implied restrictions of the monetary approach in the expression above are the following:

$\varphi_1 = 1$ price homogeneity which is governed in the long run by the law of one price

$$\varphi_2 = \frac{\partial \log (y,id)}{\partial \log Y}, \quad \varphi_4 = \varphi_5 = -1 \text{ offset coefficient} \qquad (3.63)$$

$$\varphi_3 = \frac{\partial \log (Y, id)}{\partial id}$$

For the empirical test of the MABOP we have to assess the following assumptions: firstly, the statistic estimation should validate the theoretical values, and secondly, the estimates of income and interest elasticities in the equation above give estimates of income elasticity and interest elasticity of the demand for money balances. The above implies that a stable, well specified demand for money should give exact elasticities as for the expression above.[22]

Another MABOP result which is drawn from the expression above is that any balance of payments surplus (deficit) indicated by $\frac{IR}{IR+DC}$ reflects stock disequilibrium between the demand and supply for money.[23] So any excess supply of money due to an increase in domestic credit (DC) will produce a deficit in the balance of payments,[24] since that increase will exacerbate aggregate demand for commodities and financial assets. So the outflows will spill over into foreign markets through the current account (goods) and capital account (financial assets).

The "reserve flow equation" outlined is the reduced form from which the MABOP should be tested,it implies the restriction of $\emptyset_4 = \emptyset_5 = -1$, that is, no sterilisation policies are enforced.

One of the basic assumptions of the MABOP is the assumption of exogeneity of the domestic credit component of high powered money, since it is assumed that monetary authorities do not engage in sterilisation policies which could offset the stock of money due to foreign exchange inflows, or an increase in international reserves. Indeed sterilisation means that there a policy objective that will keep money stock constant by incorporating into the money what is withdrawn through a balance of payments deficit, and conversely, by withdrawing money following a balance of payments surplus. See Turnovsky (1981, p 206). Sterilisation can be administered by open market operation and/or through reserve requirement policies. If no sterilisation is done changes in DC cause a similar change in IR with opposite sign.

The relevant question here is to test the assumption of exogenity of the domestic credit, so simultaneous problems arise if we cannot prove the exogenity issue. Several authors have attacked this exogenity issue by employing the Granger Causality Test, which turns out to be a test of exogenity. See Kreinning and Officir (1978 p 50).

Alternatively a simultaneous estimation requires the incorporation of a new equation for the domestic credit variable, which has been called the reaction function of monetary authorities and which could appear as

$$1 - \frac{IR}{IR+DC} \, d \log DC_t = \varphi d \log IR_t + \varphi_2 d \log GC_t + u_t \qquad (3.64)$$

where GC is central bank's net claim on government. Thus we have a two equation model in which the simultaneity issue vanishes. We will turn to this issue later. The MABOP requires that changes per period of the variables in the "reserve flow equation" are those which keep the equilibrium condition.

However, since the money market is not the only one in disequilibrium, there could be disequilibria in other markets which could operate in such a way as to induce change in international reserves. We may have a situation in which balance of payments causes disequilibrium in other markets as well. Miller (1979) and Darby (1983) mention these possibilities, Johnson (1976) makes a similar suggestion in which, for example, the MABOP could be applicable to conditions of price and wage rigidities. In the short-run it is expected that the law of one price does not hold due to the existence of non-traded goods. In such situations world prices effects are incorporated into domestic price level. Thus we have price which adjusts to world prices effects and accordingly to money stock adjustment as the demand for real money balances is affected. The effect on money demand will spill over money stock as the composition of the monetary base changes. However it is still not clear why the general equilibrium values of the money demands determinants, prices, income and interest rate are going to be predictable. Such degree of uncertainty is removed by assuming price flexibility and long run money neutrality and the law of one price already mentioned above. The exogenity of income and prices are accordingly the dominant assumptions in the MABOP literature. Income is exogenous if one assumes a classical world in which all prices are flexible and output is constant at full employment .

Before turning to criticism of the MABOP a review of the existing empirical works on MABOP is given below. Firstly we discuss some of the most important findings on the MABOP regarding developed countries' experiences and secondly we draw attention to parts of particular interest in the empirical tests of the MABOP using data for less developed economies in general and for Latin-American economies in particular. The review is not intended to be exhaustive but a select number of empirical studies can help us to discuss the validity of MABOP in the real world.

Several important contributions were made in the late 1950s, Polak (1957), Hahn (1959), Kemp (1970) and Patinkin (1956) inter alia dealt with the relevance of the monetary approach (early stages) to the theory of devaluation and to the effects of financial controls on the balance of payments position. The pioneer work began with Patinkin's approach in analysing balance of payments problems with emphasis on monetary theory. Mundell's (1962) contribution began with the submission of his thesis of fiscal and monetary mix in a closed economy where capital mobility interacts with the domestic monetary policy required to switch from interest rate policy to policies affecting directly the volume of domestic credit. In a later paper, Mundell (1968) extended his approach to study the dynamics of the monetary and fiscal mix. This work assumes that the country is, in effect, small and open and has no credit market. Mundell's discussion of his propositions is extended to the effects of devaluation, income transfers, budget deficits and reserve hoardings. Wealth is divided between real and financial and no market for bonds exists. Input prices are exogenous. Mundell's model is of a general equilibrium type in which the following conditions are satisfied: first, the stock of money should be equal to the demand for money; second, the BOP is in equilibrium and; thirdly, goods market are in equilibrium. So a knowledge of two markets will give the remainder market, simply because the excess demand function is the sum of liquidity and the balance of payments schedule. Mundell's equilibrium depends on the state of the three markets. One of the Mundell conclusions is that in particular in less developing economies his model could be relevant since it gives insight into the adjustment process to correct recurrent balance of payments disequilibria. This model is generalised in order to be applicable to different exchange rate regimes. Three markets exist in Mundell's world: commodities, money and foreign exchange markets.

These generalisations provide the basis for the general equilibrium framework within which balance of payments can be analysed irrespectively which exchange rate regime is in force. Mundell's conclusions have unequivocally formed the basis for the contemporaneous monetary approach for the balance of payments: actual surpluses (deficits) in the balance of payments correspond to changes in the money supply and conversely. Equilibrium is restored once the money stock adjustment process ends. Dornbush and Swoboda (1973) dealt with the same general equilibrium framework but this time other markets are brought in, i.e, goods and bonds markets. They conclude that a perfect capital mobility is not a necessary condition to validate Mundell's results.

But it was Johnson (1971) who first presented an empirical model using his monetary theory and investigating the influence of domestic credit policy on the overall balance of payments. Johnson works under conditions of pegged exchange rate where people instantaneously adjust their actual money balances. He assumes as well complete substitutability between commodities; constant world prices and homogeneous money demand are also assumed in Johnson's model.

Later in 1976 Johnson develops a model where demand for money is homogeneous of degree one in price and it is determined by real output and interest rate. Furthermore, money stock is composed of domestic component (DC) plus international reserves (MS = DC +IR), in addition he assumes that since the money market is in equilibrium (must be), international reserves are given by IR = MS - DC therefore IR = Md - DC. It follows that the reduced form equation obtained by Johnson relates international reserves to the underlying variables affecting the money demand and its elasticities.

Thus the growth in international reserves is related positively to income elasticity and negatively to the rate of domestic credit expansion. The underlying assumptions of flexible prices and perfect capital mobility (asset substitutability) require that world prices and interest rates are constant. Frenkel (1976) extended Johnson's analysis by introducing dynamics in a model of accumulation, where the main weight is on the decomposition of the balance of payments into trade balance, service balance, capital account and money balance. He integrates monetary (financial) and real sectors in both production and consumption expenditures, where the objective was to investigate the output growth effect on the monetary sector which underlies the balance of payments equilibria and disequilibria.

Dornbusch's (1971) contribution consists of developing a general equilibrium model with the introduction of commodities and bonds markets; by relaxing the assumption of perfect capital mobility ,he concludes that the monetary approach remains valid. In a later paper, Dornbusch (1973) he considers the concept that devaluation is in fact a monetary phenomenon and concludes that if the real money balances effect on expenditure is small enough following a depreciation of the rate of exchange, the impact of this depreciation is not significant.

Finally, Mussa (1976) enhanced the monetary aspects of balance of payments by considering the long-run consequences of policy changes. He emphasises the roles of money demand and supply of money in the analysis of balance of payments.

In the context of less developed economies some empirical tests on the MABOP are reviewed. A substantial number of empirical studies have found support and to some extent have validated the MABOP. Note that even though the theoretical framework is the same as above, some modifications are introduced in the empirical tests. Horberguer's (1963) pioneer work where he investigates the Chilean inflation utilises a quantity theory framework in which the inflation rate is caused by money supply, real income and past values of inflation. He draws the conclusion that inflation is a monetary phenomenon and that money variables play an important (decisive) role in explaining acceleration in the inflation rates.

Vogel (1971) in his study about inflation in some Latin-American countries extended Harberguer's model and concluded that monetary variables are the definitive causes of accelerating inflation. As Harberguer/Vogel used a reduced form equation they assumed that the money supply process is exogenously determined and that income is as well exogenous and reflects the interaction between money and real income which should be found in the money demand function implicitly defined in his reduced form model.

Using Korean data, Otani and Park (1976) developed a model in which money supply and income are exogenous variables. They recognised the interaction between money and real income. The investigations they carried out relates money to price determination as well as to real income and balance of payments. Their model is a careful design where the assumptions of the MABOP are embodied. Money plays the central role in explaining the other macroeconomic variables. They incorporated some new developments in the theory of MABOP by investigating the MABOP in the short run, contrary to the standard approach. In their model prices and income are not determined outside the system but endogenous. Money supply is exogenous and interest rate is governed by foreign interest rate. They go further by examining the effects of monetary,fiscal and exchange rate policies on the balance of payments. The specified long run demand for money is the function of real income, interest rate and expected rate of inflation, as in Harberguer (op cit) where a reduced form approach is estimated in addition to an inflation equation with money stock stock changes, real income an interest rate as determinants.

Conolly and Taylor (1975) have successfully tested the validity of MABOP for the less developed economies. Their hypothesis is that exchange rate depreciation in less developed economies improves the balance of payment position if, and only if, no active monetary policy is taken when expanding the domestic component of the money base. Assuming that the demand for money function is stable, which is not tested, prices and permanent income are the money demand arguments. Their model presents money in equilibrium, and income is independent of exchange rate depreciation.Although they assume a fixed exchange rate regime in the first instance they continuously devaluate the exchange rate to examine its effects. On the other hand any expansions of domestic credit has a proportionally adverse effect on the balance of payments.

Their empirical work relates the changes in the balance of payments as a function of the growth rate of permanent income , exchange rate changes and domestic credit growth.The estimated equation is

$$\Delta \frac{BOP}{M} = (1+g) \frac{\Delta e}{e} + \frac{\Delta DC}{M} \qquad (3.65)$$

or in other terms $\Delta(\frac{BOP}{M}) = \varphi_0 + \varphi_1(1+g)\,\frac{\Delta e}{e} + \varphi_2\Delta\,(\frac{DC}{M})$ (3.66)

The co-efficient on the growth rate of domestic credit should be -1 in order to validate the MABOP assumptions. Although they are not minus one (they are -0.767 and -0.82) it follows that the MABOP test is inconclusive. Their conclusions, although econometrically doubtful, are that in most countries the slow down of the domestic credit expansions have produced balance of payments improvement. In their study they dispute Cooper's (1971) findings that there is no correlation between changes in domestic credit and improvement in the balance of payments. An important aspect of their empirical work is the confirmation of the monetary proposition that devaluation could improve the balance of payments disequilibria if an increased demand for money follows but no domestic expansion happens. In the context of a flexible exchange rate regime Fry (1978) studies the determinants of exchange rate in Afghanistan. He incorporated into the analysis a demand for money function (long run) which is determined by permanent income and interest rate. A short-run demand for money is specified under the assumption that the power purchasing parity holds. His estimated exchange rate equation depends on money, world prices and permanent income. Applying straight econometrics he found validity for his apriory restrictions.

In another study Wilford and Wilford (1978) applied the MABOP to a study of Honduras' balance of payments. They concluded that a stable exchange rate policy is conditio sine quanon to test the validity of the MABOP. Their result is similar to others when reporting the validity of MABOP assumptions. Interest rate is found to be not statistically significant.

Miller and Askin (1976) in a study of policy and the balance of payments in Brazil and Chile investigated the extent to which the balance of payments affected the ability of monetary authorities to exercise control on money supply. Precisely, they have investigated to what extent changes in the domestic credit are compensated by balance of payments disequilibria. Their monetary model included a central bank reaction function. Unlike other MABOP applications they have explicitly treated the simultaneity issue between money and income by incorporating equations representing equilibrium in the commodities market and in the money markets.

The monetary authorities' reaction function is specified by relating the domestic component of the monetary base to real income and international reserves, plus a time trend. The implied coefficient in IR is the sterilisation coefficient and it is expected to be negative. They have derived a estimable reduced form equation in which the casual relationship between money and income is implicit, even though money does not appear explicitly in their model. However, it is the monetary authorities' reaction function which is the endogenous variable. The equation for the demand of international reserves is expressed as a function of real income, of the domestic component of high powered money and of the exchange rate.

The MABOP assumptions were not confirmed with respect to monetary policy. There is no evidence however for counter cyclical monetary policy. The sterilisation co-efficient is different from (-1) indicating that sterilisation policies are carried out to sterilise the impact of international reserve on the balance of payments. Aghevly (1977) developed a model for Indonesia. He incorporated the government budget constraint in addition to real money balances, supply of money and balance of payments. In his study about the monetary approach to the Venezuelan balance of payments Khan (1976) found that Venezuela exhibited a free trade policy and free capital mobility. Similarly he confirms the basic assumptions of the MABOP.

In a short, in all these empirical tests of the monetary approach the basic features of MABOP are confirmed. Note that in most of these works the econometric methodology used to confirm a priori hypothesis appears doubtful ,however it is not our main task to consider these issues in this thesis. The common feature of these tests are the direct links between money and prices,however causality links have not been tested in advance which could invalidate apriory test of the MABOP when deriving the estimable equation. See Kamas (1985, 1986) for a contribution along the lines of this criticism.

Kamas (1985) (1986) (1986) carried out empirical tests for the monetary and Keynesian approach using Colombia, Mexico and Venezuela data. No confirmation of the broad monetary approach was found in the Colombia case. She found that the short-run offset coefficient differed largely from minus one and contrary to assumptions the offsetting works through current account rather than through the capital account[25].

In the long run, the monetary authorities sterilise a large portion of reserve flows. Monetary policy is effective and sterilisation of reserve flows is completed.

In a later work Kamas(1986) carried out tests for both Keynesian and monetary approaches to balance of payments. Using Mexican data she found a positive offset coefficient indicating that monetary expansion results in higher international reserves. Other tests carried out using Mexican data have given negative sterilisation coefficient. See Blejer (1977), Gomez Oliver (1976) and Wilford and Feder (1979). Note that a positive offset coefficient could reveal that monetary authorities have been successful in blocking the offsetting of monetary policies through trade policies or through foreign borrowing to counteract potential reserve losses. See Kamas(op cit p. 476).

Using Venezuelan data she found some support for the monetarist propositions. The offset coefficients are significantly different from minus one but large in size, similar results are found using a portfolio model, very close to the monetary model. The author develops a Keynesian and a portfolio model with similar results.In both cases she confirms Frankel and others (1980) findings that in monetary models the offset coefficient is biased toward minus one. Accordingly with the available empirical evidence it can be said that there is not a conclusive result for the applications of MABOP to less developed economies.This contrasts with the results obtained using data for industrialised countries.We could aggregate the factors which lead to such conflicting results into two categories; first, capital mobility and perfect assets substitutability are not common factors in less developed economies, so interest rate is pegged enforcing capital markets to be fragmented. Secondly domestic credit policies are in most cases related to the availability of funds breaking down the the links between domestic and foreign markets.

3.5 CRITICISMS OF THE MONETARY APPROACH TO BALANCE OF PAYMENTS

The adjustment process of the balance of payments is dynamic in nature even in the classical analysis of the price-specie-flow mechanism. However the contemporaneous monetary approach and both the elasticity and absorption approach have been in general static and the adjustment process has rarely been discussed in a dynamic context.

The most common features in these studies is that in general they are concerned with the balance of payment adjustment process but ignore the implications of the government budget constraint. The exceptions are Currie (1976, 1978), Turnovsky (1977), and Miller (1977) which incorporate explicitly into the analysis the government budget constraint. In particular, Currie (1976,, 1978) makes a strong criticism of the long run validity of some of the MABOP propositions. He showed that when the government budget constraint is incorporated in the analysis the conventional results of the monetary models are not correct.

On the other hand, in respect to the adjustment process of the balance of payments among the most important issues found in the BOP literature are the following: first, the assignment problem of fiscal and monetary policies and its effectiveness in both short and long run; second, the effects of devaluation, tariffs, barriers and other instruments for balance of payments correction; and third the questions of economic growth and its association with balance of payment disequilibria, namely, deficit or surplus.

The MABOP by treating the balance of payments as a "monetary phenomenon" analyses the balance of payments in terms of the interaction between the demand and supply of money. Such framework makes the MABOP to consider that non-monetary instruments for balance of payments correction such as devaluation, tariffs and others could affect the balance of payments only in the shortrun since in the long run those instruments lose their effectiveness.

Currie (1976,1978) outlines the main criticisms ofthe MABOP with respect to the use of non-monetary instruments for balance of payments correction and the long run steady state. The MABOP regards the process which follows the asset adjustment as flows required to finance a balance of payment deficit (surplus). This assumption in Currie's words "suggests a different mechanism whereby the effects of such policies as devaluation or import controls may be eroded in the long run ...".See Currie (1976) p 508. What is at the centre of Currie's argument is to demonstrate that the non-monetary policies for balance of payments correction such as devaluation have permanent effect. The starting point in Currie's criticisms of MABOP is the static character that the MABOP exhibits, although he retains the non-growing economy assumption implicit in its analysis of balance of payment correction. The second aspect is the criticism of no recognition of the government budget constraint. This omission has led the MABOP to ignore the fact that sterilisation could be affected if governments run a budget deficit (surplus) which needless to say could not alter private sector stock equilibrium.

By retaining the assumption of a non growing economy he demonstrated that when the government budget constraint is explicitly incorporated in the model, non-monetary policies of balance of payments corrections can be effective in the steady state equilibrium, arguing that a government budget deficit (surplus) matched by a balance of payments deficit (surplus) need not disturb private sector portfolio equilibrium, so that there is a need for a balanced balance of payments in the long run.

Another aspect in Currie's criticism is the general feature of MABOP of ignoring the long run effects of fiscal policies and other absorption policies. Currie demonstrated that in conditions of underemployment, policies such as expenditure switch (due to fiscal policy), quotas and tariffs do have permanent effect on the balance of payment. Finally he showed that once the government budget constraint is recognised it becomes clear that domestic credit is affected directly and indirectly by non monetary factors (policies) such as fiscal policies and tax changes. As a result the domestic credit should be endogenised since it changes due to discretion policies, apart from being affected in the long-run by changes in the real variables.

3.5.1 Conclusions.

The above sections encompass a comprenhesive review of the different approaches on the balance of payments: the elasticity, absorption and monetary approaches.

Since the abolition of the Bretton Wood's agreement in the early seventies, the balance of payment problems have been exacerbated by the difficulties of the fixed exchange rate regime to equilibrate the nations' payments accounts. In implementing their particular policy suggestions the classical (elasticity and absorption) approach and the MABOP have dealt with the contemporaneous economic problems providing a coherent body of theoretical and empirical validations to analyse the balance of payments in the context of transfer of flows and stock adjustment of partial and stock equilibrium.

The evolution and development of international monetary and payments issues dates back tothe classical works of Hume and Smith. They argued that there were automatic self-regulating mechanisms, the price-specie-flow mechanism which acts to bring about equilibrium in the nation's payments balance. In Hume's times this mechanism was framed by gold flows which in turn produce prices changes such as suggested by the underlying quantity theory of money. Such gold flow and prices changes brought about a balance of payments' self correcting mechanism, where that mechanism was the result of goods transactions only. In other words domestic prices vary according to the law of one price under the effects of disequilibrium between the demand and the stock of money (supply). These disequilibria produce changes in trade flows and affect the balance of payments (current account) and consequently alter the domestic money supply in the long-run.

The remergence of the classical monetary approach is due to the classical Keynesian inability to explain the balance of payments problems in the last 40 years. (Classical approaches, both elasticity and absorption, put emphasis on the trade flows (current account) and on the applications of non-monetary policies for balance of payments corrections).

Thus the application of exchange rate depreciation (appreciation) to improve competitiveness of the domestic economy and increase employment at home, has been the focus of advocates of the monetary approach and its partial equilibrium analysis. The influence of money and the increasing importance of the financial sector made the general equilibrium approach appear a variable theoretical tool with which to investigate the whole complexities of payment imbalances, Mundel, Johnson, Mussa, Frankel, Dornsbusch inter alia have re-elaborated the classical Humean theoretic propositions and present a new body of propositions termed the MABOP. The emphasis was put not on the relative price changes but on the direct influence of the excess demand for or supply of money on the balance between income and expenditure.

In a more general setting the theoretical propositions emphasise the balance between the adjustments in the portfolios (stock adjustment) whether through consumption and production or through lending and borrowing. Johnson (1972) (1977) when criticising the so-called Keynesian approach and its policy suggestions stated that such a view is particularly short-run and completely ignores the interaction between financial (monetary) stocks (money) and aggregate demand. Such bias shifted attention only to the elasticities conditions, but this time as a result of devaluation policies. It is then recognised that at least in the short-run these policies have important results as relative prices change. Lerner (1937) and Robinson (1937) stated accordingly with the underlying process mentioned above that the functioning of the gold standard requires that both elasticity of demand for imports and exports be greater than one in absolute terms. This is the Marshall-Lerner-Robinson conditions which are necessary for stability of the classical system.

In her seminal paper about the theory of foreign exchange Robinson (1937) explained that there are some conditions in which devaluation improves the payments balance (current account). If wage and price rigidity are valid assumptions devaluation of domestic money would change the tradeable prices, making them more competitive when estimated in foreign currency. The process of improving competitiveness would enhance substitution in importables and in consumption. The basic policy suggestions are straight: if underemployment (Keynesian) exists devaluation will increase output and employment, (substitution effects). Advocates of the elasticity and absorption approaches suggest that non-monetary policies could bring about equilibrium in the payments balances and could be used to increase domestic output.

By incorporating the monetary aspects, absorptionists extended the analysis to account for the effects of the so called foreign multiplier. (Alexander (1952, 1957) bases his analysis on arguing that equilibrium in the balance of payments does not depend only on the devaluation but as well on the increased (decreased) absorption relative to the production capacity (multiplier effects).

Accordingly the effect of an exchange rate depreciation is investigated in a framework in which income, prices and output changes are considered together with their effects on the balance of payment. This line of analysis in which the monetary factors matter next to the non-monetary factors is developed by Meade (1951) in his famous book about the economic policy and the balance of payments. Meade's economic policy view treat exchange rate depreciation as one of the policy instruments needed to restore internal and external balance The other instruments are money supply and interest rate and fiscal and monetary policies .

As mentioned above Johnson criticises Meade's integral approach as it is in essence of a partial equilibrium character. He follows by establishing his fundamental proposition that the balance of payments is a monetary phenomenon. Johnson developed his monetary propositions in a general equilibrium framework. The resulting portfolio adjustment framework implies that actual money balances (assets by extension) adjust to their desired level through an outflow (inflow) of money (assets) through the balance of payments. The concepts outlined above belong to the elasticities, absorption and monetary approach and give some indications about the historical development of the different approaches on balance of payments.

In a joint paper, Frankel, Gylfasson and Helliwell (1980) attempt to rebuild an integrated proportion for the study of balance of payments. They elaborate a synthesis of MABOP and the overall Keynesian approaches by amalgamating their interamoral differences to integrate both financial sector and real sector. The theoretical work is done by distinguishing between reduced form relationships and the relationships which emerge from money market equilibrium. According to the author such a distinction makes it possible to identify the relevant criteria embodied in their synthesis between Keynesian and monetary approaches.This idea provides the model we present in the next chapters to develop and carry out empirical analysis on the balance of payments.

Before we end this summary, I would like to highlight the theoretical predictions developed by the Frankel, Gylfasson and Helliwell (1980) synthesis. The explicit distinction between both approaches allows the authors to present a short-run model[26] in its simple form. The generalisation of both monetary and Keynesian approaches allow them to incorporate the identities and behaviour equations representative of each approach and accordingly endogenise income, interest rate and prices and include a simple aggregate supply. All links between income, prices and interest rate are then explicitly presented.

The 'final' model includes the following equations: (See Frankel and others p 588).

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$$IR_K = P.TB\ 9Y,\ e/p) + KF(r) \qquad (3.67)$$
$$M = Md\ (P,Y,i_d) \qquad (3.68)$$
$$MS = Md - M \qquad (3.69)$$
$$M = m\ (DC + IR) \qquad (3.70)$$
$$\dot{IR}m = \dot{M}d(Y,P,i_d)/m - \dot{D}C \qquad (3.71)$$
$$Y = E(Y,i_d) + G + TB(Y,e/p) \qquad (3.72)$$
$$Y = Y(P) \qquad (3.73)$$

Where Y,r,P,IR,M are endogenous and the control variable is G which represents fiscal policy, DC represents monetary policy and e is the exchange rate. According to the procedure used to integrate both "partial approaches", both monetary and Keynesian are special cases of this integrated more general model.

To validate this generalisation the following assumptions are hypothesised: first capital markets are fully integrated or goods markets are integrated between countries; secondly, by fixing output with full employment the short-run results are the same as in the presented general model; thirdly, if a sterilisation policy is carried out, such as the partial Keynesian model assumes, monetary authorities could be exogenised by modifying domestic credit so the monetary assumptions of offsetting changes between DC and IR is accompanied; and fourthly, balance of payments deficit will be followed by decreasing input (output) and prices.

The main purpose of this section was to summarise the classical approaches and the monetary approach to balance of payments which allows us to draw some temporal and some terminal conclusions valid to be further developed in the next chapter, from both theoretical and empirical sides.

A further consideration of this comprehensive review of the literature has led me towards a more eclectic approach to our objective of modelling the balance of payments of a small open economy. The model I will use is similar to the one presented by Frankel and others (1980) in which the main criticisms of Currie (1976, 1978) are fully incorporated.

CHAPTER IV

Open economic macroeconomics and the balance of payment. The government budget constraint. Macroeconomic policies.

4.1 INTRODUCTION.

The material presented in this chapter is not intended to be directly linked to the contents of the last chapter in which different approaches to the analysis of balance of payments were surveyed. However, taken in sensu-structu it may be considered as being a natural extension, since the methodological framework is expanded to cover, although not exhaustively, the open economy macroeconomics where the balance of payments and its pace of adjustment play a major role. During the presentation below some assumptions have been taken as valid; firstly we work with an open, small economy in which it is assumed there are no feedback effects on the work economy. In the next chapter an empirical model along the theoretical lines highlighted in this chapter will be developed.

A macroeconomic equilibrium situation is recognised when monetary, financial, real domestic and foreign sectors clear simultaneously. In this regard, the Keynesian model assumes the open macroeconomics founded on the foreign multiplier. Factors coming from other sectors, such as monetary and/or financial sectors do not have a place in the extreme variant of these Keynesian models.

In dealing with an open macroeconomic equilibrium some of the assumptions of both elasticity and monetary approach need to be considered. Assuming that the exchange rate is fixed (managed pegged) we have a situation in which real, monetary and external sectors are integrated in the following system:[27]

$$Y = E(y, i_d, e) + X + G \quad \text{real sector} \quad \frac{\partial E}{\partial y} > 0;\ \frac{\partial E}{\partial i} < 0 \qquad (4.1)$$

$$M = Md(y, i_d, e) \quad \text{monetary sector} \quad \frac{\partial Md}{\partial y} > 0;\ \frac{\partial Md}{\partial i} < P \qquad (4.2)$$

$$BOP = X - M(y, i_d, e) + KF(id - if) \quad \text{external sector}$$

$$\text{where} \quad \frac{\partial M}{\partial X} > 0;\ \frac{\partial M}{\partial i_d} < 0;\ \frac{\partial M}{\partial e} > 0;\ \frac{\partial KE}{\partial (i_d - i_f)} > 0. \qquad (4.3)$$

?

In BOP exports are given since the exchange rate is fixed, and E which defines domestic aggregate demand is made to be dependent on income and interest rate in this simplified model. The balance of payment equation includes capital flows which are defined in a portfolio adjustment or stock-flows fashion. Equation ? is the conventional money demand in which money demand side is defined. Such models have to deal with the determinants of both current and capital account transactions on the balance of payments.

The above simple model embraces the well known Mundell and Fleming[28] model; the determination of the current account or trade balance is given by the level of marginal propensity to import $\frac{\partial M}{\partial Y}$ since a rise in income will drive the markets to an expansion in imports. If, on the other hand, the exchange rate depreciates, exports are increased and the net effect on current account will be positive. Our model above does have exchange rate equal to one, however the analysis can be carried out by defining a measure of real exchange rate as in Stevenson et al (1986).

The Mundell-Fleming model incorporates the capital account into the analysis. Capital flows depend on the differential between domestic interest rates and foreign interest rates. If the differential is positive we will witness capital inflows and otherwise. Such specifications of the capital flows have been criticised since they relate flows into the level of the differential interest rate. The argument is that capital flows owing to stock or portfolio balance adjustment. So capital flows are functions not of the levels of the differential but of the changes in the interest rates. See McGregor (1980) for a detailed account of this discussion.

On the other hand, variations in the current account and on the exchange rate change the domestic residents' wealth.[29] It is probable that wealth changes affect domestic prices owing to the exchange rate effects on domestic prices. If exchange rate is depreciated domestic prices rise because of the increased price of imports.[30] The character of fiscal and monetary policy and their internrelation have an important effect upon the acceleration of domestic prices. The remainder of the chapter is set out as follows. Section 2 discusses the opening of a close economy model under a fixed exchange rate regime. In Section 3 we discuss the expanded model to allow for assets markets and balance of payments. Section 4 incorporates the government budget constraint and wealth effects. Section 4 introduces the analytical model on which fiscal and monetary policy is exercised.Finally the chapter ends with a brief summary.

4.2 THE OPEN ECONOMY.

One of the major features of the Mundell-Fleming model is its assumption of fixed prices, since no significant effect was expected to be transmitted by exchange rate changes via import prices. Cuthbertson (1977) suggested the incorporation of a price expectation augmented Phillip's curve for salaries and a mark-up setting for prices which is likely to involve changes in output violating the neo-classical world of neutrality.[31]

In the framework of the Mundell-Fleming model the depreciation in the exchange rate improves the balance of payment if, and only if, the Marshal-Lerner-Robinson condition is fulfilled[32] since a process of expenditure switching is exercised. Exchange rate devaluations could have an expansion effect on domestic output if the export elasticity, (|x), is larger than zero and import elasticity (|n), less than zero, the latter implying that imports will increase if income rises. In the short run the improvement in the balance of payment will be compensated by the rise in imports. In the current account or in the balance of trade for simplicity, and, assuming that Marshall-Lerner-Robinson conditions are fulfilled, there will be an initial improvement since output and exports rise. Import increases in the second round and the equilibria could be restored in the short run.

On the capital account side - in this simple Mundell-Fleming model- capital flows occur owing to a stock adjustment process. There is, however, a flow theory which relates capital flows as a product of the levels in the interest rate (differential). The above statement is made on the grounds that the exchange rate is pegged, thus expectations are static.

The mentioned stock portfolio definition for capital flows recognises that capital flows in reaction to a change in the interest rate in the short run; once the portfolio equilibrium is restored capital stops flowing. When taking both current and capital transaction into the overall balance of payments surpluses will increase on international reserves and deficits represent a depletion in the stock of international reserves. Let us assume, for instance, an increase in the stock of international reserves caused by a large current account surplus, which was indeed an effect of a devaluation in the rate of exchange. As we know, larger output will drive imports upwards and eventually an equilibrium in the balance of payment will occur. The induced effect of an increase in the interest rate which, by reverting or strengthening the interest rate differential, will produce capital inflows, in turn will keep the balance of payment in equilibrium. The intensity of these flows will depend on the interest elasticity and on expected depreciation. Suppose that we start from an equilibrium position in the goods sector which is:

$Y = E + X$ where E is domestic aggregate demand as before and X are exports. (4.4)

This schedule is downward looking since increases in domestic aggregate demand (E) will increase income accordingly. Eventually the income increase depends crucially on the sizes of the elasticities, i.e. on the marginal propensity to expand. Usually this propensity is expected to be less than one in absolute value (< 1). The equilibrium could eventually be restored if interest rate decreases in order to accelerate increases in the domestic aggregate demand.

Looking at this process from the balance of payment side, increases in exports and, accordingly, in output will produce a balance of payments surplus on the input effect. Eventually imports driven by income will restore equilibrium and/or capital flows in, since interest rate decreases owing to an induced effect in the goods sector. Thus

$BOP = X - M(Y, i_d) = 0$ where exports can be defined as exogenous (from the demand side) or endogenous (from the supply side). (4.5)

If endogenous exports are affected by the competitive relation from exchange rate, domestic and foreign price, the schedule is upward looking, which reflects the fact that importables are income driven and capital flows (inflows) are wealth affected, owing to interest rates increases. Note that an increase in the interest rate, induced by the increased domestic aggregate demand will damage the import growth (in real terms) in the opposite direction of income increases.

From the above, it emerges that an optimal combination of both interest rate and income are the forces behind the restoration of balance of payments equilibrium[33] in which both current account and capital account add to zero.

Another market to be considered is the asset (money) sector which is usually represented by the demand for money. Assuming that the exchange rate regime is fixed, a surplus in the balance of payments causes an increase in international reserves and in the stock of money. This process which seems automatic, in fact depends on the assumptions about the mobility of capital. If capital mobility is not perfect, the monetary authorities can sterilise the 'new' money by exchanging bonds and money with the private sector. Sterilisation may happen as well if domestic credit is offset by the monetary authorities.

The grounds for a sterilisation of domestic money are rationalised when the macroeconomic policy is directed in order to guarantee both internal and external balance. In our framework of a Mundell Fleming model the monetary consequences of disequilibria in the balance of payments can be offset by sterilisation policies.

In the extreme case of perfect capital mobility sterilisation looks impossible since offsetting the increase in the money supply will cause an increase in interest rate and probable new money due to new capital inflows. Clearly this process could lead to instability. The other component of the money supply, the domestic credit, is endogenously determined since in a fixed exchange rate regime the money supply becomes endogenous because balance of payments disequilibria affect the total money stock.

Thus:

$$MS = DC + IR \quad \text{and} \tag{4.6}$$

$$\dot{MS} = \dot{DC} + \dot{IR} \tag{4.7}$$

The monetary sector of this Mundell-Fleming model is, for the sake of simplicity, represented by the demand for money.

$$Ms = Md \tag{4.8}$$

$$Md = f(Y, id) \tag{4.9}$$

where the partial derivatives are $\partial Md/\partial y > 0$ and $\partial Md/\partial id < 0$. So, the demand for money is an increasing function of income and a decreasing function of interest rate. The schedule is upward looking in order to ensure equilibrium in this market. As mentioned above balance of payments disequilibria (surplus) induce an increase in the money supply.

Figure 1 shows clearly that the increased money stock (A B), drives the BOP schedule into deficit as income grows from y, to Y_2 owing to a decrease in the domestic interest rates.

On the other hand a balance of payments deficit will decrease the money supply by the amount of the deficit. There are important implications from the above, since the approximate automatic adjustments mechanism may reproduce the neutrality proposition, because monetary policy does not have a long-run effect. It will only alter the composition between domestic credit and the international reserves. Another aspect which could be induced from the above mechanism is the well known assignment problem and its relation to the effectiveness of monetary policy in the long run.

Let us now examine in this simple model the interaction between the goods, monetary markets and the balance of payments. Assuming that we still work with a fixed exchange rate regime the money, as stated above, will vary accordingly to the balance of payments equilibria; if there is a surplus the money stock increases and if a deficit the opposite. This latter result emerges from the monetary approach to the balance of payments as perfect asset substitution exists and no sterilisation policies are enforced.

The equilibria of the three sectors' interaction happens when all three schedules converge and will depend on whether money is considered exogenous or endogenous. Equilibrium is eventually achieved once all three markets clear. At the equilibrium position we expect that domestic aggregate demand elasticities or propensities are less than one in absolute values; < |1|; and the import elasticity of marginal propensity to import is below a certain critical value.

To examine this important restriction, assume that the equilibrium in the real and financial (monetary sector) is achieved with an external balance disequilibria deficit. Relaxing the assumption of no sterilisation, as stated above, the disequilibrium in the balance of payments corrected will leave the money stock unchanged and the overall equilibrium will remain at its starting position.

If, on the other hand, no sterilisation is pursued the money stock will reduce moving the monetary schedule upwards and eventually increasing interest rate. The negative induced effects in domestic aggregate demand will lower income and accordingly reduce the balance of payments deficit, which could be compensated with 'new' capital inflows. If the deficit in the balance of payments worsens, the money schedule will continue its unstable upward movement and the interest rate will rise continuously and eventually the balance of payments deficit will be reduced to zero. At this point a new stable equilibrium is achieved between the three markets in our simplified Mundell-Fleming model.

From the above analysis it emerges that the domestic expenditure elasticities lie between 0 and 1, so income could increase, owing to an excess demand, and recursively aggregate demand will increase, owing to new rises in income. Thus the equilibrium is guaranteed if and only if the regarded elasticities are less than one. otherwise, the system explodes since it is totally unstable.

The second aspect which is related to dynamics towards equilibrium is the size of the import elasticity since it has to be around certain critical values. If the import elasticity (income) is larger than the critical value, the net effect will not produce the desired balance of payments equilibrium, and a deficit occurs. If the situation is one of balance of payments surplus, a high, larger than critical value, marginal propensity to import and the increased income will generate a lower interest rate with a net effect of a balance of payments equilibrium, or even a new deficit depending on the size of the income import elasticity. The key element is the dynamics adjustment process exercised by the stock of money. This adjustment process lies at the centre of the monetary approaches. It implies that an automatic mechanism disequilibrium is of flow nature, as the disequilibrium (deficit) in the balance of payments is produced by a goods and capital transaction. In other words:

$$\begin{aligned} & MS = DC + IR \\ \text{or}\quad & IR = MS - DC \qquad\qquad (4.10) \\ & \dot{IR} = \dot{MS} - \dot{DC} \end{aligned}$$

What emerges from the above is that the disequilibrium is not a product of flows transactions or a direct effect of excess demand for money but a product of excess demand for money on the interest rate - wealth effect, and through this into the goods and capital transaction. This view follows a portfolio approach which is different to the monetary approach and to the classical Keynesian approach.

4.2.1 Fiscal and monetary policies for internal and external balances.

In a system with a fixed exchange rate regime most balance of payment surpluses (deficits) that may occur may be a function of policies parameters; fiscal and monetary. Fiscal and monetary policies will affect prices and interest rates, however the rigidities in the rate of exchange the surpluses (deficits) generated, accumulated over time increase (reduce) the stock of international reserves. In this section we examine the mechanism through which both internal and external balance interact before fiscal and monetary policies. Equilibrium in an open, small economy requires that markets for goods, money and international reserves are in equilibrium. Our Mundell-Fleming model has assumed that the three schedules depend on the level of expenditure, its elasticities, the interest rate and the money supply adjustment process. Figure 2 shows the model in which the three schedules interact:

The curve IS depicts the locus of the interest rate (id) and income (y) in equilibrium (E) for goods market. The curve LM depicts the locus of interest rate and income which produces an equilibrium in the financial markets. The curve BB tracks the locus of interest rate and income which produce a balance of payment equilibrium.

Assuming that the economy is reduced to these schedules let's examine the effects of changes in the exchange rate as well as the effects of both fiscal and monetary policies.

The analysis is similar to the classical Keynesian Mundell-Fleming model where no government budget is recognised. In the next section the government budget constraint is fully recognised, as well as the induced wealth effects. Thus the analysis is similar to a text book model found in most open macroeconomic books. See inter alia Branson (1979), Gordon (1981) Artis (1983) abd Turnovsky (1977).

The first case to examine is the expansionary fiscal and monetary policies. In Figure 3 below we can see these effects are depicted. The interaction of the three schedules (1) states that there is a general equilibrium. An expansionary fiscal policy represented by a switch upwards of goods schedule (IS) will increase income from Y_1 to Y_2, accordingly interest rate rises to id2. Although money and goods schedules are in equilibrium (2) there is a balance of payment deficit. Retaining the assumption of no sterilisation policies the expansionary fiscal policy will produce a decrease in money and eventually re-establish the equilibrium around 3. If we now consider the expansionary monetary policies the money schedule shift leftward to LM_x. The increase in the stock of money reduces the interest rate and increases income to a new level. Since the BOP schedule is steeper than the money schedule, the net effect of a monetary policy is to produce a balance of payments deficit. Relaxing the assumption of sterilisation of balance of payment deficit implies that the money stock decreasesd shifting back the LM schedule from LM_2 to LM_1, with no apparent effects on income, interest rates or on the balance of payments.

As seen from the above it appears that neither fiscal nor monetary policies affect the balance of payments in the long-run, but only in the short run. Assuming a simplified model like this one the analysis is extended in some more detail to show the effects of fiscal and monetary policies. This ought to deal with the assignment problem due to a mix to achieve domestic and external balance.

By recognising the nature of the balance of payment constraint and the balance of payments objective the problem is seen to be the character of the management of the exogenous parameters which are available to achieve both internal and external equilibrium. (Artis (1987). One of the key results from the Mundell-Fleming model is the attempt to find a solution for a general equilibrium between internal and domestic balance in such a way that both equilibria are considered simultaneously. Our case here is with respect to the set of policies - excluding exchange rate policies - which are targeted to achieve the mentioned objective. It is worthwhile mentioning that we are still working on an extremely simplified (abstract) model and in it our ideal world does not consider other percentage policy measures, such as tariffs and exchange rate. There is an important aspect when considering internal and external balances which is related to the accounting flows in both current account and capital account. Equilibrium exists if current account deficit is matched with a capital account surplus. However there appears to be serious questioning for several reasons; see Stevenson and others (1987)[34] first, when there exists a current account deficit (surplus) the capital account position reflects domestic holders' wealth changes, which have in turn feedback effect, into the balance of payments. I will return to these effects later when the model incorporates the full stock equilibrium assumption from the portfolio approach.

As the regime in which we are operating is of a fixed exchange rate the problems of reaching internal and external equilibrium simultaneously constitutes one of the still unsolved questions of the macroeconomic theory.

Fiscal and monetary policies are the most favourable instruments to overcome macroeconomic disequilibria. These policies affect in different ways the relevant variables involved in both equilibria. Let us illustrate with the case of monetary policy which affects simultaneously the interest rate level and the capital flows, since interest rate changes according to the priorities of monetary policy. On the other hand fiscal policies, are known not to affect directly but through induced effects. Both instruments are different. However the relevant aspect is the optimal combination of both instruments when used to affect the disequilibria in both internal and external balance.

To depict the effects of fiscal and monetary policies the real sector should be augmented by adding government expenditure. This identifies fiscal policy with the management of government fiscal expenditures. On the other hand monetary policy is identified by the changes in the interest rate in our simple Mundell-Fleming model.

To start with, let us assume that our system is in equilibrium zero balance of payments (external equilibrium). Internal excess demand is related to internal disequilibria. The objective of our mixed policy is to achieve internal equilibria by holding the initial external balance and increasing domestic output (income). We carry out this exercise by increasing government expenditures due to an expansionary fiscal policy. The assignment problem is solved by means of monetary policy as interest rate is changed. Both schedules switch upwards to the right. This assignment problem consists in assigning to each policy one single target after instruments are weighted for the policy objective.

Institutional factors emerge as in most cases different bodies are in charge of fiscal and monetary policy. Gondolfo suggested treating this problem by "applying" Mundell's principle of effective market classification"[35] which signifies that each policy instrument should be used related to the objective upon which it has more relative influence. Related to the above aspect is the expected efficiency of both fiscal and monetary instruments in relation to the objective area and its feedback. Assume that we want to affect the external balance, for this, we use monetary policy as it has been widely suggested that it is more efficient when dealing with external balances disequilibria. In our simple model we will try this by changing the interest rate in order to correct a balance of payment disequilibrium. The interest rate change (monetary policy) will affect capital movement. Authors have suggested using monetary policies for external balance objective and fiscal policy for internal balance targets. Similarly, and starting with a balance of payments deficit, assume that an increase in income due to an expansionary fiscal policy will increase imports -The effect depending on the size of the imports elasticities (marginal propensity) - as a consequence, balance of payments deficit is likely to increase. The explanatory motion of accelerating could be dampened by the enforcing of a tight monetary policy. The objective is to lower the pace of growing output which eventually will drive the balance of payments deficit to zero. As the interest rate has been used as instrument (increase) capital flows in. There is a net result which needs to be examined since policies which have the objective of solving the external balance could not keep income growing. On the other hand conflicts may arise, since monetary policy is exercised to reduce the balance of payments deficit by holding income. The same example above could be inverted and the result will be totally symetrical if the target is holding an equilibrium in the balance of payment at any cost.

Several authors have criticised the plausibility and the effectiveness of the assignments problem in optimal mix, as the effects are only short-term, see Tsiang (1975), Gondolfo (1980), M von Newman (1970). One of the major criticisms of the optimal mix policy is related to the expected effects of monetary shock, as interest rate changes on the capital mobility and on the real sector.

Frequently interest rate effects on the mobility of capital are considered of short-run nature, as they occur through a process of international reserves movements due to foreign exchange transactions. Particularly since interest rate effects on capital movements are mainly addressed to correct short-term (speculative) imbalances in the balance of payments; the main implication is that such policy cannot be used when we fact so called structural imbalances, and monetary policy is not able to affect such structural disequilibria. The most prominent case of such structural disequilibrium is a prolonged deficit in the external balance. Pronounced deficits in the balance of payments are expected to produce currency depreciation, so interest rate change may not be effective since economic agents anticipate it and devaluation occurs dampening the effects of interest rate change. The second aspect which is related to the above is the stock adjustment practise of economic agents' portfolio; before policies of interest rate changes. Interest rate change will only have limited effect as it attacks the flow adjustment (very short-run nature) and not the stock of assets of portfolio adjustment.[36]

To represent more formally the above theoretical abstractions about the effectiveness of fiscal and monetary policy mix, we reduce our model to two equations. Let us, for convenience, rewrite our simplified model:

$$Y - E(Y,id) + X + G = 0 \qquad (4.11)$$

$$BOP - X - M(Y,id) + eKF(i_d) = 0 \qquad (4.12)$$

We have left exports exogenous for simplicity. There are two objective variables, income (Y) and the balance of payments (BOP) and two potential instruments for both fiscal (G) and monetary policy (id).
The implicit function theorem allows us to express both instruments variables in terms of the mentioned objective variables

$$G = G(YmBOP); \quad id = id\ (Y,BOP) \qquad (4.13)$$

the Jacobian is $J = \begin{vmatrix} -1 & \partial Y/\partial i_d \\ 0 & [(\partial M/\partial i_d)-(\partial KF/\partial i_d)] \end{vmatrix} \neq 0$

$$J = \partial M/\partial i_d + \partial KF/\partial i_d = \partial KF/\partial I_d - \partial M/\partial i_d \qquad (4.14)$$

which means there is no functional dependence, that is, there are direct effects of the interest rate on the balance of payments.

The effectiveness of the mentioned instruments on the[37] objective variables could be examined analytically as follows:

$$\partial Y/\partial G = (1/1-\partial E/\partial Y); \quad \partial BOP/\partial G = (\partial M/\partial Y)(\partial Y/\partial G) \qquad (4.15)$$

$$\partial Y/\partial i_d = \frac{\partial E/\partial i}{1-\partial E/\partial Y}; \quad \partial BOP/\partial i_d = -(\partial M/\partial Y)(\partial Y/\partial i) - (\partial KF/\partial i_d - \partial M/\partial i_d) \qquad (4.16)$$

Finally

$$(\partial BOP/\partial di) = -\partial M/\partial Y + \frac{(\partial KF/\partial i - \partial M/\partial i)(1 - \partial E/\partial Y)}{\partial E/\partial id} \qquad (4.17)$$

$$\frac{\partial BOP/\partial G}{\partial Y/\partial G} = -\partial M/\partial Y$$

which means that monetary policy appears with a larger influence on the BOP than the fiscal policy which in turn has a larger effect on income than the monetary policy or, alternatively:

$$\frac{\partial BOP/\partial id}{\partial y/\partial id} > \frac{\partial BOP/\partial G}{\partial y/\partial G} \text{ and } \frac{\partial Y/\partial G}{\partial BOP/\partial G} > \frac{\partial Y/\partial i}{\partial BOP/\partial i} \qquad (4.18)$$

4.3 OPEN ECONOMY, ASSET MARKETS AND THE BALANCE OF PAYMENTS.

A further development in the open economy model is the introduction of stock-flows concepts brought about by Tobin (1959),Markovitz (1956), McKinnon & Oats (1966), Branson (1968, 1971). The model is extended to include the stocks and flows relations in the short and in the long run. Although the model is developed following the portfolio adjustment and the wealth constraint, it still has a strong Keynesian content although it is a more general approach.

The analytical content of the model is founded on Meade since capital account was only added without regard for internal consistency since the concerns were almost exclusively with capital flows rather than stocks of assets and liabilities (Polly and Kenan (1983)). Such emphasis on flows both real and financial has put the analysis of traditional macroeconomics concerned in most cases with short-run stabilisation macroeconomics in a Keynesian framework (Allen & Kenan (1983)). The implication of explicit recognition of the stock adjustment is to bring about the notion of long run stabilisation in an neo-classical context. The stock-flow relationship in open economy models implies that wealth and portfolio balance constraints were invoked to modify the Mundell-Fleming model with respect to the optimal policy mix and the assignment problem.[38]

The focus in the stock flow relationship represents the implications of asset market integration in which one of the main issues is the degree of substitutability between the different assets (securities) involved.[39]

The most important implication of asset market integration in open economy models is the recognition of one important accounting relationship: savings add to the stock of wealth, capital flows add to the stock of reserves and foreign assets and in a fixed exchange rate environment foreign exchange reserves add to and subtract from the money supply. The new approach which recognises that capital flows happen as a process of portfolio adjustment, and that trade flows are treated as being a reflection of excess demand and supply for domestic and foreign goods depends on relative prices and on the level of domestic absorption as well. Now we have that domestic absorption depends on the stock of wealth (money demand and consumption expenditures). This approach allows us to distinguish the important interactions between three components of 'internal balances' and 'external balance' and the effect of policies, both fiscal and monetary and other policies for external balance correction.

As economic agents hold assets dominantly in foreign currencies, policies affecting the exchange rate will cause capital gain and losses.Thus wealth changes, and so savings and domestic absorption through consumption expenditure and the demand for money, since the effects on assets holdings is likely to last a period of time (adjustment process), means there will be differences between the short run impact and effects in the long run following a policy shock. The relevant aspect here is that these two 'types' of effects are integrated by a dynamic process embodied in stock and flow relationship. In this new open economics macroeconomics the balance of payments and capital flow are a consequence of stock adjustment until capital achieves its desired stock.

The central aspect will be the analysis of the wealth effects in an open economy under fixed exchange rate regime. Thus we will have wealth effects in the current account which transform the traditional Mundell-Fleming analysis that internal and external balances can be achieved by the use of an optimal mix of fiscal and monetary policies. In a more formal way we attempt to complicate our supplied Mundell-Fleming model from above to allow domestic residents to hold wealth or portfolio in different assets, including foreign ones.

There will be net recognition of the government budget constraint, which we leave for the next section when we discuss the government constraint explicitly and present it in a detailed and formal way. However it has been shown by several authors, Currie (1980)[40] inter alia that the consistent specification of stock and flow models should integrate the government budget constraint (Currie (1978) as the accumulation of wealth runs from two main sources: budget deficit and balance of payment surplus: see Artis (1983) for a textbook explanation of this important aspect. Once it is distinguished that the central aspect of the over extended classical model incorporates the fact that economic agents hold wealth or portfolios into various different assets, the main target is the analysis of the forces behind the equilibrium in assets markets which is now incorporated somewhere between domestic (internal) and external balances.

It follows that yields, risks and returns involved in asset's holdings are the relevant economic determinants in asset market equilibrium apart from the implicit wealth constraint.

To keep our model in a simple form we assume that asset holders distribute their wealth into the following portfolios: money, domestic bonds and foreign bonds which are denominated in foreign currency.[41] Holdings of money, domestic bonds and foreign assets add to financial wealth (wealth constraint) (W).[42,43] Thus:

$W = M + Bd + eFA$ (A) Budget constraint of private sector. (4.19)

The maximisation of asset returns subject to the budget constraint yields the following set of asset demand functions.

$$\begin{aligned} M &= m\,(id,\ if,\ Y)\ W \quad \text{(B)} \\ Bd &= b\,(id,\ if,\ iY)\ W \quad \text{(C)} \\ FA &= f\,(id,\ if,\ Y)\ W \quad \text{(D)} \end{aligned} \qquad (4.20)$$

Equation (A) is an accounting identity defining wealth portfolios. In equations (B) to (D) wealth appears as the scale variable (level of wealth). All these demand functions are homogeneous in wealth. This aspect allows us to define them in nominal terms since it assumes that price homogeneity and real wealth prices cancel out. See Tobin (1969) and Cuthbertson (1987), Branson (1974, 1975).

We assume, as before, the small country assumption so that if foreign interest rate is exogenous, the following set of partial derivatives set out the following equilibrium conditions for each of the assets. In the money market:

$M = m\,(id,\ if,\ Y)\ W$ where the derivatives (4.21)

$$\begin{aligned} \partial M/\partial id &< 0 \\ \partial M/\partial if &< 0 \\ \partial M/\partial y &> 0 \end{aligned}$$

On the bond market:

$$Bd = b\,(id,\ if,\ Y)\ W^{kBd}/kid > 0 \qquad (4.22)$$

$$\partial Bd/\partial id > 0$$

$$\partial Bd/\partial uf < 0$$

$$\partial Bd/\partial y \lessgtr 0$$

The long run position of the asset is described by:

$$\frac{Yi}{W} = \alpha_{io}' + \sum_{j=1}^{n} \alpha_{ij} \log ij \qquad (4.23)$$

Where Yi represents the desired stock of asset i (M, B, FA) and ij represents the relevant interest rate variable. The coefficients ij are subject to the adding up restrictions across equations, and are given by

$$\sum_{i=m}^{n} \alpha_{io} = m \qquad (4.24)$$

$$\sum_{i=m}^{n} \alpha_{ij} = 0 \quad \text{for all } j = 1,\dots,n \qquad (4.25)$$

In the short-run asset demand adjust in a partial adjustment format. Thus:

$$\Delta yi = \sum_{j=1}^{n} \partial ih(y^{*}_{jt} - y_{jt-1}) \text{ for all } j = 1,\dots,n \qquad (4.26)$$

Where the kij's or adjustment parameters are subject to the cross equation adding up restriction:

$$\sum_{1=m}^{n} \partial ij = 1 \quad \text{for all } j = 1,\dots,n \qquad (4.27)$$

By continuing (i) and (iv) we get the following:

$$\Delta(yi/w) = \sum_{j=m}^{n} \partial ij(y^{*}_{jt} - y_{jt-1})/W + \sum_{j=m}^{n} \partial ij\ \alpha_{ij} \qquad (4.28)$$

On the foreign asset:

$$eFA = f(id,if,y)W \qquad \partial FA/\partial id < 0 \qquad (4.29)$$

$$\partial FA/\partial if > 0$$

$$\partial FA/\partial i \gtrless 0$$

In a similar setting we define the following as being the supply function for each asset.

$$
\begin{aligned}
Ms &= m\ (id,\ if,\ Y)\ W \\
Bds &= b\ (id,\ if,\ Y)\ W \\
eFAS &= b\ (id,\ if,\ Y)\ W \qquad (4.30)
\end{aligned}
$$

By applying Walras law the equilibrium is presented (supply side) as Ms + Bds + eFAS = W.

The sum of partial derivative (demand side) should hold the following:

$$
\begin{aligned}
dM/\delta id + \delta Bd/\delta id + \delta FA/\delta id &= 0 \\
\delta M/\delta if + \delta Bd/\delta if + \delta FA/\delta if &= 0 \qquad (4.31) \\
\delta M/\delta y + \delta Bd/\delta y + \delta FA/\delta y &= 0
\end{aligned}
$$

The derivative sign allows us to recognise the slopes of each demand schedule, as shown in Graph 4.

Adding the demand equations for each asset we comply with the wealth constraint.

$$W = m\ (id,\ if,\ Y)\ W + b\ (id,\ if,\ Y)\ W + f(if,\ if,\ Y)\ W \qquad (4.32)$$
$$1 = m\ (id,\ if,\ Y) + b\ (id,\ if,\ Y) + f\ (id,\ if,\ Y)\ W \qquad (4.33)$$

We can now set the equilibrium in the asset market by equating the demands and the supply for each asset:

Thus:

$$MS - m\ (id,\ if,\ Y) + Bds - b\ (id,\ if,\ Y) + eFAs - f\ (id,\ if,\ Y) = 0 \quad (4.34)$$

which is the Walras law.

From the above it follows that as the asset market is represented by the schedules corresponding to each asset in which there will be an optimal combination subject to the interest rate, both domestic and foreign and to expenditure and to the portfolio constraint. Let us depict a short-run behaviour of all mentioned schedules to highlight its emergence path to steady state.

Assuming an interest rate decrease, we expect that domestic demand for real money balance increases so its stocks as the shift is toward equilibrium. This large yield on money reduces relatively the value of alternative assets, say bonds. The increased money increases wealth which in turn increases the demand for bonds, interest rate should fall accordingly and equilibrium is restored. This equilibrium point will be intersected by the foreign assets (in domestic currency) schedule if capital is mobile, but if no capital mobility exists, then we have to speak in terms of full (domestic) asset balance. Note that we have no incorporated government in our analysis. This is to be done in the next section.

As we assume a certain degree of capital mobility we note that the drop in the domestic rate pushes wealth holders to demand foreign assets since the change in the differential makes them more profitable. The result uses capital outflows since portfolios are adjusted accordingly to the cost of holding an alternative asset, although it is expected that total wealth does not change due to these substitution effects. However foreign assets are re-evaluated (devaluated) in national currency due to a devaluation (appreciation) in the rate of exchange. Inverting the analysis above we could easily examine the factors behind the inflows of capital. Similarly we can depict the effects of changes in wealth due to a balance of payment (current account) surplus (deficits). The exercise depends on the substitutability between assets, including foreign ones.

Both schedules, money and foreign assets holding, shift upwards (left) reflecting the fact that the demand for both assets is an increasing function of wealth (direct effects) and an decreasing function of interest rate in domestic market. On the other hand the bond schedule switches downwards as it is an increasing function of wealth, too, but it is increasing with respect to interest rate as well. Wealth effects cause money and foreign assets to increase at lower domestic interest rate.[44]

Another way of examining the asset equilibrium in this extended Mundell-Fleming model is by observing the effects of monetary policy and its induced effects on the capital flows. This will in some way complement our example above of balance of payments (current account) and wealth effects on the involved assets demand.[45]

Assume we exercise a monetary policy by acting on the interest rate. We could do it thus by complementary fiscal policy if a budget deficit is implied; or alternatively by pursuing an open market operation, or by a combination of both. As we have not yet considered government in our simplified model, let's consider in short a process of bond sales. Clearly wealth or portfolio is not directly affected. However, the open market operation or bond sales will shock domestic interest rates upwards, money holdings is affected as it is a decreasing function of interest rate, so the stock of money falls. The improved interest rate differential will affect foreign assets and capital inflows are recorded due to a depletion of foreign assets holdings. De Growe (1983) extended this analysis in the framework of a more general model by considering the portfolio model as a special case of a more general monetary approach to the balance of payments.

By now it has become clear that extension of the classical model by allowing stock and flows inter-relations and stock adjustment, fiscal and monetary policies could be set independently of foreign shocks. Our treatment of such a problem requires a more general model in which we allow for the full working of wealth effects due to balance of payments deficits (surplus) and government budget deficits.

In the words of Stevenson and others the portfolio approach in the framework of fiscal and monetary policies presents a more acceptable model since it "integrates wealth effects into the analysis ... where the net outcome is that the current account now becomes central to the analysis...".[46]

We now turn to the section where all these inter-relations are treated in a more general setting allowing budget deficits to affect both real and financial sectors.

4.4. THE OPEN ECONOMY, THE GOVERNMENT BUDGET CONSTRAINT AND THE BALANCE OF PAYMENTS, FISCAL AND MONETARY POLICIES.

The extension of the Mundell-Fleming model by integrating the portfolio adjustment dynamics produces important macroeconomic implications since the portfolio adjustment mechanisms reflect the inter-relations between stocks and flows. The overall result is that we have got a full macroeconomic framework which makes the foundations for macroeconomic policies and particularly for the integration of fiscal, monetary and other related policies instruments.

The representation of macroeconomic policies, both fiscal and monetary is achieved theoretically and empirically through the financing of government budget deficits (surpluses). This aspect is of some great importance since we can specify different scenarios which are available to government in financing its deficit (surpluses).

The relevant point to start with is to express an explicit recognition of the government budget constraint. Our model in the last section did not have government, so we abstracted government budget in this section to emphasise the working of the classical Mundell-Fleming model.

In his paper on macroeconomic policy and government financing Currie carried out an exhaustive survey and discussion about the macroeconomic implications following the recognition of the Government Budget Constraint in an open economy and open macroeconomics. The point is that the Government budget constraint and the balance of payments constraint are analogous for an open economy and should be analysed together. Currie's discussions appear as a natural extension of the Christ (1968), Blinder and Solow (1973) and Currie (1975) papers, by including into the analysis the implications of the government budget constraint. The exclusion of g.b.c. from the analysis tend to highlight only the long-run importance of money and ignore other permanent effects derived from fiscal policies and other policies of balance of payments correction. When the model specifies explicitly the government budget constraint it is very likely that, for example, domestic credit would be affected by non-monetary instruments of macroeconomic policies, such as fiscal and import quotas (or tariffs). Stock and flow relationships arise then in the whole interaction between real and nominal in Borro's words. This statement implies that domestic credit is an endogenous variable as it is defined in full stock flow equilibrium. Consequently real factors appear in the right hand side with long-run effects. Currie extended his analysis by examining the effects of real variables (fiscal policy and others) and their permanent effect on the balance of payments. The theoretical exercise is carried out with expenditure switching (reducing) policies and finally demonstrates the permanent effect of such policies in an improvement in the balance of payments. The important result is that government budget deficit matched by a balance of payments deficit need not alter private sector stock flow equilibrium, since what is required is to use fully the government held foreign exchange, see Currie (op cit p.521).

In this section we intend to extend the theoretical formulation of a more general model on which the empirical exercise of the following chapter is based. We examine the impact of monetary and fiscal policies and the way the domestic economy reacts and if their final effects are fed into the system or simply exported through the balance of payments.[47]

Balance of payments surpluses induce an increase in private sector net wealth, and government budget surpluses reduce it. From this follows that the private sector would be in equilibrium with constant wealth at the same time as the government budget deficit (surplus) equal the balance of payments deficit (surplus).[48] Before examining the implications of the government budget deficit (surplus) with the balance of payments with capital mobility I would like to note an assertion made by Currie (op cit P. 8?) about the sources of an unstable capital account.

If we assume zero balance of payments and zero government deficit (surplus) non-domestic residents excess demand for domestic bonds could affect the capital account of the balance of payments due to increased principal payments. Currie's emphasis is on the wealth effects caused by an interest rate produced by the exogenous excess demand for domestic bonds by non-domestic residents, which deteriorates further the capital account showing an unstable path. The deterioration on the balance of payments reduces private sector wealth, unless current account improves to compensate for this capital account deterioration. The relevant conclusion drawn from the above is that when the capital is perfectly mobile under a fixed exchange rate regime the size of wealth effects will determine the sources for an unstable capital account.[49]

Let us now introduce the effects of government budget deficits (surplus) remembering the above new source of instability. One aspect not mentioned by Currie but which is implicit in his analysis of the implication of government deficits (surplus) with capital mobility is the effects - unstable - caused by financing government deficits by selling domestic bonds to foreigners - external financing of the government deficit. Similar to the above case, instabiity could arise not only from an exogenous excess demand for domestic bonds by non-domestic residents, since the financing of budget deficit in our case is endogenously determined. The relevant aspect is that the new acquisition of government bonds by foreigners has twofold effects. First, the demand for government bonds from non domestic residents will increase the interest payments made to them, deteriorating in the short-run the current account, not mentioned by Currie. However, an increase of the interest payment (wealth effect) is not effected as a direct consequence of bonds purchased. We can argue that some imperfections in the financial markets of the domestic economy eliminate the wealth effects emerging from this deficit financing method. Secondly, the external financing method is turned into a money financing, since foreign exchange receipts from the external borrowings increase international reserves (and money supply accordingly). Such money supply expansions due to external financing could dampen the wealth effects, under the assumption of perfect asset suitability, and give arise to the prospect of stability such as it is remarked by Currie, when noting that money financing with a balance of payments deficit could be used by monetary authorities to reduce the stock of outstanding debt.

Once we have commented on the overall implications of the recognition of government budget constraint in the macroeconomics of open economy we turn to a detailed examination of all these aspects and to analyse the effects of various policies scenarios represented by fiscal, monetary and other non-monetary policies for balance of payments corrections. As with monetarists, Keynesian stabilisation policies are concerned with the pace of adjustment of the balance of payments. The main objective is to produce a model where the economy grows in a balance of payment framework and look at the long-run full equilibrium effects of fiscal, monetary and other instruments of balance of payments correction such as devaluation, import quotas, tariffs etc.

Our approach, eclectic in some way, incorporates assumptions and rationale from the main gospels. In this chapter we have already surveyed the functions of monetarists and Keynesians in their approaches to balance of payments.

Before we present more formally our model some comments should be made about the stock and flow nature of the economic system in which we are working. One has to mention that the representation of macroeconomic policies both fiscal and monetary is done theoretically and in practice through the financing of government deficit (surplus). The government budget constraint implies in fact the integration of a set of instruments around a particular scenario. The financing of budget deficits is of importance as there are various financing methods available to government and monetary authorities.

Deficit (surplus) could be financed by issuing new debt which makes the outstanding stock of debt increase as new interest payments are necessary. A direct effect of this deficit financing method is to increase (net) wealth, thus wealth is affected as well as its portfolio (stock) adjustment path. If money is issued to finance government deficits, private sector wealth is increased by the same amount and accordingly modified, so its adjustment path. The induced effect of government deficit financing is the wealth effect of disposable income and domestic expenditure. These definitions are to be presented more systematically, but what we want to emphasise is the tight relationship between the macroeconomic environment and the stock and flow relationship when both constraints are analysed together.[50]

Our abstraction includes this set of important assumptions: the exchange rate regime is fixed, prices are flexible now we relax the sticky price assumption, capital flows freely and so assets are perfect substitutes (extreme assumption), the country is small and free assets are in play similar to the above portfolio balance model.

Following from the criticism made of monetary models and other asset market models as they reflect on trade flows and current account, we recognise that the further development of the asset market approach in its incorporations of wealth effects has restored the current account to a more relevant role. The above is a clear consequence of the interaction between the two constraints.

Another set of assumptions is that government expenditure includes interest payments.[51]

Since both categories of government exports are exogenous and exchange rate is pegged, we depict government expenditures including interest payments exogenous to the model. As made flows or current account is explicitly defined there will be domestic and foreign goods, import and domestic prices. Import prices for simplicity are defined in foreign currency and accordingly exogenous. Domestic prices (overall) appear as a weighted average of domestic and imported prices, Pd & Pm respectively. The rate of inflation P is given by the change in domestic prices, so:

$$P = Pa\,(\alpha) + (1 - \alpha)\,Pm$$
$$P = dP/P \text{ (inflation rate)} \qquad (4.35)$$

Exchange rate is given by e where it is a change in exchange rate or e = de/ep so import and export functions are brought into the model. Our eclectic approach sets the place for a modified monetary proposition, the relationship between the international reserves and the money stock. In setting the model our emphasis is to analyse the effects of fiscal and monetary policies, as well as the other instruments or real variables. A dynamic framework is set up in which stocks' growth is explicitly accounted for. As growth rates for real and monetary stocks are considered, one main feature developed here is the recognition of a growing economy.[52] This fact goes through the interactions of various markets emphasising the components of both real and asset markets. Wealth effects are the transmission channels for this effect.[53]

Although exchange rate is fixed, capital mobility is accepted. As mentioned above we include a reserve-flow equation in which the banking system is brought into the analysis, so the money multiplier is included and the assumption of constance is relaxed, as money multiplier is endogenous as a function of income and interest rate.

Thus:

$$MS = mMB$$
$$MS = m(DC + IR) \qquad (4.36)$$

where DC is domestic credit, IR international reserves and MB is high powered money, m money multiplier and MS money stock.

The real sector:
Output is made of consumption (C), investment (I = K), exports (X) minus imports (IM) and is determined by the following homogeneous production function

$$Y\ (K,L) = C + K + X - IM \qquad (4.37)$$

Labour grows at exogenous rate likewise its proportion of population, so labour supply grows at similar rate as population. This implies a normal distribution of population around its average age.
Consumption in expenditure is a function of output or disposable income/wealth, prices and interest rates.

$$C = f(Y(K,L),W,Pd,Be) \qquad (4.38)$$
$$C = f((1-to)Y(K,L),W,id,pe) \qquad (4.39)$$

Where the following restrictions are defined its partial derivatives are:

$$\delta c/\delta y > 0; \quad \delta c/\delta w > 0; \quad \delta c/\delta id < 0; \quad \delta c/\delta pe \lesseqgtr 0 \qquad (4.40)$$

Exports are defined as depending on domestic prices (Pd), foreign prices (Pf) and exchange rate (supply function for exports).

$$X = f2\ (Pd,ePfd,Y(K,L)) \text{ supply function where} \qquad (4.41)$$
$$\delta x/\delta pd < 0\ ; \quad \delta x/\delta epf \geq 0$$
$$\delta x/\delta y(K,L) > 0$$

Imports are similarly defined as being the function of domestic output, exchange rate and foreign prices.

$$IM = f3(Pd,\ ePf,\ Y(K,L)) \quad \text{demand function where} \qquad (4.42)$$
$$\delta IM/\delta Pd > 0; \quad \delta IM/\delta ePf < 0; \quad \delta IM/\delta Y(K,L) > 0$$

Investment is our growth variable, as it is defined as being equal to K (net investment)
Thus:

$$I = \dot{K} = \frac{d\dot{K}}{Kt} \text{ rate of exchange} \qquad (4.43)$$

$$I = K = Y(K,L) - C(1-to)Y(K,L),W,id,\dot{P}) + IM\ (Pd,\ ePf,\ Y(K,L)) - X(Pd,ePf,Y(K,L)) \qquad (4.44)$$

The wealth constraint is defined as an identity according to the portfolio balance model.

$$W = MB + By + eFA \qquad (4.45)$$

which is defined as the asset sector.

The implied long-run equilibrium in the real (good) market is when $K = 0$, thus the equilibrium is given by

$$Y(K,L)-C((1-to)Y(K,L),W,id,Pe)+IM(Pd,ePf,Y(K,L)) - X(Pd,ePf,Y(K,L)) = 0 \qquad (4.46)$$

In the asset market we define wealth to be composed of outside money, government bonds and private sector holdings of foreign assets.
In an open economy the money supply is composed by a domestic component (DC) which by simplicity take as money creation variable are by the foreign counterpart the international reserves (IR).
Thus,

$$MS = MB = DC + IR$$
$$MS = m\,(MB) = m\,(DC + IR) \qquad (4.47)$$

The demand for real money balances, is of asset money demand type and is a function of output, wealth, interest rate, the rate of return on capital and expected inflation).

$$Md = f_4(Y(K,L),W,id,ib,rk,if,\dot{P}) \qquad (4.48)$$

where the restrictions given by its partial derivatives are:

$$\delta Md/\delta Y(K,L) > 0; \quad \delta Md/\delta w > 0; \quad \delta Md/\delta i < 0; \quad \delta Md/\delta ib < 0$$
$$\delta M/\delta rk < 0; \quad \delta Md/\delta if < 0; \quad \delta Md/pe < 0 \qquad (4.49)$$

We expect in the long run that the full equilibrium applies,

$$\dot{MS} = \dot{m}(DC + IR) + (\dot{DC} + \dot{IR})m = 0 \quad \text{for all } m = 0 \qquad (4.50)$$

As capital mobility is assumed the balance of payments is determined as the sum of current and capital account. Thus:

$$BOP = \dot{IR} = X\,(Pd,ePf,Y(K,L)) - IM\,(Pd,ePf,y(k,l) + KA\,(id,if,W,Y9K,L)) \qquad (4.51)$$

where in the long run it is expected that

$BOP = \dot{IR} = 0$ to deficits (surplus) in the current account are matched by surplus (deficit) in the capital account.
In free equilibrium the $BOP = 0$ is

$$X(Pd,ePf,Y(K,L)) - IM(Pd,ePf,Y(K,L)) + KA(id,if,W,Y(K,L)) = 0 \qquad (4.52)$$

We further assume that capital account flow corresponds to foreign assets adjustment so

$$KA = e\dot{F}A$$
$$\text{or} \quad KA = \dot{e}FA + FAe \tag{4.53}$$

then

$$BOP = \dot{IR} = CU + (e\dot{F}A + FA\dot{e}) \tag{4.54}$$

An endogenous capital account then looks given by:

$$\dot{e}FA + F\dot{A}e = fe(id,if,W,Y(K,L)) \tag{4.55}$$

which is the stock and flow assumption for the capital account. The above markets in equilibrium sets up the model as follows:

$$T(JMK) - C(1-to)Y(K,L),W,id,pe) + IM(Y(K,L),ePd) - X(Pd,ePf,Y(K,L) = 0 \tag{4.56}$$

$$X(Pd,ePf,Y(K,L) - IM(Y(K,L)ePf,Pd) - \dot{F}A(id,if,e,/wmY(K,L)) = 0 \tag{4.57}$$

$$m(Y(K,L),W,id,ib,rk,if,Pe) - \dot{IR} = OP^{54} \tag{4.58}$$

The above system solves the long-run equilibrium for the endogenous K, Pe, IR. Applying Walras' law we can drop the balance of payment equation, and determine only K and IR (from the money equation). Effects of macroeconomics policies are not considered here since they have been mentioned elsewhere in the thesis. The implications of such policies are fully developed when incorporating the government budget constraint.

In our growing economy framework the government budget constraint enables us to obtain an analytical tool where the dynamics involved by its recognition is integrated into a capital accumulation process. The model which follows is a dynamic formulation of the balance of payments which takes into account net investment (capital accumulation) assets markets and the budget constraint of government.

The theoretical exposition consists of a simultaneous interaction of the basic equations representing the long-run equilibrium of all sectors involved. The full recognition of government budget constraint expands our real sector equation by adding government expenditures. Thus:

$$Y(K,L)-C((1-to)Y(K,L),W,id,Pe) + IM(Pd,ePf,Y(K,L))-X(Pd,ePf,Y(K,L))$$

$$-G - 0 - \dot{K} - I \qquad (4.59)$$

where the first three terms above represent output less consumption plus imports which are the function of K, L in our simple production function.

Our first conclusion is one which is traditional already and follows from the Currie, Turnovsky works in which government debt increases with international reserves increases, and due to a balance of payments surplus the private sector financial wealth increases.

As wealth effects[55] are exercised in consumption expenditures it follows then that the growing difference between income and consumption will reduce. We introduce another complication to our model by recognising real wealth given by stock of capital (K) as being wealth component, thus: $W - MB + Bg + eFA + K$.

By implication we assume perfect substitutability above as assets are gross substitutes, where the rate of return on capital (re) is equal to the marginal productivity dr/oh. This requires that the rate of return on capital be determined by the production function:

$$rK - fs\ (K,L) \qquad (4.60)$$

where the restrictions given by its partial derivatives are the following:

$$\delta rk/_{\delta k} < 0; \quad \delta rk/_{\partial L} < 0 \qquad (4.61)$$

The asset market sub-system is formed by the following set of demand equations.[56]

$$\begin{aligned} Md &- md(Y(K,L),W,id,ib,rk,if,pe) \\ Bg &- b(Y(K,L),W,id,ib,rk,if,\dot{p}e) \qquad (4.62) \\ FA &- fa(Y(k,L),W,id,ib,rk,if,\dot{p}e,e) \end{aligned}$$

and the restriction being given elsewhere in this paper. In the very long run the supply of assets varies through the accumulation of government debt and accumulation of international reserves through a government deficit and a balance o payments surplus.

The supply of the stock of money as defined above is

$$MS - m\ (DC + IR) \qquad (4.63)$$

where government stock of debt (DEBT)is made of outstanding securities and domestic credit (money creations).

So,

$$DEBT = DC + Bg \qquad (4.64)$$

From the above we can assume that a proportion of the outstanding debt is money finance

$$\alpha = DC/debt \qquad (4.65)$$

$$DC = \alpha\ (DC + Bg) \qquad (4.66)$$

and $$DC = \frac{\alpha}{1-\alpha} Bg \qquad (4.67)$$

Thus $$MB = DC + IR \qquad (4.68)$$

$$MB = \frac{\alpha}{1-\delta} Bg + IR \qquad (4.69)$$

which represents the process by which the money is created; finally:

$$MS = m(\frac{\alpha}{1-\alpha} Bg + IR) \qquad (4.70)$$

The equilibrium in the money market is

Md = Ms = MB if multiplier is constant

or

$$Md = Md\ (Y(R,L),\ W,\ ic,\ ib,\ rk,\ if,\ \dot{p}) \qquad (4.71)$$

$$MS = m\ (\frac{\alpha}{1-\alpha} Bg + IR) \qquad (4.72)$$

and

$$m(\frac{\alpha}{1-\alpha} Bg + IR) = Md\ (Y(K,L),\ W,\ id,\ ib,\ rk,\ if,\ \dot{p}) \qquad (4.73)$$

The supply of bonds is defined as a new deal so

$$Bg = DEBT - \alpha\ DEBT \qquad (4.74)$$

in equilibrium

$$(1-\alpha)\ DEBT = b(Y(K,L),\ W,\ id,\ ib,\ rk,\ if,\ pe) \qquad (4.75)$$

and the supply for foreign asset is exogenous, so real money balances are constant, asset markets clear and wealth converge $\frac{\dot{W}}{W} = 0$ or $W = 0$. So a sufficient condition is to have

$$\dot{M} = 0 \qquad (4.76)$$

If we proceed similarly as in the other markets and quoting the demand and supply of money we get

$$\dot{m} = 0 = \dot{m}(\emptyset Bg) + (\emptyset \dot{B}g + Bg\dot{\emptyset} + \dot{IR})\ m \qquad (4.77)$$

$$0 = \frac{\alpha}{1-\alpha} \qquad \text{and } m = \text{money multiplier}$$

The long run equilibrium is achieved when M = 0 but the stock adjustment process could distinguish two states, first when changes in government debt which is caused by a budget deficit (surplus) and changes in international reserves which is caused via a balance of payments deficit (surplus) are equal to zero so

$$\dot{DEBT} = GOVDEF = 0 \qquad (4.78)$$

$$\dot{IR} = BOP = 0 \qquad (4.79)$$

The second case arises when changes in the stock of international reserves (IR) caused by a balance of payments deficit (surplus) is offset by a change in the government debt (DEBT) which is caused by a government deficit (GOVDEF) or surplus which is financed by a money creation policy. In this case it is clear that in the long run there is equilibrium in the bonds market so outstanding stock of bonds is constant. What we have following a money financing of budget deficit is a growing proportion of domestic money with respect to total 'debt' or the money debt ratio is altered.

Then

$$\dot{IR} = BOP = -\dot{DC} = -(\dot{\emptyset}\ DEBT + \dot{DEBT}\ \emptyset) \qquad (4.80)$$

The above expression tells us that equilibrium in the asset market can co-exist with a government deficit associated with a balance of payments deficit. Stock flow equilibrium, therefore, not necessarily implies a balanced external account and government account. This proposition forms an important part of the monetary approach and implies that the economy is growing, $K \neq 0$, so full equilibrium is needed at constant growth, $\dot{K}/K = \emptyset$ where $\emptyset$ is a constant rate of growth. It is important to note that Currie (1976) op cit demonstrated that if the government ran a budget deficit (surplus) the portfolio balance requirement implies a compensation in the stock of international reserves, so a fall in international reserves is produced by a balance of payments deficit of the same amount since there does not exist an inherent mechanism in the economic system to produce a zero change in the stock of international reserves.

We will return to this important result later. Our system is now completed by introducing the government.

With regard to the government account, we make the standard assumption; governments collect revenues from taxes to finance their expenditures including interest debt payments. If expenditures (G) grows more rapidly than revenues (T) the implied budget deficit has to be financed by increasing government debt either by issuing bonds, or money. Finally taxes depend positively on output (income).

Thus

$$t = F_{10}(Y(K,L)) \tag{4.81}$$

The government budget constraint is written as follows:

$$Z - ibBg - t(Y(K,L)) = \dot{D}C + B\dot{g} = DEBT = COVDEF \tag{4.82}$$

$$\text{and } DE\dot{B}T = \dot{D}C + Bgt = GOVDEF \tag{4.83}$$

in line with earlier comments.

There is no need for government budget deficit, including debt payments, to be equal to zero, the long run equilibrium.

Rewriting the balance of payment equation

$$\begin{aligned} I\dot{R} = B\dot{O}P = {} & X(Pd,ePf,Y(K,L))-IM(Pe,ePf,Y(K,L)) \\ & + KE(id,ib,rt,if,e,Y(K,L)W) \end{aligned} \tag{4.84}$$

In the long run we can distinguish two forms of behaviour by the balance of payment and the government budget deficit, namely; first, when the government deficit and balance of payment are zero -do deficit in both constraints

$$IR = BOD = 0 \quad \text{and} \quad D\dot{E}BT = GOVDBF = 0 \tag{4.85}$$

Second, when both balance of payment and government deficit add to zero. Thus:

$$IR = BOP + BOVDEF = 0 \tag{4.86}$$

or alternatively BOP = GOVDBF, IR = -DEBT

If such government deficit is money financed (DC) the identity can be rewritten as

$$BOP = -DC \quad (4.87)$$

From the above we know that $DC = \frac{\alpha}{1-\alpha} Bg = \emptyset Bg$

$$\text{or} \quad \dot{DC} = \emptyset By + B\dot{g}\emptyset \quad (4.88)$$

$$IR = BOP - (\dot{\emptyset}Bg + \dot{B}g\emptyset) = -DC \quad (4.89)$$

The model has been eventually completed, writing it in full we have the following system of equations on which we will examine its stability properties and the conditions in which the system converges.
Thus the system is formed by the following equations:

$$I = \dot{K} = Y(K,L)-C((1-to)Y(K,L),W,id,Pe) - X(Pd,ePf,Y(KL,L)) - IM(Pd,ePf,Y(K,L)) - 6 . \quad (4.90)$$

$$\dot{L} = \alpha L \quad (4.91)$$

$$BOP = \dot{IR} = X (Pd,ePf,Y(K,L))-IM(Pd,ePf,Y(K,L)) + KF(W,ib,rk,if,e,W,Y(K,L)) \quad (4.92)$$

$$GOVDEF = \dot{DEBT} = G + ibBg -to(Y(K,L)) + BOP \quad (4.93)$$

$$0 = Md(Y(K,L),W,pe(\dot{Pd},ePt),if,ib,rk,if) - \dot{m}(Y(\bar{K},L),id)(\emptyset Bg+IR) \quad (4.94)$$

$$0 = b(Y(K,L),W,pe(\dot{Pd},ePf),id,ib,rk,if) - (1-\alpha)DEBT \quad (4.95)$$

The above system has to be solved for the following endogenous variables: K, L, W, DEBT, IR pe subject to the following exogenous variables: G, e, id, if, p, to.

Finally we have the system for the effects of the following policy variables: k,G to,e[57].

But for simplicity and to keep the model to manageable proportions we drop the labour equation since it could be regarded as exogenous, and will not be affected directly by changes in the exogenous variables,
As it is stated above we present a dynamic model in which the economy is allowed to grow and a full stock and flow equilibrium is achieved with both zero and constant rate of growth. It is our main objective, after the model is solved for stability to exercise the main hypothesis embodied in the different scenarios of policy analysis. If it is possible we will present the analytic structure following the effects of the different fiscal, monetary nd other non-monetary policies for balance of payments correction. The next section is devoted to such an examination.

4.5 MACROECONOMIC POLICIES, FISCAL, MONETARY AND NON-MONETARY POLICIES FOR BALANCE OF PAYMENTS CORRECTION: AN ANALYTICAL PRESENTATION.

Before we follow with the analysis of the effects of fiscal and monetary policies let us recall come of the propositions of the monetary approach which states that the balance of payments is a monetary phenomenon, and consequently only monetary policy matters and as such will have a permanent effect on the balance of payments. If this is true, disequilibria in the balance of payments could be adjusted by running policies which affect the growth of domestic credit and affect the money stock accordingly. Assuming that no sterilisation is carried out, increases in the domestic credit (0999) will be offset in the steady state through capital outflows. It is correspondingly assumed a fixed exchange rate regime exists.Note that in most times the monetary proposition is made to deny the effectiveness of fiscal policy in a steady state. Traditional Keynesian argument has presented a contrary assertion.

Stern (1982) (1980) presented a detailed exposition of the differences and similarities between both points of view, finding some similarities when the effects of monetary policy are examined in the short and in the long-run, since international reserves can fall or increase due to balance of payments deficit (surplus) caused by a monetary policy. In what follows we will attempt to analyse these issues in the model developed above, under the assumption of a growing economy.[58]

Our specification allows us to examine the growth of the money supply in accordance with the method by which the government finances its budget deficit. In this particular case by increasing (reducing) its debt through a money financing policy we will trace the effects of such policies on the balance of payments, and accordingly on the capital accumulation in the steady state, as well as on the short run balance of payments and on the stock of international reserves. In this respect we will consider the following set of policies, both monetary and fiscal. First, we go through a policy where the objective is to alter the debt structure by changing the money debt ratio (k).

This policy is carried out through an open market operation. To start with we assume that government budget is balanced. However, if there exists any deficit which is financed by issuing debt, the monetary authorities will intervene in the financial (asset) markets with the objective of holding the money to debt ratio constant, unchanged. This is achieved by engaging in open market purchases of government bonds and stabilising the money debt ration accordingly.

Secondly, there will be a fiscal expansion whose deficit is financed by money. Thirdly, the fiscal expansion is financed by debt issues. Fourthly, the fiscal expansion is financed by rising taxes. That is a policy of balanced budget.

One of the main objectives of analysing these policy shocks is to measure the effectiveness (ineffectiveness) of these policies by looking at the steady state position of the balance of payments and at outstanding government debt. Finally, we will examine a case in which the balance of payments deficit (surplus) is offset by a government deficit (surplus). The same set of policies is examined.

With regard to the case in which there is zero balance of payments and not government deficit, thus IR = 0, BOP = 0 and GOVDEF = 0 = DEBT and k = 0.

The system of equations above is solved for the effects of the different policy scenarios mentioned above by evaluating the money debt ratio (δ). An open market operation policy is used. The effects of such policy is the stocks of international reserves, balance of payments and capital accumulation for such purposes both IR and BOP where balanced. A pure monetary policy is done by affecting the money debt ratio. As a consequence the high powered money expands due to monetary authorities' purchases (sales) of government bonds (Bg). In this exercise the policy variable is the money debt ratio (δ). Alternatively there is a special case when both balance of payments deficit and government deficit sum to zero, but when the deficit of money follows.[59]

In other words

i)	$BOP + GOVDEF = \emptyset$	(4.96)
ii)	$\dot{BOP} + \dot{DC} = \emptyset$	(4.97)
iii)	$\dot{IR} + \dot{DC} = 0 = MS = 0$	(4.98)

In this special case the money debt ratio (k), is no longer a policy parameter, since there is either balance of payments deficit or a government budget deficit or both. (i), in (ii) the deficit is money financed. However since this case represents a static non-growing economy we drop it.

After totally differentiating the system of equations and polishing it for dk/dx and dIR/dx we get the following results:

$$\frac{dk}{d\alpha} > 0; \quad \frac{dIR}{d\alpha} < 0 \qquad (4.99)$$

These results mean that a change in the money debt ratio due to an open market operation will have a permanent long-run effect on the capital accumulation. The economy approaches its steady state withconstant ($\dot{K}/K - \Phi$) rate of growth. The economic rationale underlying these effects in a stock and flow and portfolio balance model is that changes in the money debt ratio affect the distribution of private sector's portfolio (wealth), which in turn has a positive effect in assets yields. So, wealth directly affects the assets demand and consumption expenditures.

With respect to the effects on the stock of international reserves, it is found there is a negative effect of change in the money debt ratio, The macroeconomic rationale is that changes in the money debt ratio, ? will increase the stock of capital and real money balances. To reach equilibrium in the money market change in the domestic credit (money creation) is followed by an increase in the demand for real money balances and by a decrease in the stock of international reserves[60] wealth effects in this case will be measured affecting the demand for for foreign assets. It is likely that the true model necessitates an endogenous interest rate as it is likely to be affected by the changes in the money debt ratio. For our purposes already mentioned we have left interest rate exogenous to keep the model manageable. It is worth at this stage to note that the whole result above depends crucially on stability holding, which in our case is denoted by the determinant being positive, as is the case. Note, however, that the model is a simplified abstraction, but it does not seem to alter the results as however more complicated it becomes. The real test is left to the empirical exercise in which numerical solutions through simulations are used to solve the model, which is more complicated indeed. In the following case, the economy is assumed to grow to $\dot{K}/K \neq 0$, $\dot{K} = pk$. In this case the changes in international reserves, IR, are matched by a government deficit, money financed.

Thus,

$$BOP = \dot{IR} = -\dot{DC} \qquad (4.100)$$

Since $DC = \emptyset\ DEBT$ and $\dot{DC} = \dot{\emptyset}DEBT + \dot{DEBT}\ \emptyset$[61] It follows that

$$BOP = IR = - (\dot{\emptyset}DEBT + \dot{DEBT}\ \emptyset). \qquad (4.101)$$

As in the first case we solve the system of equations after adding the (?) One of our objectives here is to consider whether the balance of payments and the government budget deficit are different from zero in steady state, where it is expected that the economy (capital) is growing at constant rate; $\dot{K}/K = \Phi$.

After differentiation and solving the system for $dK/d\emptyset$;dIR/dO, $dBOP/d\emptyset$ we get the following set of results;

$$\text{for } \frac{\partial k}{\partial O} > 0; \ \frac{\partial IR}{\partial O} < 0; \ \frac{\partial BOP}{\partial O} < 0 \qquad (4.102)$$

In examining closely these results we find that changes in thé rate of growth of the money debt ratio ($\emptyset$) will affect positively the capital hoarding, but negatively the balance of payments and consequently the stock of international reserves. Our first conclusion from the above is that in the constant – in steady state – growth the fiscal expansion money financed will permanently affect the balance of payments provided that our assumptions above of BOP and GOVDEF are different from zero in steady state. It emerges that disincorporating the government budget constraint from the above we would not be able to examine the stock and flow and portfolio adjustment, which arises from the running deficit and from the disequilibrium in the balance of payments.

4.5.1 Fiscal policies effects

Similarly to the pure monetary policies examined in the last section, we now investigate the fiscal policy effect due to an increase in government expenditures. Although we have attempted to break up both sets of policies the strong integration and relationship of fiscal and monetary policy is apparent. This statement highlights the fact that the separation of these two policies is nearly impossible. These fiscal policies are to be investigated in the same framework of a non-growing and growing economy. At first let us assume that both the balance of payments and the budget deficit are equal to zero.

Thus,

$$\dot{IR}/IR = 0, \dot{DEBT}/DEBT = 0; \text{ OR } GOVDEF = 0 \qquad (4.103)$$

Similarly, we solve our system of equations for the effects of the different policies we have in mind. The rate here is to finance by money the fiscal expansion. Steady state effects are given when solving the above system for the effects of government expenditure (G) increases.

We obtain this set of results:

$$\frac{dk}{dG} > 0; \quad \frac{dIR}{dG} < 0 \qquad (4.104)$$

It is worth while to note that these results are similar to the monetary effects already investigated when monetary policy was set up. To some extent both cases are similar. By implication the rationale in this case is similar to the above - pure monetary policy - and we do not report these here. What it showed is the complementarity of these policies, pure monetary and pure fiscal, but with the same method of deficit financing. Both policies are shown to be effective and non-neutral in the steady state. However there are some details which are worth noting. The specification of the model incorporating the government budget constraint highlight the importance of the method by which government finances it deficit when it results in a fiscal expansion. In case of money financing we have found that such financing methods have a positive impact on the economy. That is the crowding-in effect. By implication we can approximate that if fiscal expansion is financed by increasing taxes a crowding out effect could be found, since taxes will decrease disposable income, with its negative effect on both private consumption expenditure and demand for money balances. Let us now examine the case where in the long run both government debt and international reserves (balance of payments), are different from zero. That is, when DEBT $\neq$ 0, IR = BOP $\neq$ 0, which is the most real case. Here we have the case of a balance of payments deficit (surplus). Solving our above system of equations for the effects of fiscal policy - money financed - on the capital accumulation $K/K\neq 0$, the stock of international reserves $IR/IR\neq 0$, and on the balance of payments $IR\neq 0$, we get the following results: The results show that an expansionary fiscal policy - money financed on capital accumulation is positive whereas on the stock of international reserves and on balance of payment the effects in steady state is negative.[62]

So $dK/dG < 0$; $dIR/dG > 0$; $dBOP/dG > 0$. These results differ from the case when both government debt ad the stock of international reserves are equal to zero.

4.5.2 Non-Monetary policies.Effect of devaluation.

One important aspect of models like this one was pointed out by Currie (1976, 1981),[63] in which he noted the recognition - explicitly, of the government budget constraint contradicts the ,marked results of the monetary approach to the balance of payments. It has been asserted by MABOP followers that in the long run non-monetary policies are neutral and non effective. So policies of devaluations, fiscal policies, tariffs and import quotas are only effective in the short run. Furthermore, it was argued that these policies do not consider the stock adjustment process going on in the economy. As surveyed in earlier chapters, Currie (op cit) has demonstrated that the MABOP misleads in its conclusions as it fails to recognise the government budget constraint. In this context and relying heavily on Currie, assertions are made that in the case of Keynesian under-employment environment any reduction in expenditure in the form of government expenditures, or tax revenues, or by imposition of import quotas, tariffs, barriers and exchange rate depreciations a steady state effect is likely to be observed.[64] Based on these results, and on my results the monetary implication appears to be rejected. In a framework of a non growing economy Currie (1970) explicitly recognised the government budget constraint that non-monetary instruments of balance of payments corrections are indeed effective in the steady state, having a permanent effect. The argument is relevant to the analysis since a government budget deficit (surplus) equal to a balance of payments deficit (surplus) need not affect private sector portfolio (wealth) equilibrium. In other words stock or portfolio equilibrium is not a necessary result of a balanced external account.

In the framework of a growing economy we attempt to test Currie's theoretical findings. This section deals with the effects of exchange rate depreciation, $e/e \neq 0$ effects on the steady state economic growth (capital accumulation), and on the stock of international reserves and balance of payments. As in our previous section we carry out our analytical exercise considering the following two polar cases. First, we assume a non-growing economy $K/K = 0$, when both balance of payments and fiscal deficits are equal to zero, so BOP = 0; GOVDEF = 0. To investigate the effects of exchange rate devaluation we solve our system of equations above. Differentiating totally and solved for the effects of exchange rate we obtain the following results:

$$dK/de < 0 \quad \text{and} \quad dIR/de > 0 \tag{4.105}$$

The result of dBOP/de or dIR/de holds provided that Marshall-Lerner-Robinson conditions hold.

In the long run exchange rate depreciation will have negative impact on capital accumulation, and economic growth may be affected. Currie's proposition is confirmed as the positive effect on international reserves expresses a continuous balance of payments surplus. Secondly, we investigate these effects when the economy is growing at constant rate in steady state, $K/K \neq 0$, and government deficit is run zero and compensate balance of payments deficit. Assume as before that deficit is financed by money[65] so:

$$1 - \emptyset = 0; \ \emptyset = 1 \tag{4.106}$$

Our results show that $dK/de < 0$ and $dIR/de > 0$ and $dBOP/de > 0$ by implication. We have been able to prove the proposition that in the long run devaluation of exchange rate has lasting effects on the balance of payments (international reserves). The model developed above and solved accordingly for different assumptions of macroeconomic policies give the long-run equilibrium when all stocks converge. This means that the wealth (portfolio) stock of assets is constant in time, or in other words, money and funds are stationary. If stocks are constant, flows are so; looking at it from the flow side, stock equilibrium (ΔW=0) means that sowing (capital accumulation occurs, since both saving and net investment are in equilibrium. In other words we could have capital stock growing at the same rate of growth (constant). One important implication is that both budget deficit (GOVDEF) and current account (BOP) are zero; GOVDEF + CV = 0. The condition for a stationary equilibrium is no current account deficit BOP = 0. In other words the condition for steady state equilibrium is that BOP + GOVDEF = 0 since capital account is zero as portfolio equilibrium is reached. So BOP and CV are equal. This shows that in steady state only capital account is requested to converge, whereas the current account on the balance of payments does not need to be in equilibrium.i.e BOP = CU + GOVDEF = 0.

4.6 SUMMARY OF CONCLUSIONS.

This chapter is concerned with the macroeconomic theory of an open economy withfully specified government budget constraint. Our main interest was to present the implications of the financing constraint with for the balance of payments.The model developed in this chapter serve as basic and theoretical framework for the empirical work developed in the next chapter. The material presentes a critical view of the monetary approach to tha balance of payments in the context of an analytical model in the framework of a growing economy.

The model presented in Section 5 integrates real and financial sector and fully recognizes the governement financing constraint. This allow us to exercise several analytical experiments framed as fiscal,monetary and non-monetary policies for balance of payments correction.The target is to "test" the main proposition of the theoretical construst outlined in Chapter II.

The most important theoretical result which folows from the recognition of the government financing constraint is that domestic credit is affected by non-monetary policies such as import quotas and devaluation. This makes domestic credit endogenous contrary to the monetaris argument.This fact affects the monetary proposotions regarding the balance of payments correction.

Another important result is that government deficits can be matched by a balance of payments deficits, so that the private sector stock flow equilibrium does not necessarely alters,since authorities can fully use foreign exchange holdings. On the other hand if a balance of payments surplus is achieved private sector net wealth will increase but government will reduce.

The model is to some extent eclectic since its incorporates assumptions and rationale from the main gospels. Thus real, monetary, capital, private sector budget constraint,balance of payments and government budget constraint are represented in the model which is solved analytically in the context of a growing economy.

The presence of the government budget constraint enable to fully investigate the dynamics in the context of a accumulation process. The solution of the model involves the long run equilibrium of all sectors accomodated in the system. Although the goal is not to confront monetary and non-monetary policies,we have been motivated by the issue that not only monetary policy is effective in the steady state but other policies instruments do so too, implying that fiscal policy is effective in the long run. In the case of monetary policy it is shown that a change in the money debt ratio folowing a open market oeration will have a permanent effect on capital formation, so the economy approaches its steady state,i.e. constant rate of growth. The effect on the stock of international reserves reflect the fact that an expansion in the economy deteriorate the balance of payments . Thus a permanent effect is found on the balance of payments provided that the balance of payments and the government budget constraint deficts are different from zero in the long run.

Similarly, fiscal policies are shown to have permanent effect on the balance of payments. Another important result is the complementarity between both fiscal and monetary policies since the method by which government finances it budget require certain stance for monetary policy. Other policies,such as exchange rate depreciation were found to have lasting affect in the long run.

In the next chapter we attempt to demonstrate empirically various theoretical propositions, some of which are introduced in this chapter. Our empirical work shall be carried out by means of an macromodel.

CHAPTER V

The balance of payments and the Venezuelan Economy. A macroeconometric model.

5.1 INTRODUCTION

In the last chapter we have presented the theoretical framework on which the empirical work is based. The subject of this chapter is to present such empirical work and the results which follow from the estimation of the different components of the model whose major aim is to explain the Venezuelan Balance of Payments. Having specified our goal two alternative approaches emerge; first, a reduced form approach, common to most monetary models and second, a structural multi-equation approach common to Keynesian and structuralists as well as to somehow eclectic monetarist models in which the balance of payments is dissaggregated in the context of the whole economy. This approach to some extent captures the different economic and macroeconomic inter-relations which characterise the economic system. On the other hand, reduced form models are in most cases estimated to investigate certain causal relationships but are unable to explain the simultaneous nature of macroeconomic policies and their integration in the economic system. The need for a structural model was particularly determined by the imperative requirement of building a model which could "describe the economic reality as completely as possible, and to investigate different policy scenerios - domestic and foreign origin - and its effects on the main components of the balance of payments, as well as on the stock of international reserves. Such integral approaches allow us to observe the most important economic rationalities in a developing economy and the advantages of having them quantified. The target is then to build a model which combines the most sound theoretical constructs of analytical models and of the empirical descriptions of economic reality. Among the goals which have justified this approach is to answer the question of whether macroeconomic policy analysis could benefit from the use of general empirical models and whether the empirical work is related to a developing economy. Macroeconomic models, when used for policy analysis, tend generally to be large. Hence they often become complex vehicles generating outcomes which are complicated when seen from a quantitative angle. In the case of Venezuela, there is an additional motivation for building a macroeconomic model, in fact such motivation is related to the lack of experience in building economic models for policy analysis and/or for forecasting. Unfortunately very few economic experiments have been carried out using Venezuelan data in both types of approaches; single equations (reduced form) and/or structural ones, as is the one we present in this thesis.

It is well known that there is no econometric modelling without data and this one among other reasons has precluded the activity of econometric modelling in Venezuela, and relegates the existing few exercises to annual data modelling. Unfortunately to date no Venezuelan official body collects quarterly data for the real sector, although there exist for the financial sector. This aspect of data collection, makes it nearly impossible to estimate the true short-run structural models and relying, as in our case, on annual data for short-term policy analysis and for forecasting. The most appropriate approach is the building of "short-run" models which are better tools for "stabilisation policy analysis". These "short-run" models rely on quarterly data. Other objectives such as long-run structural transformation, income distribution and determination, supply side bottleneck may be better 'understood' with the help of 'long-run' econometric models, even though "short-run" models can be useful tools. In this particular case, we attempt to develop a 'short-run' model using annual data which is organised through the presence of several markets. As mentioned above, there are several important aspects of a national economy which become the source and motivation for constructing 'short-run' macroeconomic models. Inflation, balance of payments and a monetary stability to mention some. In particular those issues appear today as problematic sectors of a developing economy such as Venezuela. One answer to the problem of how to have the economy under a stable path with long run growth and prosperity lies in the way economic policy formulation is organised. In other words an answer has to be found to the problem of how should agents, including government respond to the ever changing external and domestic economic conditions. This leads us to a superior stage in economic management, and stresses the need for a more consistent framework for short-run, and accordingly for long-run analysis. Furthermore, if we live in a country which is under the stress of well identified disturbances, such as inflation, real exchange rate overshooting (undershooting), recurrent balance of payments, disequilibria, unstable terms of trade, volatile oil prices, monetary instability etc, large and quite sizeable adjustments are required: for instance, stable government deficit output ratio, exchange rate devaluation, liberalisation of financial markets, flexible interest rate, exchange controls, trade liberalisation etc. This delicate economic environment requires careful research about the best policy package, or rules which cannot be easily identified by just casual observation. A combination of policies produce unobservable interrelations from the casual observation point of view.

For example, a devaluation of 10% can make a difference. So can similar variations in government expenditures, reserve ratio, interest rate etc. The problem here is to recognise that more carefully judgement on the part of policy makers and economic agents is required if they intend rationally and responsibly to influence the course of events. These examples above apart from the ever more complex economic structure, point to the need for a more consistent and comprehensive framework for policy analysis and forecasting. Intuition and voluntarism tend to fail in most cases, whereas a formal tool of sophisticated technology could be capable of capturing most inter-relationships and interactions between sectors and variable, i.e. stock adjustment or equilibrium in the long-run.

In this particular case, we present a well integrated structural model which encompasses the two sectors, real and financial in a stock-flow fashion. The size of the model and the periodicity was in great part dictated by the data condition and availability. The currently available data is not adequate for building large integrated (with disaggregated supply side) fully fledged macroeconomic model of Venezuela for the 'true' short-run, unless we rely on ad hoc methodologies to build up pseudo-data. We have chosen the former way. Annual series in Venezuela in some parts lack of continuity.[66] However, for this 'small' model (65 equations in all) some of the data problems persisted and in its construction we were obliged to depend on some non conventional procedures.

The remainder of the chapter is organized in the following way. In section 2 the conceptual framework for the model is discussed and the model is written down as the model structure is presented. In section 3 we present the rationale both theoretical and empirical; the institutional background of each of the estimated equations is discussed and the resulting estimates interpreted. When available, our results are discussed in the light of other results either related to Venezuela or to other developing economies. In section 4 a broad summary conclusion is done. Finally there are annex (1) for the data sources, problems and definitions; annex (2) where the econometric methodology used for estimating the individual models (equations) is systematized and annex (3) model equations and summary statistics and diagnostics.

5.2 THE MODEL STRUCTURE AND THE CONCEPTUAL FRAMEWORK

The basic structure of our structural model reflects the fact of a small and open economy. Its structure is in line with macroeconometric models in general and is designed to reflect our perception of the functioning of the economy, the type of questions that we expect our model to answer, institutional factors particular to Venezuela and constraints imposed by the data base. These aspects are to be referred in more detail and made more evident at the point of specification and estimation of individual models (equations). At the outset it is important to stress two important features which difference open, small economies than others more domestically orientated (closed).[67] First, international trade (price and volume) constitutes the largest part of the economy in quantities and in terms of its effects on aggregate demand and supply of the domestic economy. Changes in the terms of trade, due to, for example, a fall in the price of oil will affect balance of payments, government finances, money supply, exchange rate expectation, prices, aggregate demand and supply. On the other hand, domestic conditions which do not directly affect the terms of trade, do have strong impact on the state of balance of payments which operates through changes in domestic aggregate supply via variations in the exportables (tradable) supply and on the aggregate demand via the demand for importables. In addition the nature of the exchange rate regime, fixed in our case will affect the state of the balance of payments as its own expression in the movements in the stock of international reserves. Accordingly the latter will have feedback effects into the system and produce secondary impulses which will cause further effects into the domestic economy. The process is likely to look recursive as several rounds take place before the overall stock-flow equilibrium is achieved eventually.

Secondly, there is an important component of the domestic prices which is determined by world prices. This is the case of imported goods which in our small open economy constitutes an important part of consumers and investors expenditures (raw material and capital goods in developing economies). If world prices of these goods rise we will have direct and indirect increases in the domestic price level, which are independent of the domestic conditions of the aggregate demand and supply. On the other hand, a deflationary policy or repressed inflation may conduct to relative lower prices of some domestic commodities. However, it could be that domestic price index does not decline accordingly. This could give one the reasons to embed into the model an explicit relation able to capture the interactions between aggregate demand and supply, and their effect in determining prices. However it might be true as well to introduce explicitly the reverse causation or changes in prices and the demand with effects on the supply side. A specification for each component of the general domestic price index may be explicitly required. For instance, in our particular case the monetary model inflation is rejected by the data. We finally embedded a augmented Philps curve approach with supply side effects and external effects (imported inflation). Before we describe the model's structure and equations integration some general features of the model need a brief account. Although someone may find the model a bit eclectic with regard to the theoretical approaches surveyed in earlier chapters, it is important to note that, for example, money supply is endogenised from both sides; demand and supply, which may indicate some disequilibrium features in the money market. This is so as the exchange rate is fixed and makes it difficult for the authorities authorities to determine money as being exogenous. On the other hand, according to the past history of the Venezuelan balance of payments and the free currency convertibility the assumption of perfect substitutable is established as in the case of the model, capital flows freely and an asset (portfolio) adjustment mechanism is embedded.

On the demand side, equilibrium is assumed a tradable sector in which prices are endogenous, and a Keynesian (underemployment) goods sector where output is determined by excess demand in both real and monetary sectors. Labour markets and prices were defined in an augmented Philps curve fashion with sticky wages. The perfect capital mobility assumption embedded in the portfolio adjustment nature of the model is made in spite of few variations in the domestic interest rate (government pegged), so increases in domestic credit (domestic component of high powered money in our case) will affect income through its wealth effects. Sterilisation policies may not result as interest rate changes are rare in the estimation period. Thus we do not expect a drop (automatic) in international reserves and on money supply due to expansion on domestic credit. The reason being that although capital is perfectly mobile, financial repression is part of the system due to administrative interest rate ceilings. This aspect leads to an important result in contrast with MABOP's theoretical constructs.

Another important 'institutional' feature of the model is that there is an inherent relationship between income and the balance of payments.[68] Thus several hypotheses of the Keynesian and monetary approaches can be analysed as special cases of the general model we have developed.

The model we have developed incorporates the possibility of testing monetary approach propositions although it has to be recognised that presence of the real sector (real variables) make it possible to incorporate fiscal policy, disequilibrium dynamics and income formation process. Thus, it differs from the same monetary models because it incorporates the government sector and relaxes the exogenity of output, endogenous prices and domestic credit assumptions. By recognising these it will be demonstrated, in the course of simulation of policy scenarios that fiscal policy is effective in the long run to correct balance of payment, and monetary policy is not neutral with respect to the level of income in this small open economy, and, additionally, exports and price level flexibility play a crucial role in the determination of the balance of payments. Up to now the plan was to indicate here some of the broader considerations that have guided us in structuring the model. In what follows, before releasing the detailed description and specification and estimation issues, let us identify the markets recognised in the model.

Our point of departure, draws from the theoretical and empirical works surveyed in the third chapter and formally supported in the fourth chapter is that neither an absolute real sector model nor a pure nominal model can effectively capture the dynamics of the economic system. The presence of a strong asset market and its wealth effects on the balance of payments (current account) integrates several markets to provide a more general model. So a model like this could cope with policy variables such as level of credit due to reserve requirement policy, and the level of government expenditure being super exogenous variables, when cast in nominal terms. Similarly a model like the one proposed can develop the real and wealth effects interactions which emerge from the optimising decision of the economic agents with respect to variables such as consumption expenditures, investment, money demand and stock accumulation, when cast in real terms.

The integration of real sector, balance of payments, government fiscal policy with an income determination process together with the financial sector in the framework of a Walras Paradigma[69] is of significance in a less developing economy, since in the context of balance of payments exchange rate depreciation can not properly be assess without relative prices. Such a reason makes up consider explicitly a price formation process. Finally, and regarding model size, modelling constraint and economic reality in a less developed economy it is important to note that there appears to be a disagreement with respect to the model's size. There has been a tendency for econometric models to be towards gigantisom[70]. Although models are built according to the above tendency, the modelling of medium term, short term models of medium size is increasing. However we have to follow a more practical approach since data constraint and disaggregation problems preclude us from developing the supply side of the model, even though we are using annual data. In this respect, capital stock is endogenous given by the accumulation of net investment less depreciation, but it could not enter in the gross investment of private sector as no disaggregate data exists at all. Furthermore the lack of data of capacity utilisation precludes us from specifying consistent production function for the most important sectors. However we were able to consider some stock-flows relationships in the real sector by specifying stock appreciation as a terminal variable, although no link with the wealth of private sector, as private sector portfolio is constituted only by the financial part. Financing of government budget enters following Christ (1968)(1969) and Currie (1975) since they have demonstrated how the incorporation of the budget financing requirement in the government sector can change the analytical properties of the system, both theoretical and in practice. Besides, the budget (financing) constraint would limit the policy variables with important implications as we observe ahead when we present the model structure.

5.2.1 Sectors and the basic elements of the model

The model encompasses various sectors, real sector, income and output determination; financial sector, money and other assets; internal sector; government sector including the government budget constraint; and the price formation. In the monetary sector although highly aggregative, we do define both demand and supply of money endogenous. The stock of money is endogenised through the standard accounting identity which includes the money multiplier whose components are as well endogenised. On the demand side money (or M3 equivalent) is decomposed into transactions, demand for money (M1) and an asset demand for money which could capture in a better way the portfolio choice behaviour of asset holders. This sector includes as policy variables, not the level of credit to the private sector exogenous, which is found in many monetary approach empirical experiments, neither endogenises, as monetary authorities could affect the demand for credit by using two powerful mechanisms; firstly the base (discount rate), the required reserve, and other restrictive policies (quantifying the level of credit to commercial banks for instance. In the resume we distinguish the following policy variables; firstly, the base (discount) rate, the required reserve and domestic lending and deposit rates which have been pegged by monetary authorities.

In the external sector (balance of payments) part of the total exports, the smaller ones, considered to be non-traditional exports, are endogenised from the supply side by depending on non-oil gross domestic product and relative prices. The remainder of exports, the large part - oil exports, is endogenised as an accounting identity in which oil exports are the residual form of oil production and domestic oil consumption. As it emerges from this approach, a production function which non-renewable resource supply and cartel features is estimated for oil production whereas for domestic oil consumption an expenditure function is estimated. Imports are considered in both an aggregative and disaggregative manner. In its disaggregative way imports were broken down into (i) imports of capital goods and raw materials and (ii) imports of consumption goods and services. This approach was chosen in order to take into account varying and distinct import intensities associated with expenditure components and its different import price (relative) elasticities, and to trade the inward orientated economic strategy for most parts of the period. For keeping the simplicity in the current account net factor income payments are exogenous. However there are no difficulties when endogenising this variable in further developments of this model.

The capital account has been highly disaggregated into its private (short term and long term) and public sector (both short term and long term). Short term capital flows of private sector are assumed to be flows produced by portfolio adjustment and were specified accordingly, as since accumulated they represent the foreign assets holdings and part of private sector financial wealth. This aspect exposes one of the stock flow features of our model as there are wealth affects from the nominal sector into real sector with its corresponding feedback effects into the financial sector. The capital account for public sector was specified by assuming that all flows short-term and long-term constitute the adjustment in public sector external liabilities. Thus a model for the demand for foreign borrowing emerged from the above approach. Both current account and capital account add to the balance of payments or changes in international reserves. An accounting identity relates the stock of international reserves with the balance of payments (overall) or change in international reserves. Thus, $IR = IR_{t-1} + BOP$ or alternatively $BOP = IR_t - IR_{t-1}$. It emerges from this approach that we can define changes in the stock of international reserves as being determined by both real and financial aspect of the economy. Feedback effects are specified due to the links between the stock of international reserves and the financial (monetary) sector. The government sector will be highly aggregative, although minor disaggregations take place. Government expenditures were broken down into consumption expenditures and gross fixed capital formation. Both are considered as policy determined, with both entering in the aggregate demand identity. Government fixed capital formation is specified in a similar way as the public sector one. On the fiscal side, government expenditures (G) are broken down into current and capital expenditures (budget categories), interest payments are encompassed by government expenditures. On the revenue side, government receipts are broken into the following categories; direct taxes which were aggregated due to the lack of data on both personal and corporative sectors; indirect taxes, import duties and tariffs. All these categories were endogenous determined. The deficit, or differences between receipts and expenditures is assumed to be financed from the monetary sector (bonds) and private money (central bank) as well as foreign borrowing, which is expected to yield the same impact results as the money financing policy.

On the private sector side, on the expenditure component we have considered the main aggregates, since the lack of data precluded us from distinguishing the balance sheet of private sector into its different components; householders and corporative or business sector. This constitutes itself in one of the main constraints (institutionally) we will consider only aggregate consumption even though we estimate consumption of durables and nondurables.

The behavioural relationships are accordingly, in this respect, the consumption expenditures, broken down themselves into non-durable consumption and durable consumption. On the investment side the lack of data did not allow us to consider residential and non-residential investment, although Icould disaggregate gross capital formation into fixed capital formation and demand for inventories (stocks). Both private and public sector breakdowns were considered except for stocks, which indeed is not a limiting aspect, due to the fact that a larger proportion of stocks is made of imports, in this oil economy.

As mentioned above when reviewing the monetary sector, the demand for money balance and asset are private ones. The presence of wealth effects link both sectors real and financial, so it has been demonstrated that expenditures (private) are sensitive to the portfolio or wealth of private sector. To deflate the nominal variables both in the real and financial sectors we have used the whole sale price index, which itself is determined in terms of prices pressure emerging from both domestic and external price level through the effects of nominal exchange rate and the import prices. The specification of a general deflector precludes us from utilising different deflators for different quantities categories due to the quality of data. Thus inflation rate is defined by the change in the wholesale price index.

The labour sector is fully specified and a Phillips' curve fashion; specification is carried out for the demand of labour, for unemployment and wages.

5.2.2 Market Sector and Decision Making Process

The most important decision making economic units are householders and corporate sector (private sector in aggregate); government sector, central bank or monetary authorities. They operate simultaneously in the goods market (real sector), money market (monetary and financial sector); balance of payments (for external sector). Interest rate is exogenous given but pegged by monetary authorities, the economy being one of which exchange rate regime is fixed, thus disequilibria is the market for foreign exchange will be affecting the stock of international reserves linking directly foreign market with the financial markets. Following our specification of financial markets and particularly the supply and demand for money balances when in disequilibrium is not connected through changes in interest rates as in Keynesian and monetary system. The market will clear with some lags through the real sector. In the real sector, disequilibria is absorbed through inventories even though we have defined a behavioural relationship for it. In short we are going to develop a model in which external sector (balance of payments) output (income) and prices, money and assets are all integrated. It considers the stock-flow behaviour in a small open economy. The stock-flow feature of the model presents an economy in which prices operate with adjustments and quantities adjustment.[71] In the real sector stocks were introduced with reference to fixed capital and stock (inventories) adjustment to their desired levels. In the financial sector we have incorporated the supply of money, (various categories), domestic government bonds, foreign assets and the stock of international reserves.

The integration between stock and flows result from the specification of the government budget constraint[72] and its effects and feedback affects on the real sector or expenditure sector.

Before we go on in describing the structure of the model, it seems important to digress about the stock-flow effects in an open, small economy with fixed exchange rate regime. The financing of budget deficits by money creation increases the stock of money, if interest rate falls and income rises, the equilibrium (new) is reached. The deficit clears and the stock of money ceases as it grows. The economy has reached a full stock flow equilibrium. The situation looks similar if the budget deficit is financed by bonds. In both cases the increase in the stock of money (bonds) introduce wealth effects which are better recorded in some demand functions. When felt in consumption expenditures an increase in wealth will increase consumer demand. When wealth is felt in the demand for money balances the new equilibrium require the specification of a portfolio balance approach to the demand for money. The same mechanism is valid for other monetary and non-monetary assets. In this regard the use of a portfolio balance approach to asset holdings is crucial to the argument of the presented model below.

When analysisng the balance of payments it is crucial to consider the type of exchange rate regime in force. In this case with a fixed exchange rate monetary expansion (contraction) are the by product of balance of payment surplus (deficit). No budget deficit is assumed above. But if we introduce a government deficit which is money financed, there is a balance of payments deficit which compensates the budget deficit. The situation is termed to be in flow equilibrium. However in the long-run it will imply a stock adjustment process, not necessarily in equilibrium. As full stock disequilibrium may persist, balances will flow due to foreign exchange transactions. A full stock equilibrium is achieved when income (flows) sterilise producing a balanced budget and balance of payments surplus.

The process described above considers only financial assets. We expect that holdings of capital stock will form part of wealth as well. If this is so, we assume that a model with portfolio adjustments stock and flow effects will produce eventually capital accumulation.[73] As we can see capital stock does not enter in our definition of wealth due to the lack of reliable data. However we have plugged capital stock where it does not produce feedback (wealth) effect. At this stage in the presentation of the model I follow Davies (op cit) in specifying a capital stock appreciation as a terminal variable. For further development of our model capital stock must be fully integrated. But for this, reliable data is necessary. Returning to the description of the model, we have included equations relating to the quantity behaviour which arises from the traditional macroeconomic variables, expenditure flows (consumer demand, net fixed investment, imports, exports, inventories, income and others). A price set of equations are included. These variables determine the price level, the nominal (real) wage rate, the export prices (non-oil exports).

The financial sector integrates the capital account of the balance of payments and further disaggregates money balances between transaction money, asset money. Private sector financial portfolio is composed of money, bonds and foreign assets holdings which in turn result from the capital outflows of private sector. That sub-sector is completed with the endogeneity of the stock of money, which is defined as determined by the money multipliers and the use side of monetary base which determines the endogeneity of the money multiplier and its components. Finally the model is closed by the incorporation of the government budget constraint. The latter requires the endogeneity of government revenues. Thus a set of taxes equations is specified. Government expenditures include interest payments and it is exogenous to the system.

The procedure to which we attach ourselves in the presentation of the model's equation is to introduce the specification of particular equations (models) according to the sector each equation belongs. So we are presenting sector by sector's equations.

When reporting the theoretical specification of each function (equation) we are simultaneously reporting the respective survey carried out into the theoretical and empirical work in the corresponding area.

The econometric methodology assimilated in the specification, estimation and testing is due to the works of Hendry and associates both in general as well as in specific terms. In general terms there is an emphasis on specification searches and diagnostic testing in the estimation of possible equations to be included in the model. In specific terms, the influence has been emphasised into the consumption function, investment and money demand, and the econometric methodology due to DHSY (1978) and Currie (1981) which is related to the concept of steady state and dynamic specification. An annex is enclosed in order to systematise the econometric methodology mentioned above.

5.3 SPECIFICATION, ESTIMATION AND TESTING MODELS EQUATIONS

In the specification of each model or function we will review the different conflicting theoretical developments as well as the most relevant empirical findings in both developed and less developed economies. We have done so to eliminate the bias of concentrating only on the review of the empirical literature emerged from less developed economies, since in spite of different and sometimes conflicting results found in empirical work related to developed industrial economies and less developed economies, this offers an important source for the learning process of understanding less developed economies. Our review demonstrates that apart form the institutional factors which are presented in the collection of a plausible database and the imperfections in the market clearing process the econometric methodology we use enables us to trade off the main features of the data generation process with the theoretical framework of particular area. This is important in less developed economies in which some theoretical postulations are difficult to test due to several institutional and historical factors.

5.3.1 The External Sector: Balance of Payments, the Demand and Supply for Exportables and Importables

To begin with the balance of payments, we have disaggregated it in the following way.

$$BOP = CU + CA + EO \tag{5.1}$$

$$CU = X\ Px\ e - IM\ Pm\ e_t + NFP \tag{5.2}$$

$$CA = PBCF + PRCF \tag{5.3}$$

where BOP_t is the overall balance of payments, or the change in the central bank's foreign reserves at time t. X_t is the volume of exports at time t, Px_t is the export prices index, e_t is the exchange rate for exports; IM_t is the volume of imports, $_t$ is the import price index.

CU is the current account and CA the capital account where PBCF and PRCF are public sector capital flows and private sector capital flows. The balance of payments (BOP) is related to the stock of foreign reserves through this accounting identity:

$$IR_t = IR_{t-1} + BOP_t \tag{5.4}$$

where IR is the stock of foreign reserves at time t. By dropping the exchange rate we are expressing the variables of the external sector in US dollars.[74] To carry out our investigation an analysis of current account components I shall drop net factor payments to equalise the current account with the balance of trade. So we can utilise our discussion in the context of balance of trade components, imports and exports. Let us note that the discussion and survey of the elasticity approach in Chapter III applies here as it was assumed that the balance of payments is equal to the current account. To simplify even further we will discuss in terms of balance of trade.

We emphasize the discussion of exports and imports of independent markets in the context of the elasticity approach and on the effects on both markets of an exchange rate depreciation. Nominated as the Marshall-Lerner-Robinson condition the price elasticies of supply (demand) for exports and imports are the subject of the analysis of exchange rate changes.[75] Those conditionsassumes a one to one correspondence between the terms of trade and the exchange rate changes, in this case an exchange rate devaluation. The main postulate is that, provided the conditions hold, a devaluation will improve the balance of trade.

As can be seen from the above, the emphasis of this approach is only on changes in relative prices whereas other factor explaining the balance of trade (exports and imports) are considered to be constant. For the purpose of our analysis and model presentation we separate both function, imports and exports in order to examine both the theoretical and the empirical evidence in accordance with each function.

5.4 EXPORTS

Early studies of exports were mainly aimed at recognising the conditions for balance of payments correction policies in line with the traditional elasticity approach to exchange rate depreciation. Those studies were concerned with the size and the right sign of the prices elasticities, since exports were in part defined from the demand side income ad prices always entered as explanatory variables, see Dornbusch (1985) Khan & Goldstein (1978), Goldstein and Khan (1980), Khan (1974), Marquez & McNeilly (1985). Foreign trade, and particularly exports have been both theoretically and empirically studied in the context of two general models; firstly, the imperfect substitutes model which assumes that neither exports or imports are perfect substitutes for domestic goods; or perfect substitutes model which assumes that traded goods and untraded goods are perfect substitutes.[76] The main implication for the imperfect substitution model is that the low of one price may not hold across countries.[77] The exception could be when the trade is for standardised commodities. The conventional approach in specifying export demand and supply function is by considering the relative price competition issue. In the demand side the relative price is the ratio of export price to competitors export prices. The exchange rate enters to homogenise to one specific currency, which in empirical work it has been specified as in the framework of the elasticity substitution.[78]

According to these postulates the demand for exportables is given by the following expression:

$$Xd = f1\ (Pd/PX)/e \qquad (5.5)$$

where $[\delta Xd/\delta(Pd/PX)] < 0$

On the other hand the supply of exportables assumes that exports is an increasing function of its own price and decreasing function of the domestic prices. The supply of exports takes the form:

$$Xs = fz\ (Px/Pd) \quad \text{where} \quad [\delta Xs/\delta(Px/Pd)] > 0 \qquad (5.6)$$

where export price is assumed to be endogenous in this model of imperfect competition. If perfect competition holds, as is common with commodity trade, exports price is exogenous to the system. The domestic price index which is incorporated to deflate export prices explains that given export prices level it is likely that exports are affected if profitability (costs) rise (decrease), since factor costs are affected by domestic prices. According to Khan and Goldstein (1985, op cit) the advantage of presenting both the demand the supply side of exports is to specify simultaneously the relationship between volumes and prices.

However most studies in the subject have estimated models for export with assumption that its price elasticity is infinite. So the estimation of the supply for exports can be done by single equation method, OLS. Already Orcutt (1950) provided strong criticism for the probable bias in the price elasticities, to mention here the simultaneous supply and demand schedule, observational errors, aggregation bias and adjustment lag.[79] However we can minimise this objection arguing that the definite supply elasticity assumption is more dependable when exports prices are exogenous, as it is in the case of commodity export.

Another aspect, which is related to the simultaneity issue is the exogeneity of domestic prices. There is empirical evidence, Goldstein (1980) which says that the domestic price variable, money wages, are strongly affected by exchange rate depreciation (appreciation) and by import prices. Such effects could reveal that high price elasticities could not guarantee that in the case of depreciation or expenditure switching policies could effectively improve the trade balance (Khan & Goldstein 1985). This issue is linked to the fact that there should be required strong assumptions to regard export prices as exogenous, which accord with some authors (Khan & Basevi (1980). This is only possible with the conditions of perfect substitution. These assumptions of price elasticity of supply for exportables is specially relevant when productive capacity is underutilised in the exportables sector, or how it is affirmed by Aurikko (1985), when production is subject to constant returns to scale. For a specification along these lines in which the supply for exportables depends, among others, on the domestic supply conditions see Frankel and Johnson (1976).

In summary and returning to our discussion about the specification of exportables function we will allow for factors affecting the demand side and factors affecting the supply side. In what we can call the demand side effects we consider the economic activity abroad, the effects of relative prices on demand, several institutional factors.[80]

With respect to the supply side determinates, apart from those mention above, we consider the relative price or the ratio of export prices on domestic prices, the profitability and the pressure and profitability facing competing exporters, domestic economic conditions such as supply bottlenecks and institutional factors.

The determinants of Venezuelan non-oil exports are to be explained in the context of this imperfect substitutes model. Thus as non-oil exports is our dependent variable we will consider the fact that oil exports do not affect directly the exports of non-oil products.[81] As there is a strong component of imports for export output. This specification will allow us to consider the argument that the exportable industries or sectors required indeed import components. This issue is important since the import substitution policies[82]implemented for some period intensified the imported inputs in the exportables sectors. Before we turn to the development of our export function let us take a review of some of the most important empirical works on the demand and supply for exportables. What is of our interest here are the specification issues and the econometric modelling followed by these works.

There is one aspect which appears with a larger importance in most empirical works; it is the aggregation bias once referred by Magee (1975) as the most troubling problem in empirical work on the foreign trade. Different exports categories are usually aggregated into larger groups, this gives an excessive weight to exportables with different (lower) elasticity, as well as compensating product price changes could imply less aggregate price variations. Concerned with these problems, usually empirical works have tried to disaggregate the trade flows.

Parallel to the aggregation bias there is as well an important problem concerned with measurement errors. Since export price indices may not exist, researchers have been inclined to work out unit value indices which reflect a part of price variations, volumes variations as well.[83]

It is customary in the literature of empirical works that exports and import functions are estimated as demand functions subject to the simultaneity problem. See Goldstein and Khan (1978), Browne (1982) inter alia. The dynamic structure of such estimated functions usually reflect the assumption of partial adjustment, in which a distributed lag or Almon lag have been embodied. The functional form must 'accept' in the non linear forms, linearised by a double log specifications. A representative work of these vintage models is Goldstein and Khan (1976) in which they estimated the demand and supply for exports simultaneously from several developed countries, and Khan (1974) in which he estimated imports and exports for fifteen developing countries. The estimation was carried out taking care of the simultaneity bias, so he estimates simultaneously the domestic demand (foreign) demand for and the domestic (foreign) supply of exports (imports) The procedure traditional in those cases was to impose a double log linear model where elasticities were constrained at all levels of the variables. This would be not adequate since some trending variables might imply that elasticities are not the same. Furthermore, as we all know, the import substitution process could indicate a decreasing price elasticity once income is growing steadily. The expectation that the import substitution switch from imports of high price elasticity to imports of low price elasticity as intermediate inputs and capital goods. These comments will be detailed in the imports section. However, they were brought about as the estimation was simultaneous. His estimation of the supply for exportables is absolutely symetric to the import case, since both foreign and home counterparts are introduced in the model. However, we could argue that the domestic functions are probably mis-specified since the domestic supply of exports as well as the demand for imports are assumed to be affected via relative prices, that is export or import prices to domestic prices. Khan's specification incorporated proxies for the quantitative restrictions on trade which are probable common in less developed economies.

The approach taken in this paper will be to endogenise exports so as to being into the analysis the impact of domestic economic growths, relative prices and world demand in the determination of supply for export. The approach will be similar to A Winters (1981) by allowing factors from the demand and supply side to affect the export function of the Venezuelan economy to the extent that growth and relative price are in turn sensitive to monetary and fiscal policies as well as for other policies of balance of trade correction. The impact of these policies on the export sector can be discerned indirectly, in the first instance. The level of exports of goods and services (X) would therefore be disaggregated into oil exports XOIL and non-oil exports (XNOIL), the former is endogenised and it is a residual from the following accounting identity:

$$XOIL = OILPROD - DCOIL \qquad (5.7)$$

where OILPROD is oil production and DCOIL is the domestic consumption of oil. This approach is to some extent justified as the oil domestic consumed has grown steadily, while oil production has been affected by the supply side and by the OPEC quota systems. Although most oil production is for exports, hence it is reasonable to suppose that domestic production is geared toward implementing the decision of oil producers of how much to export. There is important to distinguish two periods in which the decisions about exports of oil is concerned.

Thus exports are disaggregated accordingly in the following way:

$$XTOT = XOIL + XNOIL \qquad (5.8)$$

In the period of study the Venezuelan non-oil export are made absolutely (1955-1984) of commodities, among them iron ore, aluminium, coffee, cocoa and some manufactures. For simplicity I have aggregated these exports into a unic category of non-oil exports.

The volume, or in this case, the value of non-oil exports is determined by the supply side, since non-oil exports in this oil economy have been reduced drastically in the last 30 years, indicatingthe traditional effects of the "Dutch disease" effects on the non-oil economy. It is assumed that non-oil exports are not driven by world demand, therefore it is determinated from the supply side. Non-oil exports are determined in the following non-linear function:

$$XNOIL_f = \alpha_0 \, Y_t^{\alpha_1} (Px_{t*} \, e_t/Pd)^{\alpha_2} e^{\alpha_3} \qquad (5.9)$$

Where ko is some constant, Y_t a measure of domestic acticity Px_t. e_t/Pd is a measure of relative price where Px is export price Pd_t is domestic price index and e exchange rate. This Cobb-Douglas functional form is chosen firstly from an econometric point of view. since as export funtion it can be easily estimated by linear estimation methods once we take the double log transformation. Another point is that the interpretation of the co-efficients is easier than in the case of a normal linear. Then the co-efficients of domestic measure of economic activity and the relative prices are easily interpreted as the elasticities of export with respect to the domestic activity variable and the price elasticity. In such Cobb-Douglas function, the mentioned elasticities are independent of the level and units of these variables, which is not true of a linear functional form.

The rationale behind the use of domestic output which is suggested in the trade literature make the assumption that in small very open less developed economies exports are supply determined, that is, the assumption that a small country can export all it can supply at given world market price. The relative price variable Px.e/Pd merely states that as the foreign price of exports increases relative to domestic prices exports increase. Accordingly an exchange rate depreciation, an increase in e, with stimulate export. This explanation is standard to the specification of export function for both developed and less developed economies, see Goldstein and Khan (1976) (1985), Khan (1976) (1974). However, it remains an important aspect in this relative price variable, since domestic prices are likely to be affected by the exchange rate devaluation. a net effect should be found since, if relative prices are not fixed as is Johnson (1977), devaluation effects could offset any relative price advantage for exports if domestic prices grow in line with world prices. Although this result according to the MABOP should hold, it has been demonstrated that the devaluation has permanent effects on the balance of trade provided the Marshall-Lerner-Robinson condition holds.

5.4.1 Non-oil exports.Empirical results.

For the estimation of non-oil exports we have considered the period from 1960 to 1984, the data is annual (see Data Appendix).

Non oil exports were defined as the aggregate of non-oil commodity exports plus other exports. This aggregation is justified by the fact that non-oil exports make only on average (8%) of total exports.[84] This situation is typical of an oil exporting country such as Venezuela. The domestic output variable expressed in national currency (Bolivares) is GDP at market prices in constant prices of 1968. The relative price variable is defined as non-oil export prices with respect to domestic price. All variables are expressed in logarithms. We assume that exports (non-oil exports) respond to variability of prices or to price relatives, as well as to the level of domestic production of exportables. The desired supply of exports can be expressed as: $X_s = f\ (Pd/Px, Y)$ or linearised

$$\log X_{s_t} = \alpha_0 + \alpha_1 \log (Px/Pd)_t + \alpha_2 \log Y_t$$

where X_s desired supply of exports, Px non-oil export price and Pd domestic prices, Y domestic output.

The starting point of the dynamic specification search is the autoregressive distributed lag model (ADL). Rewriting the above expression we get the general form needed for the specification search.[85]

$$\log X_{s_t} = \alpha_0 + \sum_{i=0}^{n} \alpha_1 \log X_{s_{t-1-i}} + \sum_{i=0}^{n} \alpha_2 \log Y_{t-i}$$

$$+ \sum_{i=0}^{n} \alpha_3 \log (Px/Pd)_{t-i} + u_t \qquad (5.10)$$

Note that since we use annual data the dynamics of the model is likely to be rather simple, however we have written the expression above in more general terms. As exporters do not adjust to changes in the relative price or in the level of domestic output instantaneously, it is expected that they follow a distributed lag rule for dynamic adjustment.

After several trials and reparameterisation we arrived at the following selected estimated equation:

$$\begin{aligned} A \log (RNOO11X)_t = -1.7412 &+ 0.6815\ A \log (6DPREAL) \\ &+ 0.4732\ A \log (RNOOILX)_{t-1} \\ &- 0.5315 \log (RNOOILX/6DPREAL)_{t-1} \\ &+ 0.0541\ A \log (RELPRICE) \\ &- 0.1802\ D1 + 0.6224 D2 \qquad (5.11) \end{aligned}$$

The evaluation criteria for the selected equation follows Hendry and associates' econometric methodology and is presented in more detail in the Appendix dedicated to the Econometric Methodology.Note that in the estimated equation the standard error of the regression (SE) is 0.0564.7. Furthermore the LM test for residual serial correlation, (in F form) is not significantly satisfying the necessary condition for the absence of systemic lack of fit, i.e. white noise residuals. Such residuals would also be innovations since the variance of the unrestricted equation (not reported) measures the innovation variance. Thus the Ftest[1] tests the joint significance of additional parameters in the unrestricted model and which we excluded in the estimated restricted model above. Residual hetrocedasticity, of the type autoregressive and conditional variety is tested by the ARCH test proposed by Engle (1982), and it was found to be not to significantly satisfying as well the condition for no mis-specification. Furthermore White's standarderrors were not different from those traditionally computed . According to these tests all coefficients are well determined and jointly significant accordingly to F.test even though the relative price variable is not significant at 5%.

In summary, Appendix 2 lists the coefficient estimates of the associated conventional standard errors and the diagnostic statistics, including normality and functional form tests. The coefficients in the equation above have sensible values and emphasise the role of contemporaneous and lags information (adjustment). RHS variables are orthognal to each other in spite of output and non-oil being intercorrelated. Output growth and relative export prices positively affect non-oil exports, where the long run output elasticity indicates proportionality (unit elasticity). The growth of output positively affects the non-oil exports from the supply side. Relative prices similarly positively affect (by its changes) but it is not significantly different from zero at 5% significance. The lagged dependent variable reflects certain lags by exporters in adjustment to their desired levels (changes). An important feature of the resulting dynamic specification is that the rate of change, rather than the levels of the output variable, would be relevant to explain non-oil exports. In the static long run case there is no effect of this variable on non-oil exports. Proportionality exists between non-oil exports and output since the long run income elasticity is unit. Note that the disequilibrium term in the estimated equation is represented by the error correction term.[86]

To investigate the parameter constancy of the above model there are several methods available; namely parameter constancy test and recursive residuals. Testing for parameter constancy is important from an economic,

economic systems may alter when structural changes occur. Thus it is important to identify empirical models with reasonable parameter constancy which are interpretable when some shocks occur. In this regard recursive estimation provides an important insight in the investigation of parameter constancy. On the other hand, testing for parameter constancy is done by means of Chow statistic for parameter constancy.

One step residuals were estimated . The associated Chow test (reported) in some extent, project the information about constancy given by recursive estimation. Theory consistency is given by the signs of the coefficient which are those expected according to the theoretical model proposed at the beginning of this section. Predictive Failure tested by Chow (1960) and Pesaran (1985) complete the evaluation of the model. This means that the model could be extended to future information. The reported Chow Test tests the variance of the forecast errors with the variance of the sample residuals.

5.5 IMPORTS

Within the framework of imperfect substitutes model imports function is modelled separately, since the imports demand do not represent any excess demand (demand an supply) for imports in this particular case. According to the traditional demand theory and to the underlying production function imports can be by maximising their utility or minimising their costs subject to a budget constraint and the producer's cost constraint.[87] The arguments for these import functions should depend on the relative prices and income level. In general and under certain conditions a country's trade (imports) over time will depend on the country's income intensity (elasticity) of demand for In a more detailed account the demand for an imported good will reflect the difference between domestic demand and supply for that particular good. In accordance with this the estimating of a country's import function for goods or group of goods is in general reduced to the estimation the domestic country demand function for such good or group of goods. By generalising and considering a disaggregate import function, we shall recognise the following properties:

i) Homogeneity: a homogeneous function of degree zero in prices and income which implies that no money illusion is expected, since equal changes in relative prices and income leave the volume of goods demanded unchanged.

ii) Negativity: negative substitution effect.

iii) Symmetry: cross substitution effect of good i with respect to price of commodity j is equal to the cross substation effects of good j with respect to good i.

Apart from the theoretical and analytical propositions of the consumer demand theory and producer optimisation production subject to its cost constraint there are no exact derivations for the particular import functions which affect as well the functional form which such import demand functions have. In accordance with these comments the specification, functional form, estimation and testing will follow the Hendry and associated approach in which a general model is set up by trading off between theory admissible and data equation process (data admissible) postulates.[88] In reviewing the literature we have found that linear and doble logarithmic form have been the form tried by most investigators in the subject. The preference for the doble logarithmic (linear) form is due to the attempts to avoid the main draw back of the simple linear form which is the price elasticity as income increases.[89]

However constraining the elasticities to be constant at all levels of the relevant variables it might not be adequate, since trending variables (as income and imports) could indicate the presence of different elasticities. Income elasticities larger than one could imply unbounded growth in imports.[90] Furthermore if we consider a situation in which import substitution policies have been imposed for a long period we could easily assume that price elasticies diminish when income increases, since once the import substitution of consumer goods is finished, imports could (indeed) consist of intermediate and capital goods which are characterised by their lower elasticities.[91] The chosen demand function (double logarithmic) have been normally regarded to hold in every period. The dynamics of the adjustment has relied in most cases to[92] the partial adjustment mechanism represented by:

$$\Delta \log M = \emptyset (\log M_t^* - \log M_{t-1}) \text{ for all } \emptyset<0<1 \qquad (5.12)$$

which gives the following estimated equation:

$$\log M_t = \alpha_0^* + \alpha_1 (Pm/Pd) + \alpha_2 \log y_t + u_t \qquad (5.13)$$

$$\log M_t = \alpha_0 + \alpha_1 \log (Pm/Pd) + \alpha_2 \log y_t + \alpha_3 \log M_{t-1} \qquad (5.14)$$

where $\delta_0 = \emptyset$ and $e_t = \emptyset\ \delta_2$; $\delta_2 = \emptyset\ \delta_2$
$\delta_3 = 1 - \emptyset$ and $e_t = \emptyset\ u_t$ whose representation is ignored in this particular adjustment model.

The salient feature of this model is that is is assumed a similar reaction in the short-run and in the steady state. It follows that such features might not be appropriate in spite of the periodicity we use. So the model ignores the possibility that equilibrium is reached in a period shorter than a year (with annual data) since the mean log may be of 2 or even 3 quarters.

With respect to the partial adjustment model (3 above), we infer[93] that the model stabilises its behaviour without regard for changes or not in the relevant variables. The parameterised equation 3 above which includes the lag dependent variable in the right hand side could produce collinearities between it and the other right hand side variables when the error term is serial correlated. It is known that OLS will not yield consistent estimators. However in spite of these most models estimated for developed and less developed economics are similar to above model 3.

A final point with respect to the lag structure is it is assumed in 3 that their lag structure is equal for all right hand side variables. The important fact here is that invalid omissions of lagged right hand side variable could have important repercussion because the shape of the distribution lag is highly skewed with a large mean lag when b_3 is large. Thus for the partial adjustment model, the mean lag is B3/1-b3 and the medium log is $\log [\alpha_3/2]/\log \alpha_d$.[94]

Among the many classification of foreign trade used in empirical work we have developed our empirical investigation with the classification of foreign trade according to the kind of traded commodities which are the most favoured approach found in the literature. In general it is assumed that in volume terms, imports are determined by the above non-linear function, which is standard specification in which the notation is conventional, and where b1 > 0 and b2 < 0. In the context of developing economy some authors have recommended the use of a net foreign asset (real terms) to proxy for the stringency of import restrictions which usually characterise imports. (See Khan (1974) (19878) Marquez (1986) (1987), A Winters (1987)[1] Hamphil (1974).[95]

In our particular case we have one argument against the inclusion of such effects, since balance of payments surplus and inflows of foreign reserves, mainly through increased exports and capital inflows is not an induced effect of a monetary gap, as in the Johnson's world. The rapid accumulation of foreign reserves during the period of study was a result of decreased imports, but of increased exports and capital flows. In fact we underline that Venezuelan imports increased greatly over the period of study because the accumulation of foreign exchange reserves (net assets) induced the government to relax import restriction, quotas and other fiscal policy instruments in the trade balance. In our review of empirical literature, I will concentrate for this particular aspect in works related to Venezuelan economy. The imports function appears as one of the few empirical works with leterature related to Venezuela in general and in particular. We have found four exercises using Venezuela data with the target of estimating both income and price elasticies for imports.

The exercises emerge as a consequence of testing the monetary approach for Venezuela. Indeed Khan (1974, 1974, 1976) estimated respective imports demands. In all these papers Khan estimated the same model (partial adjustment) reviewed and criticised above. In Khan (1976) the estimated equation is specified by including the relative price variable, import prices relative to domestic prices. He uses quarterly data[96] and found that the price elasticity ill-determined with incorrect and sign and not significantly different from zero. The income elasticity although well determined it is somehow small. He does not report long-run elasticities. The above results correspond to his first differenced model, as there is strong evidence that the good fit for such equations is particularly due to spurious correlation between imports and income, as both variables have common trend, as we demonstrate in our exercise below.[97]

In line with this his results on the levels equation appear standard, right sign, good size. Using data from the period 1950-1972, Khan

(1979) estimated an equation in which no relative price variable is included. He substituted an import price variable which makes import demand a decreasing function of import prices. He did not find domestic prices affected the demand for imports, which we assume is a price for the aggregation bias as there is no provision for the policies of import substitution which were applied in the sixties and early seventies. The comments mentioned in criticism of equations like this apply here. Finally in Khan (1974) he estimated an aggregated and disaggregated model within the same time period. The specification here is the same for all different goods of the disaggregated model. He reports price and income elasticities for all commodity groups. As they are not comparable with his previous work we will have no further comments. However the specification for each demand equation assumes total adjustment in the period of one year, which does not seem plausible.[98] In a more elaborate exercise Melo and Volgt (1982) estimated an import function for Venezuela using data from 1962-1979. Although their specification is the standard static model criticised above. Their main innovation is the re-elaborate activity variable as they expected that the oil shock during 1974-1979 affected the permanent income (wealth). The argument is that the calculation of the domestic product in real terms.

The changes occurred between 1974-1979 do not accurately measure the increase in wealth. This problem, in accordance with their argument could be partially solved if nominal GDP is deflated using a measure of price like consumer price index or wholesale price index. However these price indices contain import prices, so an increase in import price is affecting domestic prices both consumer and wholesale price index. The hypothesis is the homogeneity of domestic prices in regard to import prices as the effect cancels out and income in real terms falls accordingly. So the estimate of price (relative) elasticities incorporates only a substitution effect and not an income effect. Thus their result is not comparable with previous (Khan (1974) studies. They finally added a dummy variable which has ones in 1974-1979 and zero otherwise which hopefully make their results comparable.

The argument seems reasonable, however, we need to test the effects of import prices on domestic prices, which according to the author required zero homogeneity. What seems improbable is that the effect of import price reflect in the domestic price as above, if we consider the fact of relative low inflation in the period, with respect to higher import prices. If this is so, we do not expect income to fall in accordance with an import price increase., Furthermore, the whole period is characterised by an absolute stable (unchanged) nominal exchange rate which could develop into an appreciated real exchange rate. Data on imports reflect that the oil shock of the period 1974-179 in income corresponded to an intensive increase in imports.

On another aspect, let us recall that their automatic adjustment rejected the assumption of disequilibrium (see Melo and Volgt (1983) p. 352) as their partial adjustment estimations are only valid for imports machinery and transportation equipment.

In summary all these estimations, Khan's and Melo & Volgt's present standard econometric results evaluated by their R^2, standard errors, sign and good fit. Our comments on these exercises are mentioned above and explicitly presented in the econometric methodology annex at the end of this chapter. Our empirical investigation starts from the standard model reviewed above. In order to get the coefficients estimated we have concentrated in examining the data generation process to capture the most salient features which should be incorporated in the statistical model. Our theoretical point of departure is the standard consumer demand and production minimisation cost for the two main components of Venezuelan exports. Since no suggestions are found to the dynamics of adjustment we have incorporated Hendry's and associates suggestions which require the model to be specified from the general to specific.[99] Although we will not report the aggregated import equation, for the purpose of the model completeness, I do report them for the sake of generality and in order to compare them with previous works. However comparability is a difficult task as data, deflators and periods are different. However we could see the evolution in estimating the demand for imports in Venezuela.

The level of imports of goods and services (IM) is given by the identity:

$$IMPTOT = IMPCGS + IMPKRG \qquad (5.15)$$

where IMPTOT are total imports, IMPCGS are import of consumption goods and services and IMPKAG import of intermediate inputs and capital goods. The rationale behind this disaggregation has been to take into account the different import intensities associated with consumption and investment (capital goods, and raw materials), rather than to consider or emphasise any qualitative or quantitative difference in their determinants. Another marginal aspect which justifies our partition of total imports is the consistency in the data, as there is a high risk when breaking down into more import categories as data is not consistent for such a long period consistency in the data with regard to detailed categorisation exists only from 1968. Thus our definition into two aggregate avoid the bias of errors into measurements. The import of consumer goods and services has been defined to be determined by relative prices, expenditure levels, activity variable as below:

$$IMPCGS = f\ (YDISP,\ Pd, pM) \qquad (5.16)$$

Where YDISP is disposable income, Pd domestic prices approximated by wholesale price index and Pm, import price in national currency. Such price variables as defined here ensure that price illusion is absent and furthermore makes relative prices spread as between domestic and imported goods sensitive to expenditure level. The elasticity of imports with respect to income is expected to be in the range of:

$$0 > \delta IMPCGS/\delta YDISP < 1 \qquad (5.17)$$

and with respect to relative price, is expected to be approximated as:

$$[\partial IMPCGS/\delta(Pm/Pd)] * (YDISP/IMPCGS)\ (Pm/Pd) \quad < 0 \qquad (5.18)$$

This specification says that according to the definition of relative price (Pm/Pd) we expect to have a negative affect on imports in the case of large spread between the domestic price level (here provide by wholesale prices) the import prices. The necessary condition is that the domestic prices (Pd) to be less that

$$(\partial IMPCGS/\partial(P_m/P_d)) *)YDISP/IMPCGS) * (P_m/P_d) \quad < \quad 0 \qquad (5.19)$$

Thus, the ratio of imports to the activity variable would approach the value of $(\delta IMPCGS/\delta YDISP) + (\delta IMPCGS/\delta Pm_{/Pd})$ as the relative difference between imports price levels and domestic price level approaches unity in absolute value. Thus Pm - Pd/Pd, or alternatively the domestic import price index Pm itself approaches zero or the ratio of import price (in domestic currency) to domestic prices nears zero $Pm/Pd \simeq 0$. Our specification above is that it approximates the underlying supply and demand schedules. Imports as defined is by definition the difference between the demand for importables less the home supply of importables. As demand is an increasing function of expenditure and a decreasing function of relative prices as between domestic and importable goods, the supply is defined as being an increasing function of relative price. The sign of relative price is the demand schedule is negative since it refers to the relative cost of alternative goods. On the other hand the import of capital goods and intermediate inputs (as raw materials) is confined to be determined by gross domestic product or alternative, an industrialisation index or capacity utilisation measure. It has been suggested the use of domestic manufacture[100], we have tried both. Relative prices enter in a similar fashion. Thus

$$\text{IMPKRG} = (\text{GDP, CU DOMMAN, Pm, Pd}) \qquad (5.20)$$

the implied derivatives sign the direction of the activity and price elasticities, so we expect that 0 < kIMPKRG/kGDP since import of capital goods and intermediate inputs as part of physical capital requirements is supplied domestically.

Again $\delta\text{IMPKRG}/\delta\text{GDP} > \delta\text{IMPCGS}/\delta\text{YDISP}$ since investments are assumed to be more import intensive. There is an underlying assumption here, and that is that there is no difference between private sector and public sector with regard to import intensities. The relative price variable enters in a similar fashion than in imports of consumption goods. However a minute difference exists since import price here is indicating the cost of capital good and intermediate inputs. Similarly in this case, the price elasticity of capital goods and intermediate inputs with respect to domestic price (Pd) is given as:

$$[\delta\text{IMPKRG}/\delta(\text{Pm}/_{\text{Pd}})].\,[(\text{GDP}/_{\text{IMPKRG}})(\text{Pm}/_{\text{Pd}})] < 0 \qquad (5.21)$$

If the activity variable is the value added of domestic manufacture we want to capture the effect of industrialisation on import of capital goods and intermediate inputs. However it can be assumed that import replacements by domestic production is affected through an expansion in industrial output. But as there have been – in the period of our study – no restriction to imports and particularly to imports of capital goods and and intermediate inputs the most important determinant is the import substitution process is the relative price difference rather than the industrialisation itself.

Finally, another supply side variable which evaluates the supply effect is approximated by the variable CU, since it is assumed that capacity utilisation (CU) is a proxy for non-price rationing (Gregory (1971)). Alternatively this variable could reflect he effects of cyclical factors on the imports of capital goods and intermediate inputs. Thus an increase in the capacity utilisation rises the propensity to import. A final though before we present our estimations for both import function, consumers goods and services (IMCGS) and capital goods and intermediate imports (IMPKRG). It clearly emerges that both imports and the activity variable (income) are endogenous variables, affected by policy shocks and other weak and super exogenous variables. The fact is that in a small and very open economy as Venezuela there are fundamental and structural links between (output) and imports of all categories, but particularly between output and imports of capital goods and intermediate goods. Although there is a strong link between import of consumer goods and the relevant activity variable: the permanent income of consumers. This suggests an indirect effect into the imports by interest rate and the stock of non-human wealth, on fiscal and on monetary policies. This highlights the differences between the short-run and long-run income elasticity. It is then argued that in the long-run the imports of consumption goods will decrease if terms of trade worsens, or if other fiscal policies shocks as tariffs barriers are imposed, as well as to exchanges (devaluation) in the real (nominal) change rate.[101]

On the contrary an increase in the income variable will increase the imports of consumptions goods. The link between intermediate inputs and the income variable is of technological character, and is implicit in the aggregate production function. Let us assume a situation in which the level of intermediate inputs is tightly linked to the production output. If some shocks affecting the trade balance introduce restrictions to import this kind of goods, output will be greatly affected and reduced. However this could be an extreme assumption since it is required that the ratio between intermediate inputs and output be constant over time. In accordance with the intensity of such links the demand for import of intermediate inputs is determined by the volume and category of capital in place, and on the intensity of price elasticity (relative price). As in the import of consumption goods, the policies and foreign shocks, such as tariffs, barriers exchange rate depreciation and import prices (in foreign currency) will have a say in determining the demand for import of this category of goods. Another factor which we do not consider explicitly in the import function, is the cost of labour and its relation to the potential substitutability of intermediate inputs. As before, the character of this substitution effect is defined by the capital in place, although it is expected that the long-run price elasticity is larger than its corresponding short-run. Accordingly the variability of the growth of the demand for intermediate inputs relative to the growth of output is much larger in the long-run than in the short-run. The remainder import category, capital goods, is likely to be an imperfect substitute even in the long-run. The strong link between the import of capital goods and income (output) can be observed in the effects of a reduction in imports of capital goods in the productive capacity. From the point of view of the firm, the desired imports for capital goods is determined partially by its rental cost and on interest rate, as well as exchange rate changes and policy shocks as tariffs, barriers and some non-economic factors as political pressure under budget restriction.[102] Increasing foreign exchange reserves will affect the import of capital goods since it can estimate the accumulation of capital due to induced expectations of larger output.

A final aspect in this link between imports of capital goods and output is given by the dynamic adjustment in the stock of capital by reacting to changes in production (output) under the condition that such variation in output will last for a in the long-run. The consequence is that imports for capital goods is less volatile than the output. It is likely that the dynamic adjustment to output expectation be slow.

5.5.1 Imports, description and estimated equations

Our discussion above set the basis for the specification of both import functions, namely imports of consumption goods and imports of capital goods and raw materials. The rationale behind this dissaggregation, as has been indicated earlier, has been to take into account differences in import intensities associated with consumption and capital formation, as well as to emphasise to some extent the qualitative differences of their respective determinants. Since the economy of

Venezuela is small and open we would consider both import components to have been determined in terms of demand and supply.

We have estimated an aggregate import function and report for completeness: the basic variables affecting aggregate import function has been identified as relative prices and expenditure levels.

One of the few empirical works using Venezuelan data found in the literature is the estimation of the import function. See Kahn (1974) Melo and Vogt (1982). Those works are concerned with the estimation of both income and relative price elasticity. Because data differs as well as the period of estimation, these works are not completely comparable with the one reported in this section. However, let us mention the major findings and compare these with our findings. In principle the specification is the same since the main goal is to analyse the import intensity of output and the relative price elasticity. Kahn (1974) estimated dissaggregate imports for a nine import category, for the period 1953-1972. Even though he does not estimate an aggregate import function he reports import intensity for output and price elasticities, which are derived indirectly using the elasticities from the estimated import categories. Interestingly the reported long run income elasticity is 0.239 which seems biased towards zero. The small size of this elasticity is perhaps a consequence of the indirect method used to calculate it.

Melo and Vogt's (1982) works estimate the import functions similar to the standard model by Kahn (op cit) for the period 1962-1979. However, their results differ since Melo and Vogt (op cit) relate the analysis of import intensity and price elasticity to the economic development of the Venezuelan economy. A dummy variable with one between 1974 and 1984 and zero elsewhere. The rationale for this dummy variable is to consider the period of high rise in permanent income, due to the increase in oil prices, when measured in real terms "cannot accurately measure the increase in permanent income" (Melo and Vogt, op cit, p. 352). They report elasticities for five import categories and for the aggregate imports. As well as in the first case, Melo and Vogt's results are not directly comparable. For the aggregate imports the report on long-run elasticity of 1979 and a price elasticity of -2.086, which, compared with Kahn's results, give an approximation of the evaluation of import functions in Venezuela from 1953 to 1979.

The aggregate imports we have estimated is over a period from 1955 to 1984, overlapping Kahn and Melo and Vogt's works. The long-run import intensity for output is 3.43 which seems a more plausible estimate according to the openness of Venezuelan economy measured by the import/output ratio. the price elasticity is 0.0178 which indicates, but is not significantly different from a zero or even 10% level of significance. This result is interesting since it reflects the high trend in imports in a country without foreign exchange difficulties during most of the sample period. Note that exchange rate recursions at 4.3 units of national currency for US dollar for nearly 20 years up 1983 when the exchange rate system collapsed.[103] Similarly recall the relatively low level of domestic prices during the period. Imported inflation was in most of the period adjusted by the system of subsides and low import taxes which were enhanced by the two oil chocks. An important suggestion is that the low and no significant price elasticity may indicate the failure of the import substitution industrialisation embraced after 1958. The main reason to report the aggregate import function was to emphasise the differences between both studies and to indicate the evolution of Venezuelan imports and its import intensities. See table X where import elasticities from those three works are reported.

For the purpose of this thesis I have desegregated imports into two categories; namely imports of consumption goods (fiscal) and imports of capital goods and raw materials. Such dissaggregation gives us a more real picture of the import function since in doing so we can separate the import intensities according to the goals of economic strategy envisaged in the sixties, i.e. the import substitution industrialisation (ISI).

5.5.2 Import of consumption goods . Empirical results.

The basic variables affecting the demand for consumer goods imports (both durables and non-durables) has been identified as relative prices and expenditure levels as below:

$$IMCGSR = f(Pm/p_d, YDISPR) \qquad (5.22)$$

where Pm/p_d is the relative price measure and YDISPR the disposable income. It is expected that 0 < kIMCGSR/kYDISPR < 1 since expenditures have a domestic component. The elasticity of imports with respect to domestic price level could be approximated as:

$$(\delta IMPCGSR/\delta(Pm/Pl) * (YDISPR/IMPCGSR)\ (Pm.Pl) < 0 \qquad (5.23)$$

The specification of IMPCGSR is partially an approximation of the underlying supply and demand relationship, since the demand for imports in any period is equivalent to imports less the domestic supply of imports. After linearising the above expression, by taking logarithms:

$$\log IMPCGSR_t = \alpha_0 + \alpha_1 \log YDISPR_t + k\ _2 \log (Pm/Pd)_t \qquad (5.24)$$

The specification search started from the general autoregressive distributed lag below:

$$\log IMPCGSR_t = \alpha_0 + \Sigma\ \alpha_1 \log(IMPCGSR)_{t-i-1} + \alpha_2 \sum_{n} \log\ (YDISPR)_{t-i} + \alpha_3 \sum_{i=0} \log\ (Pm/_{Pd}) + U_t \qquad (5.25)$$

As estimated before, IMPCGSR is import of consumption goods (fuel) at 1968 prices. The relative price variable is defined as import prices in domestic currency relative to domestic prices (wholesale price index). After several trials we arrived at the following selected estimated model:

$$\log(IMPCGSR)_t = -2.4057 + 0.8655 \log(IMPCGSR)_{t-1} + 0.3451 \log(YDISPR)_t - 2.225 \text{ of } \log\ (Pm/_{Pd}) + 1/3\ D1 - 0.30D2 \qquad (5.26)$$

The implied long run elasticity for imports of consumption goods is 2.56 which seems quite plausible for a small open economy with nearly no restriction on the foreign exchange market during the sample period. The reparameterised equation above implies a restriction in the relative price variable, so that the variable affecting imports of consumption goods is the change in the relative price variable.

The evaluation criteria for the selected equation follows Hendry and associates' econometric methodology outlined in the appendix. Summary of these evaluation criteria can be found in table 7.

Observe that imports adjust quite rapidly to their desired level as can be inferred from the value of the lagged import coefficient (0.86). Thus we would expect about 95 per cent of the adjustment being completed within a period of two years. Imports are elastic, both with respect to expenditures and to changes in the relative price.

5.5.3 Imports of capital goods and raw materials. Empirical results

Import of capital goods and raw materials is considered to be a function of capital formation (DOMMAN), proxied by the value of domestic manufacturing; relative prices:

$$\text{IMPKGR} = f\ (\text{GDP}, \text{DOMMAN}, \text{Pm}/\text{Pd}) \qquad (5.27)$$

We would expect that kIMPKRGR/kGDP > 0. If part of physical capital requirement is supply domestically the partial derivative is expected to lie between zero and one (0,1). As investments are expected to be more import intensive, we expect that:

$$(\partial\text{IMPKRGR}/\partial\text{GDP}) > (\partial\text{IMPCGSR}/\partial\text{GDP}). \qquad (5.28)$$

These results are not expected to change if GDP above is substituted by DOMMAN in the import of capital goods and by YDISPR in the import of consumption goods.The relative price variable is the same from the relative price variable in imports for consumption goods. The impact of industrialisation is given by the variable DOMMAN (domestic manufacture), since import substitution by domestic goods are affected through an expansion in industrial output. However, we may consider the fact that during most of the period, and particularly after the first oil shock, there was no restriction on imports of Venezuela. In this case it is expected that the driving force behind ISI must emerge from the relative price differences rather than industrialisation as such. In accordance with the above, we have estimated two equations for imports of capital goods and raw materials.

After linearising the above expression (in logs) we get:

$$\log \text{IMPKRGR}_t = \alpha_0 + \alpha_1 \log \text{GDPROAL}_t + \alpha_2 \log (\text{Pm}/\text{Pd})_t \quad \text{and} \qquad (5.29)$$

$$\log \text{IMPKRGR}_t = \alpha_0 + \alpha_1 \log \text{DOMMAN}_t + \alpha_2 \log (\text{Pm}/\text{Pd})_t + \alpha_3 \log (\text{GDPREAL})_t \qquad (5.30)$$

The starting point for the specification search is the autoregressive distributed lag model, as below:

$$\begin{aligned} \log \text{IMPKRGR} = \; & \alpha_0 + \alpha_1 \Sigma \log \text{IMPKRGR}_{t-1} \\ & + \alpha_2 \Sigma \log (\text{GDPREAL})_{t-1} \\ & + \alpha_3 \Sigma \log (\text{Pm}/\text{Pd}) \end{aligned} \quad (5.31)$$

After several trials, and after testing down for a more parsimonious restricted equation, we have arrived at the following parameterised estimated equation:

$$\begin{aligned} \text{A} \log \text{IMPKRGR} = \; & -0.7033 + 0.7347 \, \Delta \log \text{IMPKRGR}_{t-1} \\ & + 0.4675 \, \Delta \log \text{GDPREAL}_{t.} \\ & - 3.5562 \, \Delta \log (\text{Pm}/)_t \\ & - 0.3010 \log (\text{IMPKRGR}/\text{GDPREAL})_{t-1} \\ & - 0.3937 \, \text{D1} - 0.1368 \, \text{D2} \end{aligned} \quad (5.32)$$

By substituting DOMMANR for GDPREAL we wanted to measure the impact of industrialisation. We assume that investments are more import sensitive than consumption. So, in the same way as we have used disposable income as the activity variable in the imports for consumption goods, we substitute here DOMMAN as the activity variable which is directly related to investment (industrialisation).

Even though import of capital goods and raw materials is highly sensitive to the growth of output, relative price elasticity is high, contrary to the prevailing notion that there exists a very limited substitution possibility in capital goods in less developing countries. This result suggests that production of domestic capital goods has had an important growth during the sample period.

The same econometric methodology is used. We obtain the following restricted parsimonious equation:

$$\begin{aligned} \Delta\log \text{IMPKRGR}_t = \; & -0.4717 + 0.8638 \, \Delta\log \text{DOMMANR}_t \\ & - 2.896 \, \Delta\log (\text{Pm}/\text{Pd})_t \\ & - 0.3400 \log (\text{IMPKRGR}/\text{DOMMANR})_{t-1} \\ & - 0.299\text{Y} \, \text{D1} \end{aligned} \quad (5.33)$$

As expected the activity variable doubled the effects of a more general activity variable GDPREAL in the previous equation, and accordingly the selective price sensitivity is smaller. Note that there is an interesting common result in the above two specification; the long run elasticity implied in the proportionality assumption is unity as indicated by the error correction term. Both sets of variables are accordingly co-integrated, with the import of capital goods and raw materials. The adjustment of importers to the desired level is in the latter equation more rapid than in the previous, indicated by the coefficient of the lag dependent variable.

Appendix 2 below, shows the diagnostic test and the specification search results. As is common in this thesis, we have tested for parameter constancy and predictive failure test is a precondition of policy implication. See table X below and appendix.

Estimates of aggregate import equations

	Price elasticity	Income Elasticity
Khan 1953-1972	- 0.897 (- 2.34)	0.239 (1.07)
Melo and Vogt 1.8791962-19179	- 2.086 (- 6.52)	(14.18)
Guerrero 3.431955-1984	- 0.0058 (-.0134)	(4.65)

Note that both Kahn's and Melo and Vogt's studies report on static import function where importers adjust instantaneously. This likely dynamic misspecification (both use AR(1)) might be the reason behind the level of significance of the relative price variable. On the contrary, our reported equation implies that importers adjust with some lag towards their desired imports.

5.6 Capital Account

The remainder of the balance of payments block is the capital account which has been partitioned it into two major components; i.e. public sector external indebtedness and private sector capital flows which represents the changes in the private sector's holding of foreign assets.

This section is essentially concerned with empirical and theoretical determinants of the capital account of the balance of payments, in which capital account is concerned with transaction and substitution of financial assets which are denominated into different currencies. In general and disregarding our partition mentioned above the capital account is made up of short and long-term capital flows. Although the distinction is somehow arbitrary and it is today regarded as an empirical issue since long-term capitals are associated with long-term and short-term capital flows with short-term interest rate.[104]

In what follows we will address our discussion along these classifications, although the empirical work, and the econometric modelling of these flows will be helped by non-conventional derivation of the relevant data. However, in general it will be established the above criteria. (See Beanstock (1981)).[105] Recalling from chapter IV we note that the classical Mundell-Fleming model is based on capital flows, while portfolio theories suggest analysis in terms of a stock, or portfolio balance theory of capital movements. In accordance with this modern approach an important result is the effectiveness of monetary and fiscal policies in achieving external balance that could be increasingly dependent on the use of substitutability between assets denominated in different currencies, while in lesser degree on the asset mobility (cf. Obstfeld (1986)). These stock and flow relations appear for the first time in the context of establishing empirically the sensitivity of capital flows to differences in interest rate. They are incorporated into a more general Mundell-Fleming model when wealth and portfolio balance constraint are invoked to modify the classical Mundell model.

Regarding the optimal policy mix and the assignment problems (see McKinnon and Oates op.cit.). This Mundellian model embodies the assumption that any variation in the expected returns of a financial (in this case foreign asset) asset would generate a continuous flow of capital for as long as this new return is held. In many cases this approach was considered naive and not appropriate from its theoretical background as it implied an investor's behaviour in accordance with which expected return is the only determinant of agents' behaviour. All other factors were treated as being reflected in the interest rate differential levels. On the contrary the portfolio approach (balance) introduced the importance of risk as an additional factor relevant to the agents' behaviour. Thus agents are concerned apart from expected return, with the probability that actual yield may deviate from the expected yield. Accordingly, agents are assumed to maximise their utility which is an increasing function of expected yield and a decreasing function of expected risk (e.g. McGregor (1981), Melving (1983)). If we assume that there is an instantaneous adjustment to desired stocks with no wealth growth, the effect of an increase of expected returns on foreign currency denominated assets are as follows:

If $FA^* = f(if^e, id^e)W$ where FA^* is the desired stock of foreign assets and $\frac{\partial FA}{\partial i_f} > 0$; $\frac{\delta FA}{\delta i_d} < 0$ are the partial derivatives. (5.34)

If equilibria is to be achieved it will be required that the remainder of assets holding (domestic ones) be allocated towards foreign assets. Pure stock models like this have been critised by McGregor (1983, p.6) since these models have "failed to recognise the full implications of portfolio growth". In particular, he mentions the portfolio adjustment which occurs due to exogenous disturbances, since such adjustment does not necessarily require the reallocation of outstanding portfolio which is denominated in domestic currency. Indeed he showed that an increase in the expected foreign return (if^e) will cause a continuous flow (outflow) of capital provided than both variables measuring expected return (if^e, id^e) are different from zero. The reason being that it will result in an increase of the proportion of domestic saving invested in foreign assets (re McGregor op cit page 6). However models developed according to the stock and flows adjustments have been developed as noted by the author (see Branson & Willet (1971). The author proposes an alternative way of estimating portfolio adjustments, and in which the desired holding of foreign assets depends on both an stock and a flow adjustment.

In summary the literature on international capital flows (capital account) has been characterised by the use of Tobin-Markovitz portfolio choice models which determines the desired demand for domestic and foreign assets. As mentioned, foreign assets (its proportion) depends on the expected return measure and risk, thus the adjustment (flows) in the stock or the flows of capital will depend on changes in the same variables; risk and expected return. The approach, along these lines, termed as the stock adjustment, makes the basis for the modern theory of capital mobility (capital account), in contrast with the flow approach which relates capital flows to the levels of the return and risk measures. In spite of the difference set up by MacGregor (op cit) I will regard his approach as a general portfolio balance model, whose theoretical background may produce special cases from both the theoretical and empirical point of view. In doing so, I will assume perfect capital mobility, with pegged exchange rate and interest rate regimes. In reviewing the empirical works which have reinstated the portfolio model in general, capital flows are a function of expected rate of return, both domestic and foreign, a scale variable of wealth and the probability that actual yield may deviate from the expected yield. Miller and M Withman (1970) developed a model including capital flows, characterised here by long-term portfolio investment depending on the differential rate of return between domestic and foreign rate of return. In a very often quoted paper, Kouri and Porter (1974) presented a model in which capital flows were examined from a money equilibrium between demand and supply of money. The probability that actual return deviates from its expected return is proxied by a measure of exchange rate expectations. Since the period under investigation is a fixed exchange rate one, they decided to use dummies for periods where it could be possible to find definite expectations and changes in the rate of exchange. In another application of portfolio balance model for the modelling of capital account, Branson (1968) incorporated risk into the analysis of capital flow. Later in Branson and Hill (1971) risk is ashamed to be constant, as there are still many difficulties in measuring risk. Beanstock (1981) in his econometric analysis of capital movements developed a portfolio model in which short-term capital flows the covered interest arbitrage (interest rate differential adjusted by the expected exchange rate developments) should enter into the analysis. The uncovered differential is incorporated in his model the as it is expected that differential change affects in its own the capital account. Similarly expected changes in exchange rate are likely to affect the capital account sensitivity on its own. His model is formally represented by the following relationship.

$$FA = f\ (if - if + S - F) \qquad (5.35)$$

where FA is the demand for foreign asset, F is the forward rate, id-if is the uncovered differential, s the spot rate, S-F is the cost of forward cover, the short-term capital flow in estimable form is:

$$\Delta FA = f\ (S-F,\ id - i,\ \Delta S^e,\ \Delta S) \qquad (5.36)$$

where S-F is the covered forward cost

if-if is the uncovered differential

The rationale behind these functional effects is the increases in foreign assets if the uncovered differential decreases. Such equations, which recognise a free flexible (or managed) exchange rate regime can pick up the effects of speculators due to uncovered arbitrage, as well as effects from the spot and covered forward cost adjustments (covered transactions). It emerges that such a model has clear consequences with regard to the effectiveness of monetary policy and the degree of intervention.[106]

Finally, Cuthbertson, and cit (1981)[107] argue that with non-fixed exchange rate the capital account and exchange rate cannot be modelled as a reduced form. The argument is that some of these reduced form equations are not pure reduced because they have jointly determined endogenous variables among the right hand side variables. Putting the emphasis in short-term capital flows they develop a portfolio model. The innovation here is that the estimation involves setting a model which could be solved for the exchange rate. Thus, domestic demand functions for money and other assets will enable solutions for interest rates too. So their model incorporates a forward exchange rate equation, a short-term capital flows, long-term capital flows and traded flows. Our limited review into the literature of modelling capital account shows that the exchange rate is the dominant variable in the definition of capital flows, since it is jointly determined with capital flows. Another important aspect is the complete agreement in the literature, both theoretical and empirical in the specification of capital flows as being part of stock adjustment process, so it is not relevant the amount of disequilibria in the portfolio adjustment. We should be able to take account of this in the empirical work, according to the main characteristics of the data. To formalise the major findings both theoretical and empirical in the modelling of the capital account in Venezuela we will extend our main theoretical postulates in Chapter III when formulating the model for the analysis of the balance of payments.

Our main assumptions remain, the capital is perfectly mobile, the exchange rate regime is fixed as well as the domestic interest rate. In general, models do not model capital flows. However as it is noted from our review the net capital flow is an important component of the overall balance of payments, irrelevant of the exchange rate system. Under a fixed exchange regime we need to consider the wealth effect (adjustment) through the capital account, where the intensity of such wealth effects depends on the degree of capital monthly[108] and of effectiveness of monetary (and fiscal) policies. Thus interest rate changes will determine the inflow (outflow) of capital, where if its increases capital will flow in and compensate the upward pressure of interest rate and enhance the expansionary instantaneous effect (see Currie op cit page 31). If on the contrary, if there is a fall in interest rate, capital flows out, and reduce the fall in interest rate which in turns reduces the expansionary effects of the policy. If sterilization policies are carried out, the effects of these capital flows in interest rate (feeback effect) could be compensated. The effects of sterilisation policies will depend on the degree of capital mobility.

An important point should be made here, and that is concerned with the effects of fiscal and monetary policies on the composition of private sector's portfolio with the recognition of the balance of payments. Sterilisation policies affect the private sector wealth composition, however if there is not such a policy and capital flows freely, the capital account will favour the equilibrium on the private sector wealth.

A final remark should be done in the framework of the portfolio balance model and the wealth effects. In accordance with this model the capital account is affected by the changes in the interest rate, and not by its levels. The assumption being that the portfolio adjustment is instantaneous, so the capital account becomes zero once such adjustment is completed. However, empirical evidence show that disequilibrium in the capital flows shows that the capital is imperfect mobile, and that agents need not adjust their portfolio shares instantaneously to their full optimum level. They seem, instead, to succeed in undertaking a fraction of the adjustment each period.[109] If such disequilibria is recorded, in order to explain these 'continuous' capital flows, it is expected a 'continuous' portfolio share relocation. Tacayama (op cit) suggests that such disequilibria comes form a change in the stock of assets due to capital accumulation or economic growth. However in the light of his analysis he concludes that even in absence of economic growth a continuous flow of capital is due to wealth effects on the demand for assets of private sector; a point made by Currie (1981).[110] Tacoyama extended his analysis by incorporating a full set of fiscal and monetary policies to measure the wealth effects on the capital account.[111]

Having reviewed in some detail the literature, and considering the wealth effects as an important issue in the modelling of the capital account within one structural stock and flow model I turn now to present our approach for modelling Venezuelan capital account The modelling of capital account, under the circumstances explained in the introductory section of model structure is based on a simple portfolio balance model which introduces the stock-flow links between real and financial sectors through its wealth effects. The following expression summarises our simple portfolio balance model.[112]

$W = M + Bd + eFA$	(A)	(5.37)
$M = f\,(id,\ if + e^e,\ Y,\ W)$	(B)	(5.38)
$Bd = f\,(id,\ if + e^e,\ Y,\ W)$	(C)	(5.39)
$eFA = f\,(M,\ if + e^e,\ Y,\ W)$	(D)	(5.40)

The model could be extended by adding the central bank balance sheet in which the monetary base (MB) is equal to international reserves (IR) and domestic credit (DC), and equilibrium conditions for both markets money and domestic government bonds. Equation (5.38) relates the demand for money to the nominal return on foreign assets (if) adjusted for the expected exchange rate depreciation (e^e), domestic return (ie), non-domestic income and financial wealth. Similar specification for equations (5.39) and (5.40), while equation (5.37) is the budget constraint (financial) of private sector, where Bd, eFA, are domestic bonds, exchange rate and foreign assets respectively. The wealth constraint implies the assumption of substitutability among assets, then we get the following adding up conditions (see Chapter III).

The last condition reflects the homogeneity of degree one of these demand functions relative to wealth. As general assumptions we regard foreign assets as being infinitely elastically supplied and demanded at given interest rate. Furthermore we can recognise that the total domestic financial wealth is made of

$CN = W - DEBTG$ where debts is government net debts. (5.41)

Or CN = IR +e(FAg + FAp) which is equal to the accumulated current account surpluses including revaluations due to changes in the rate of exchange as predicted by portfolio models of capital flows deficits (surpluses) in the current account would be (at least partially) balanced by an inflow of private capital or by change in the international reserves. Thus

$$\delta eFA/\delta CA = \frac{\partial FA/\delta id}{\partial Md/\delta id + \partial FA/\delta id} > 0 \qquad (5.42)$$

where a deficit in the current account, which produces a fall in the cumulative surplus of CA implies a fall in the money base. These effects will push up interest rate and capital will flow in accordance, which means a fall in the stock of foreign assets held by the private sector. The whole (net) effect will depend on the sensitivity of money demand to changes in domestic interest rates, so a higher rise in interest rate will need to estimate a capital inflow, since money demand is weak sensible to interest rate increases. By symmetry we induce that a great demand sensitivity of foreign assets for domestic interest rate will produce large capital inflows. Implying that a larger interest (domestic) rate on foreign assets holdings will leave money demand and interest rate unaffected by the current account imbalances. It is expected that if the exchange rate is fixed, the scope for monetary policy is greatly reduced.

Assuming that monetary policy effectiveness should be tested, let us consider the offset coefficient which could be given due to an initial change in the money base, an open market operation that damages the domestic component of money base, which exceeds this final change.

$$\emptyset = \frac{\partial DC - \partial MB}{\partial D.C} \quad \text{or accordingly to our model above}$$

$$\emptyset = \frac{\partial eFA}{\partial DC} = \frac{\partial eFA}{\partial CA} = \frac{\partial eFA}{\partial FAg} \qquad (5.43)$$

which means that the more sensitive the demand for foreign asset is to changes in id, the higher is the offset coefficient. For an empirical job, some modifications are introduced to the above model since we will decompose the capital account into its most important components It was decided at first to disaggregate the capital account into both private and public sector aggregate since public sector is a net debtor (liabilities) and private sector is a net creditor (assets).

Our main task by breaking the capital account into these two ends is to study the demand for foreign asset of private sector, at which portfolio adjustment generates capital outflows (inflows) and public sector (excluding central Bank) of which external borrowing (lending) generates capital outflows (inflows) both in the short and in the long run.

Public sector capital flows are matters for the next section.[113] Our main purpose in this section is to investigate capital flows in the light of individuals and firms desire distributing their wealth between assets and liabilities in both domestic and foreign markets. So we target our approach in modelling the demand for foreign assets by the private sector, in proportions that are functions of the expected rate of return, costs and risks associated with them. For the empirical examination foreign assets are to be measured in national currency, so we take account of revaluations (eg):

$$e\dot{F}A = eFA + FAe). \qquad (5.44)$$

From the point of view of the history of data we have broken even further the flows, by disaggregating accordingly with it short or long term features. Although the distinction between long and short term capital when using annual data is a bit arbitrary the tables and the data collected by the Venezuelan Central Bank breaks the flows into short (up to one year) and long-term (more than one year) flows. For our empirical work we concentrate on short-term capital flows or the flows produced by foreign asset holdings adjustment induced by the right hand side variables. In accordance we assume that the desired net stock of foreign assets can be represented by aggregating the desired net portfolio positions of private sector transactions encompassing interest arbitrage, speculation, and other short-term behaviour. Data on stock is not available, and changes in stocks cannot be estimated from balance of payments data; this data covers only flows, while changes in net positions also occur as a result of exchange rate changes; that is revaluations (devaluations). So in the empirical analysis the private sector net holdings of foreign assets have been calculated as follows:

$$eFA_t = (eFA)_{t-1} + \sum_{t=1}^{T} (e_t + FA_t + eFA_{t-1}) \qquad (5.45)$$

as the benchmark is used the private bank deposits in foreign banks provided by IBS and IMF from 1981. Net flows (short term) were used to net out assets over periods.

The capital account now divided between private and public sector accounts is disaggregated in the following flows; (in US dollars)

$$KA = PBSC\$ + STCF\$ + PORCF\$ + OTHCF\$ + DIRINV\$ \qquad (5.46)$$

$STCF = (1 + if/100)*FA_{t}-FA_{t}$ see notation in the appendix.

$$\text{and} \quad FA_{t} = f\ (id,\ if + ee,\ Y,\ W,\ Z) \qquad (5.47)$$

where the derivatives have been already explained elsewhere in this thesis.

What calls for our interest here is the wealth effects due to an increase (decrease) in the level of stock of wealth. It is expected that foreign assets holdings increase due to wealth increases since spillover effects of any increase in the stock of wealth (portfolio size) will increase the holding of foreign assets, ceteras paribus, since holders demand should increase. We may expect, however, some ambiguity in the derivative sign. When considering the dynamic effects we ought to examine the lagged effect of the adjustment process. It is unlikely taht the adjustment be automatic (see McGregor op cit). However, the portfolio balance model requires that adjustments be instantaneous.

The econometric approach we utilise requires that for the empirical investigation any stock adjustment which takes place is left to be empirically determined. Theoretically, we assume instantaneous adjustment since changes in any of the arguments of the foreign assets function would generate a once and for all reallocation of the remaining wealth. Thus this dynamic approach, implies a disequilibrium in the stock adjustment which is likely to generate not only stock relocation but some continuous flows.See McGregor op cit.for a formalised approach. Our approach differs in which I did not fix the dynamics of other exogenous variables as it is implied by the partial adjustment assumed by McGregor inter alia.

In adopting the McGregor approach, the stock and flow relationship which generates capital flows could be given by their expression:

$$FA_{t} = f\ (id,\ if + ee,\ W) + f(id,\ if + e,\ W) \qquad (5.48)$$

The above expression assumes automatic adjustment. Following a partial adjustment (mcGregor) we rewrite the expression to be:

$$FA_t = \mu f(id, if + ee, W) + \mu f(id, if + ee, W) \qquad (5.49)$$

$$+ (1 - \mu)FA_t \text{ where } f \text{ is the adjustment parameter.}$$

In a more general setting we could specify this expression as being

$$FA_t = \mu \sum_{t=0}^{e} (id_t ; if_t ; e_t ; w_t) \qquad t=0 \qquad (5.50)$$

dynamics should be generated accordingly. In doing so we are not constraining the flow adjustment response to the change in the independent variables to be equal to the proportionate change in the portfolio size variable. Given that the dynamic of stock adjustment does not obey any particular economic theory explicitly, the log response is left to be resolved by the empirical work. Although this approach may be limited due to the periodicity we are using; annual data, we expect to have some kind of distributed lag on the independent variables. The response to the changes in the right hand side variables could be featured in the following way:

i) an instantaneous stock adjustment as wealth holders may substitute foreign asset for domestic assets or vice versa
ii) a long run lagged response of stock adjustment, and
iii) a wealth effect in the long-run, as the increasing volume of the portfolio agents distribute the return to wealth in a different way as they are affected by the changes in the risk and interest rate.

This latter possibility may become crucial in the analysis as we are considering the changes in the demand for foreign assets (changes in stocks). With a long-run growth it is expected that wealth increases causing a continuous capital flow up to the portfolio size reach it optimum. When the rate of interest (or the differential) abroad changes it is required in the short run a lagged stock adjustment. Such new level of interest rate could remain constant, although portfolios could still grow. In these new conditions a higher foreign interest rate will cause capital to outflow as long as the interest rate differential deteriorates. However the unchanged new level of portfolio will reduce the capital flows.

A final thought with regard to the recognition of wealth. By allowing wealth to enter in the specification of capital account we will be able to define the dynamic process which brings the economy to its steady state (portfolio equilibrium). Thus we recognise the implied wealth effects and avoids a potential unspecification.[1] The wealth effects which allows us to understand the continuous capital flows (flow effects) which characterise capital flow disequilibrium, signals a continuous portfolio allocation, since wealth can grow in the long run. The underlying reason being that wealth or portfolio size can be affected by government deficit (bonds and money issues), assuming a growing economy, so interest rate changes accordingly. The effect could be enhanced if foreign interest rate changes and no portfolio allocations are recorded. The whole interaction can produce repercussion effects on the balance of payments, since it is probable that current account disequilibria affects the stocks of money and domestic bonds and eventually wealth. Such disequilibria could go through the system affecting both real and non-real sectors. The capital account then can cope with this new reallocation (adjustment) of private sector's portfolios.

5.6.1 Private sector foreign assets. Empirical Results

Modelling the components of capital account, particularly the private sector component, require an elaborate registration at Central Banks which is not calculated in Venezuela in such extent. Capital flows of private sector involves direct investment, portfolio, long term investment in bonds and shares, commercial loans and credits, financial loans and credits and the other long term flows. The stock theory suggests that these flows are originated in portfolio adjustments as economic agents adjust its portfolio towards its desired level. Data collected and published by Venezuelan Central Bank does not come discriminated according to the above classification. In particular data is collected and taken into account is the time span which is attached to each transaction. So we have to infer the determinants of private sector capital flows according to its short or long term definition. This put the first set of limitations since we have to work with data aggregated which obeys different transaction purposes, since some of those flows finance foreign trade in goods and services, and some reflect the portfolio adjustment of domestic private agents.

For our empirical investigation, we rely on this temporal definition, assuming that capital flows are originated by private sector stock adjustment disregarding the nature of each transaction however different they are.

The second set of limitations inherent in the first one corresponds to the length of the observation time periods. We use annual data in our model, however we estimate a short term capital flow equation. It is known that with annual data the differences between short and long term capital flows is rather arbitrary. So, we assume that our empirical work will be under the constraint of errors in variable (measurement), which makes our results sensitive to the above type of criticisms. In that respect three items are singled out for those empirical examinations. Unfortunately we were were able to build empirical models only for short-run capital flows. The other categories, portfolio and other long term capital flows did not produce plausible results. Thus we left these categories unexplained, i.e. exogenous to the system.

This section reports the empirical findings of the empirical work based on private sector foreign assets accumulation. Capital flows of private sector where dissaggregated into short term portfolio and other long term follows. Capital flows are seen as originating from desires on the part of domestic private sector to change the composition of their portfolios. Following this approach we attempt to derive our estimation equation. since data for stock of foreign assets are not collected by any government body, we have estimated a stock measure of foreign assets, by utilising net short-term capital flows and the values of private non-banking sector bank deposits[115] as a benchmark; combining both stocks and flows we were able to estimate a series for foreign assets holdings including the revaluations. (See Data Appendix and our discussion above). Using a portfolio balance model as a base for the specification of the demand for desired stocks of foreign assets.

Reviewing the characteristics of the estimated model it should be noted that structural coefficients are statistically significant and have apriory theoretical expected signs. In the equation above, the dependent variable, i.e. the rate of growth of foreign assets, signals the important wealth effects. Note that expected rate of change in the exchange rate, or alternatively the interest uncovered parity adjusted for expected depreciation is missed from the equation since exchange rate only changes twice during the sample period;[116] first it was devalued in 1961 (25%) and second in 1983 (80%). This implies that the expected exchange rate is not observable during the sample period. A dummy variable has shown to pick up both devaluations. The estimated equation suggests that private sector foreign assets demand is driven by both stock and flow decisions. The flow decision of portfolio allocation is represented by the level of yield differential (not its change), in this case foreign real interest rate. Note that domestic interest rate has no effect. This result is expected since we have estimated this equation:

$$FA^{*} = f(ife, id, ee)\, W \qquad (5.51)$$

where FA* is the desired stock of foreign assets. Even though we did not restrict our specification search for the stock model, we have ended with a more restricted and parsimonious model.

$$\log FABS_t = \alpha_0 + \alpha_1 \sum_{i=0}^{n} \log FABS_{t-i-j} + \alpha_2 \sum_{i=0}^{n} \log W_{t-i} + \alpha_3 \sum_{i=0}^{n} id_{t-i}$$
$$+ \alpha_1 \sum_{i=0}^{n} if_{t-i} + \delta \sum_{i=0}^{n} (if + \dot{e})_{t-i} \qquad (5.52)$$

where FA are foreign assets in national currency.
After several trials we obtained the following parameterised more parsimonious equation:

$$\Delta \log(FABS)_t = -0.7898 + 1.09\, \Delta \log (WEALTH)_t + 0.0931\, RINTFOR_t$$
$$- 0.4345 \log (FABS/WEALTH)_{t-1} + 0.2118\, \Delta \log$$
$$(FABS)_{t-1} - 0.4504\, D1 - 0.03142\, D2 - 0.2902\, D3 \qquad (5.53)$$

Capital outflows in periods of negative interest differential signals the preference by private agents for a more developed financial system where the real interest rate abroad is a major stimulus. Above all, when there was no reason to expect a depreciation (appreciation) in the exchange rate. The stock motive in the above equation is represented by wealth effects. The disequilibrium term or error correction term indicates the proportionality between foreign assets holdings and wealth (financial) in the long run.

The results show that while the only foreign rate of return (real interest rate in levels) as a minimal although significant effect on

Appendix for the outline of the econometric methodology.

5.5.6 The Public Sector and the Capital Account

This section deals with the public sector capital account and it is mainly concerned with adjustments of the stock of foreign liabilities. The approach followed permits the incorporation of the stock and flow adjustment in a more general model in which the real sector enters treating foreign indebtedness as a case of capital accumulation. Capital (both long and short term) flows due to a process of real capital accumulation in a world of excess demand both in the public sector and in the private sector. Our main objective is to produce a integral body of theoretical propositions in which the excess demand in the domestic economy is financed by borrowing in international markets and in which borrowers are special economic agents; the public sector. This brings about the issue of sovereignty which, as we can see, is an important component in international financial transactions. In short we are concerned on an economy in which sovereign borrowing is exercised in an context of economic growth. Before we postulate our econometric modelling strategy we will review the already extensive literature of public sector (government) foreign indebtedness.

One of the most important issues of the government (public sector) debt financing is the external borrowing and its effects in financing deficits in the short and in the long-run. In this regard the popular two-gap model asserts that government (public sector) indebtedness is caused by deficits in the government finances and in the current account deficits financing. In general the external financing is considered to aim at closing that gap. In such a context considerations about external borrowing by public sector (government) should take into account an integrated objective function where borrowing   debt service and the macroeconomic effects of debt financing conform a whole body in the analysis of the determination of the public sector foreign debt.

The model we attempt to develop integrates some aspects of foreign borrowing (external financing) as long term (run) borrowing, debt service and the generalised effects of such financing objectives in an open small borrowing by public sector (government) should take into account an integrated objective function where borrowing, debt service and the macroeconomic effects of debt financing conform a whole body in the analysis of the determination of the public sector foreign debt.

The model we attempt to develop integrates some aspects of foreign borrowing (external financing) as long term (run) borrowing, debt service and the generalised effects of such financing objectives in an open small economy. The attempt at integrating the factors explaining borrowing abroad into a single framework is aimed at describing the evolution of the public sector's external indebtedness through its budget deficits and external balance financing, and through the savings - investment gap in the domestic economy, of both private and public sectors. Therefore the aim is to focus on those factors that determine the public sector demand for debt in general.

Traditionally, in the literature which studies the subject, both the excess demand on the part of the public sector and/or on the whole economy (including the private sector) is given by the investment policies, the domestic consumption behaviour, the domestic financial market etc., as for the ability of government to cope with external shocks. In more detail the government demand for foreign finance is strongly tight to the gap between its expenditures and its revenues.

In LDC where the tax system is ususally very inelastic, foreign borrowing appears as a suitable policy to fill the gap between revenues and expenditures (including debt payments). Under these circumstances it is a useful exercise to look at the short and the long-run effects of policies which lies behind the excess demand of the public sector. As the situation in the domestic markets looks unstable, it is worthwhile to note that the degree of financial integration (domestic and international) and the availability of resources that characterise financially repressed economy, does not seem to be of great help to mobilise large flows from private domestic sector towards public (government) sector. So, the less astringent source of financing this excess in expenditure is the external borrowing. Foreign finance apart from the advantages of producing an increase in the reserves that bring some sort of stability in the foreign exchange market at least in the short-run. However in the long-run it has been shown that some debt service problems may come when domestic and external shocks affect the trade (exports) with the consequent effects on the debt payment capacity of the country.

Under these conditions the scope for adjustment is limited, particularly in the LDC. Debt service constraints appear and a crisis in the balance of payments emerges as the exchange rate system collapses. It has been assumed that the country pegs its currency. But if the object of the indebtedness has been capital formation, any anticipated crisis might be delayed, although the burden of debt may worsen. However signs of instability can be clearly detected as well.

One additional issue should be reviewed when studying the foreign borrowing. There exists a theoretical presumption that increasing foreign borrowing will cause (instantaneous) appreciation of the real exchange, and cause an increase in the expected depreciation over the time. Such supposition must be examined closely in order to catch up the effects on the cost of the borrowing schedule.

Martin and Selowsky (1982) argue that if the real exchange rate depreciates over time, the cost of the external indebtedness (in home goods term) increases, the idea behind this hypothesis consists in that external financing resources flow in when traded goods are less valuable relative to the future, when debt service is due to be made. So it is argued that in the short-term the effects on the exchange rate is to appreciate, whilst in the long-term the effect is a real devaluation. The latter affects directly the cost of carrying out the service of the debt. That issue was also reviewed by Harberguer (1985), Dornbusch (1985), Khan (1986), where in general there are emphasised the effects of real wages, indexation and resources allocation between traded and non-traded goods. Khan (1986) studied the interaction between capital outflows due to private sector's portfolio adjustment and the public sector (government) foreign borrowing.

What is common, however, is the assumption that real appreciation of the exchange rate slows down the adjustment (stabilisation) of an economy towards exportables in order to generate enough resources to accomplish the payments requirements and to serve the debt. So the appreciation on the real exchange rate (or over-valuation of nominal exchange rate) will allow for increases in the government expenditures in the long-run. Further it might be argued that real appreciation of the exchange rate leads to a decrease in the domestic savings. Thus the issue may strengthen the links between both sides of the gap. In accordance, it is suggested the empirical testing of the causal relationship between the over-valued nominal exchange rate and the foreign indebtedness of the public sector and government (consolidated).

The external indebtedness of the public sector and the corresponding associated indebtedness of private sector affect the real exchange rate through the fiscal and the monetary policies. Gahnean & Kharas (1985) analysed such effects and detailed in particular the effects of fiscal expenditure, which in turn depends on the indebtedness. The latter depends on the availability of foreign resources. We may expect some recursiveness or causation effects in this respecr. On the other hand when borrowing to finance current account deficits, a monetary expansion may be present if no sterilisation is pursued and if the exchange rate (nominal) remains fixed. It is clear that authorities may peg the nominal rate (exchange) for some objective reasons. What follows is an appreciation in the real exchange rate if prices (domestic) do not react flexible to compensate the unbalance. In the long-run current account deficits are expected as a result of the over-valued nominal exchange rate. Stockman (1980) and Corden (1982) bring the issue of the terms of trade effects as they affect income and consequently the nominal exchange rate which results in an appreciation of the real exchange rate.

One important argument should be clarified at the outset, although the treatment of the debt in a particular country should consider both public and publicly guaranteed debt, and private sector financial debt, we will deal in this part of our investigation with the so called public and publicly guaranteed debt that arises from a process of accumulated sovereign loans. So, this section only concerns this kind of foreign borrowing. One of our assumptions in dealing only with the debt accumulation (sovereign loans) lies at the heart of the present rescheduling packages. Although the rescheduling process usually has different considerations about the country's private financial debt, we note that two different classes of risks are associated with both financial transactions.

Whilst sovereign loans have attached to them a country-risk, the private sector external debt has a different kind of risk; financial risks. As I mentioned above it might not be appropriate to distinguish between public sector and government debt and private sector debt in any country. However it is necessary to insist in this methodological breakdown, where in this particular case, we have broken the capital account into its main endogenous components:

i) Private sector capital flows, where the flows demonstrate the degree of portfolio adjustment and the acquisition of net foreign assets (Direct Investment is an exogenous variable).
ii) Public sector capital flows, where the flows demonstrate the debt adjustment of the public sector.

Some discussion may arise about possible inconsistencies of our approach but it is important to mention that under the present circumstances of the today rescheduling packages between lenders and debtors, creditors aggregate public sector and private sector in a particular country when measuring their payments positions and the risk associated with any potential repudiation. Even though I do not raise the issue here, I would like to mention some aspects related to the discussion above. Harberger (1983) and Diaz Alejandro (1984) assert the thesis that private sector borrowing should in some way affect the public sector indebtedness, as private sector demands for foreigner finance may increase the risk premium usually attached to the public sector borrowing requirements. This will raise the country's constraint with respect to future credits. What appears to be the main reason for this creditor's perception is that they are concerned with the potentially increased probability of financial crash that may be present in the external debt payments by private sector if the public sector rescheduling probability is as large as it usually is.

Empirical evidence given by Diaz Alejandro (1984) and the recent experience about the rescheduling process of some Latin-American countries, (Venezuela, Mexico, Argentina and Brazil) have suggested the importance of the private sector debt in the rescheduling discussions. In particular the Venezuelan case is important because the recognition by the government of the private sector external debt has been an important issue in the debt rescheduling agreements. In this regard it has been suggested by Harberger (1983) and Cooper & Sachs (1984) that taxing the private sector external borrowing will in some way compensate the costs charged implicitly in the public sector.

Heffernan (1986) (1984) develops the microfundation of the demand and supply for sovereign borrowing in the framework of an equilibrium approach between supply and demand for foreign finance. Using the well known Constant Elasticity Substitution, (CES) function she set up a model where it is assumed that the maximisation of national output is a function of Labour (L) and Capital (K) and technologic progress, see Heffernan op cit. As the demand for foreign borrowing is likely to depend on the international interest rate the country borrower maximises its expected output.

In with line above argument Beenstock and Dalzil (1983) and Heffernan (op cit) assert that foreign borrowing (debt accumulation) can develop under the well known permanent income hypothesis since consumers expend a fraction of their permanent disposable income. The main reason behind this assumption is that foreign borrowing requirements are based on the hypothesis that expectations of future higher income will cause demand for foreign financing in order to accomplish with it consumption and investment requirements, given that under conditions of financial repression savings are not sufficient. Furthermore, there will be an excess investment over domestic savings.

These aspects reflect the country's maximisation problems where an optional borrowing (external) requirements (in the long term debt accumulation) are determined by the domestic supply of capital due to past savings, international interest rate; expected income, and the inherent relationship which develops in the short and the long term.
These agents may explain in some detail the country's foreign financing (borrowing requirements) in a position where gross investment exceeds domestic savings. A full account of the functions of this disequilibrium approach where the deficits in the current account are the main result, can be found among others in Reidel (1983).

Another important aspect is the interest rate which determines the financial transactions in the international capital markets. It is determined there, however, interest (risk free) is only the reference under which foreign borrowing and lending is carried out. Therefore, given the fact that creditors (lenders) are risk averse, they will look at the economic standing of a borrower country. Thus it is expected that the borrower country will deal with its obligations in the short and the long term.

On the supply side, the creditors' (lenders) estimates of the probability to default or rescheduling is fundamentally based on the borrowers' economic performance (including policies) with respect to the default probability. Thus, as a risk is involved, creditors (lenders) are expected to behave as risk averse and a risk premium may lead to a credit rationing situation. Therefore, variables explaining the factors behind such probability of default should enter in the behavioural relationship. One has to point out a significant aspect relating to the borrower's perception to default (or rescheduling), as this perception is considered specifically as a contingency, which usually occurs due to some random shock (when exogenous) or wrong policies (when domestic) which may develop into a negative impact on the output. Heffernan (op cit) argues that although these contingencies are ex-ante endogenous, in our particular situation (case) it is considered as an exogenous contingency.

One point should be made clear in this regard, is the double character of the overall public sector borrowing requirements, (government and public sector corporations). The latter are assumed to contract borrowings to expand and improve its economic performance, particularly in their resources and basic industries. On the other hand general government borrowing is subject to the government budget constraint as part of the government deficit is financed by foreign borrowings. Government borrowing is motivated by the first gap that set up ex-ante, so it is exogenous, even though the demand for foreign finance from the rest of the public sector, could be endogenous and so the total demand of public sector and it appears determined by the factors behind domestic and balance payments gap. The recognition of the government budget constraint implies the acceptance of limits on its optimal borrowing requirements if some constraints in the revenues side (taxes) suddenly appear. Under these circumstances government should lend tomorrow less than desired, related to equality of the marginal product of capital and the real foreign interest rate. Those facts highlight the cost caused to the government with respect to the debt service which in turn takes place. Another complication of the matters arises since the government expenditure aggregates two kinds of expending; current expenditure and capital expenditure, the latter appears accounted into the total gross investment of the nation (including the private sector). Therefore, constraints usually consider both kinds of expenditures.

Eaton & Taylor (1985) argue that in a neo-classical world such argument is valid. They argue that this case could only happen under the circumstances that the constraints appear in the payment period. So if the assumptions hold we may not be limited to the neo-classical world. Such relationships make it very important to examine - at least empirically - the circumstances by which governments are confronted when borrowing abroad and when at the same time they depend on an inelastic tax system which does not allow any considered adjustments to take place. Such argument might not be utilised when governments face constraints in the revenue side where the increasing burden of taxes may cause supply difficulties.

Another important aspect related to the borrowing requirements (debt accumulation) of the public sector is the environment which defines the relationship between foreign debt and the exchange rate. Even though some authors give little room to this issue as usually no capital mobility exists. Therefore, it excludes any portfolio adjustment and purchases of foreign assets by the private sector of borrowing countries. Thus, it may be suggested that models of open economies that do not take into account this issue could approach misleading propositions and policies. Adjustment policies in such circumstances may look forward to instability.

Another issue which usually is ignored is the public sector (government) ability to sell domestic debt. It is argued that such policies will produce inflationary consequences. Such inflationary policies (by investing national debt) are expected to affect domestic debt. In this regard, these effects may spill over (abroad) through the exchange rate. The implication is that it is always preferable to borrow abroad rather than raise inflation expenditures due to selling domestic debt. Butler and Eaton (1984) model is a good example. Disequilibrium in the exchange rate is studied by Dornbusch (1984) where those issues are criticised and discussed in great detail.

Moreover, in the last two years we have witnessed studies which among other things associate in some way the public sector external debt accumulation with the demand for foreign assets of private sector, see Cuddington (1984), Dornbusch (1984), Khan (1985). The issue is related to the strict purchasing power parity hypothesis, the differences in the inflation rates are felt in small economies through changes in the exchange rates. It is particularly important to examine the variables which explains the demand for foreign assets of the private sector as it touches directly the balance of payments adjustment policies. Although we do not deal with this aspect in this section, it is worthwhile to mention some of the possible channels by which the private sector's demand for foreign assets takes place.

From an eclectic point of view we note that the private sector's demand for foreign assets may lie in the same reasoning as why governments tend to maximise its holdings for international reserves. An important reason for this private sector behaviour could be observed when due to a specific economic situation the holdings of foreign assets is indeed a valuable buffer with regard to expected devaluation of its holdings of domestic real and financial assets. For this important reason, it becomes a crucial aspect of the stabilisation package to take into account the private sector portfolio adjustment reactions and expectations when stabilisation policies are carried out using, among others, external finance. It is likely that the optimisation problem in the portfolio adjustment of private sector might affect the effects of the government policies.

The environment in which all this takes place has put some to test empirically the transformation in private sector holdings of foreign assets of the debts accumulation by the public sector. Speculative attacks on the exchange rate regime and the related literature on balance of payments crises together with the works on the currency substitution have been dealing with the possible links and causal effects between the issues mentioned. However, it is more reliable and theoretically more consistent that the developing of a structural approach which may deal with the inherent factors that we have mentioned in the domestic excess demand.

5.6.3 The External Debt. Some Results and Empirical Findings.

In this section we attempt to survey some empirical findings based mostly in the use of econometric techniques and other multivariate methods.

Due to the obvious limitations in carrying out a detailed survey of the regarded literature, I will only mention some of the more relevant works: Cline (1981), Eaton (1981), Edwards (1984), Eaton and Gersovitz (1980) (1981), Dornbusch (1984), Cohen (1986), McFadden (1985) Cuddington and others (1984), Kharas (1984), Mayo (1978) and many others have been dealing with the issues of the public sector debt and with the so called sovereign loans (debts).

Different econometric methods estimations have been used in the works mentioned, from the qualitative dependent variables approaches as LOGIT, TOBIT and PROBIT to the most sophisticated time series models and complex structural econometrics methods which have tried to assert the important variables which may explain the public sector demand for debt.

The willingness of creditors to renegotiate the volume of outstanding debt, has been an important issue widely investigated. Important relationships as the debt service ratio, imports to reserve ratio, the stock of outstanding external debt ratio and ratio of external debt to GDP have been frequently associated positively with the renegotiation and rescheduling probabilities.

Echenegreen and Porter (1986) have investigated in detail and empirically the default's probability. Another aspect of the demand and supply by borrowing is the interest rate charge and the risk premium or spread, which is expected to be related with the credit terms, quantities and the risk which is associated with the economic performance of the borrower country. In general the risk premium is measured by the excess over the LIBOR rate. Therefore we expect that the behaviour of the debt maturity, debt service ratio, the trade balance, the current account will affect the levels of the risk (spread). Feder and Ross (1982) carried out a study where all those interactions are incorporated. Edwards (1984), Diaz Alejandro (1984) find out that the reserve ratio to GDP and the investment ratio to GDP respectively may highlight creditors' perceptions about the effectiveness of foreign investment in the economic growth in a particular country and consequently determines the premium and/of the credit rationing as a result of the creditors' willingness to lend. The ratio of current account on GDP and the debt ratio on DGP is investigated by Edwards (1984). He found them to be negatively related to the associated risk of external borrowing.

Eaton and Gersovitz (1981) found to be very significant that the public and publicly guaranteed is affected by the credit rationing. The base it studies in a cross-section of countries which were classified into constrained and non-constrained. He found that the outstanding debt is determined by whether or not the composed constraints exist. In case of any constraints countries borrowings are determined by the reasons behind the rationed credits assumptions. On the other hand where no constraints were considered the demand for new borrowings is determined by the demand factors.

Eaton and Gersovitz (1981) worked in both supply and demand schedules. They are specified as depending on the variability of exports, the ratio of imports on GDP, the growth rate of per capita income, population growth rate and the level of outstanding public sector debt. The expected raising effects of the variability of exports on optimal borrowing (from the supply side) were confirmed. The import ratio on GDP was expected to be positively related to the demand for new borrowings, and so it did. Income growth and population growth had the same effect. In a single equation model where the supply and demand factors were incorporated simultaneously the ratio of import on GDP had an ambiguous effect. However, it is expected that the empirical findings will indeed explain the direction of these relationships. The causal direction is an empirical matter as no theory suggests an exact behaviour content.
A final note should be given to the hypothesis of borrowing without any

constraint. The huge availability of international capital flows have brought the possibility of a loan-push demand. An attempt in revising this particular issue can be found in Darity (1985). The huge availability of foreign funds in the international capital markets have increased revenues with the consequent results of an impulse demand for traded and non-traded goods. As prices affected domestic, the demand for imported goods increased causing either a reduction in the current account surplus or in increase in the current account deficit.

In the money markets is expected that money stock rises, if no sterilisation policies are introduced by monetary authorities. If the interest rate turns out to be negative and consequently a depreciation in the exchange rate is expected, the private sector capital flow to adjust expected portfolio (wealth) devaluation. Wealth effects produce for the interaction between the mentioned relationships will carry over recursive effects in the system. One important long-term result is that the instability in the economy bring a well known product balance of payments crisis, which among other aspects is embodied by an exchange rate system collapse, since the supported exchange rate level which was deliberately sustained (due to policy reasons or mismanagement reasons) can not be sustained any longer.

Finally and possibly linked to some of the mentioned facts is the analysis of the so called capital flight issue. Several authors, among them Cuddington (1984), Dornbusch 91984), Khan (1985), Eaton and Taylor (1986) have studied in great detail such aspect. Although the emphasis is in the capital flight issue it is crucial at least theoretically note that what has been happening in capital account of some borrowers' countries is the adjustment to the private sector's holdings of foreign assets or foreign asset accumulation which we know very well is a part of the maximisation problem of the private sector's portfolio which is subject to the wealth constraint. Foreign assets' holdings is the less risky wealth component.

In a more general context and along the lines of the two-gap model let us point out that in most developing economies the pubic sector is the major borrower of external funds. However it should be mentioned that most public sector investment accrues to the private sector by the channels of development project, basic industries, financing of private sector, investments (on subsidised interest rates), expenditure in social (current) expenditure etc. Accordingly we can see that future governments revenues must come from the increase on the tax base if the debt service is going to accomplish with its external obligations. Since we can distinguish that the benefit from investment expenditures and the agents which bear the repayments obligations it has been suggested that the marginal rate of return to investments should be equated with the marginal cost of funds.

Kharas' (1981) model, assumed output to be produced according to a fixed coefficient of technology, so that efficiency considerations relate it directly to the domestic real capital.

If we assume that the private sector engages in foreign borrowing, private investment will exceed private domestic savings. Government obtain its revenues from taxes and by borrowing abroad. Government and the rest of public sector get it revenues as follows; government from taxes and borrowing in domestic and preferable in foreign markets, and the rest of public sector obtains its resources to finance its excess demand by borrowing as well abroad. In aggregate the public sector services its debts and allocate in investment and consumption the remaining resources.

The allocation resources problem mentioned before can be now incorporated accordingly. Following Kharas (1981) we can say that the public sector will allocate its desired demand for foreign finance in order to maximise an income function or an expenditure objective (consumption and investment). It is apparent that the maximisation problem is subject to a medium or a long-term constraint where the willingness to repay the outstanding and current obligations is maintained. In other words, and in an explicit way the tax revenues, capital returns of government and pubic corporations should growth rapidly than the debt service commitments. The assumption behind this is that the long-run constraint will force the public sector to borrow only when the marginal future expansion of the tax rate and others exceeds the marginal cost of borrowing.

All this means that the public sector external borrowings will compensate the gap between the investments and savings. Setting the issue that way, it is clear that the gap generates debt accumulation; capital stock and income growth are the result of the expenditures (investment and consumption). If the system is stable in the long run, that is, if the cost of borrowing does not exceed the marginal return, the gap will be steadily narrowed. In more precise terms, we can assert that if thee allocation resource maximisation problem is solved in a way in which the resources were utilised in productive investments, it will be expected a continuous generation of payments means which will permit to overcome the cost of borrowing.

From above its still apparent that if the resources were utilised directly and/or indirectly to solve (or impulse) consumption bottle-neck, the generation of resources to face debt payments will be constrained in the short and in the long-run. This unstable situation could be overcome it further adjustments in the consumption expenditures are enforced, under the assumption that the difficulties in servicing the debt increase the probability of rescheduling and/or default. The situation described can run unstable if the recursiveness effect of the demand for foreign fund takes place.

A final aspect may call our attention, that is the links between the potential budget deficits and potential current account deficits. If external shocks are deficit financed this indicates that government finances act as some kind of buffer in order to avoid that such shocks spill-over the domestic economy in the short run. However if the behavioural constraints of the system remain unstable it is expected in the long-run symptoms of instability.

Another related aspect arises when interest payments are affected by the increasing costs of borrowing when public sector debt is in some way consolidated by the governments finances. Thus, as budgets deficits are often reflected in the current account deficits in a standard situation in non oil developing countries, we expect that public sector debt (external) will without doubt affect the current account deficits (surplus). In the Venezuelan case in particular it is shown that the huge government revenues and current account surpluses (standard in an oil exporter country) are not affected by the budget deficits. In a study about major debtors countries Doodle et al (1983) found no link between external indebtedness and current account deficits as no cumulative deficits were recorded in the estimation period.

5.6.4 Sovereign Debt. The Venezuelan Case; The Model and Empirical Result

The model we develop follows the propositions of Kharas(1981),Beenstock (1983), (1984) and Heffernan (1983) (1985), where it is argued that LDC "get into debt in order to finance their economic development". Such assumption is compared with the life cycle theory of private savings. Beenstock suggests a "development cycle theory" of indebtedness to the nations. In essence the parallel between both postulates lies in the fact that countries tend to accumulate debt in the primary stages of its developments by financing its needs for infrastructure, basic industries etc. This implies that countries will reduce their debt when they reach maturity. See Appendix 3 for an alternative model.

Heffernan (op cit) finds that the main determinants in analysing the demand for sovereign borrowing are the investment and saving decisions, where credits and loans are intended to close the gap between savings and investments. In the context of a CES it is assumed that the country product Y at price P is given by:

$$Q_t = \left[\alpha(A,L)^{(1-\frac{1}{\gamma})\gamma} + \beta(B,K)^{1-\frac{1}{\gamma}}\right]^{(1-\frac{1}{\delta})\frac{1}{\gamma}} \qquad (5.53)$$

Given that the country has access to international capital markets and accordingly our assumption of sovereign loans, most financing will be in this form at the cost of world market interest rate and the economic performance of involved country, which in this specific environment takes the form of country risk. The desired (optimal) borrowing is then a function of the national product maximisation problem:

$$E(P_t\, q_t\, (K_t) - R(K_t)) \qquad (5.54)$$

Heffernan asserts that the permanent income hypothesis holds as similarly as consumers given that countries "consume" a fraction of their permanent real incomes; so

$$\left[\alpha(A_t,L_t)^{1-\frac{1}{\gamma}} + \beta(B_t,K_t)^{1-\frac{1}{\gamma}}\right]^{1-\frac{1}{\gamma}} - \frac{K_t}{P_t}\left[\frac{K^f}{K}\gamma + \delta P_k\left[1 - \frac{K^f}{K}\right]\right] \qquad (5.55)$$

Where rental capital is given by the price of capital goods adjusted by interest rate prevailing and applicable to these goods and by the depreciation rate implied; recall that LDC will use its expected high income to demand foreign financing to finance its excess of investment and consumption. The country borrower maximisation problem given above implies that the desired (optimal) foreign finance requirements will be given as

$$\begin{aligned} q_t(K^d) &= \frac{K_f}{K} q_t K_t^d \\ &= q_t(Y_t(\frac{pB}{R_t})^{\gamma} B^{\gamma-1} - (1-K^f)) \qquad (5.56) \end{aligned}$$

The above formulation shows that the demand for external financing in the form of sovereign loans is to be affected with negative sign if capital goods (domestic) increases due to accumulation of past saving decisions, see Heffernan (1985) for a full demonstration of this issue.

As expected the effect of the rental of capital will be negative as it is an increasing function of interest rate, depreciation and capital goods prices. On the other hand income (national product) will affect with positive sign; technological progress will have ambiguous sign, although if technological progress is an increasing function of income we expect a positive sign as well. The stock condition given above will certainly generate the desired flows. Gross fixed investment and net investment are derived accordingly.

The implied theory of life cycle hypothesis proposed by Beenstock incorporated an index of economic development. His choice was the income per capita as an indicator of the level of economic development. As proposed by other authors see for instance Diaz Alejandro (1984) who suggests proxying the intensity of economic development by using the investment ratio. As part of the deficit of government finances (budget deficit) goes to finance capital formation the relevance of this indicator is obvious.

We will account for the creditworthiness of the country by specifying a disequilibrium approach as developed into the error correction mechanism, where the short-run and the long-run are consistent, see Harvey (1981). Accordingly we can assert that creditworthiness problems arise when random shocks lead to a reduction of actual income below some critical value. This critical level of income is the level that would avoid a long-run collapse in consumption and investment if debt service obligations were paid if a stable relationship between consumption, investment and foreign inflows (new debt) holds. This framework sets the changes in the income as determined by capital output ratio and changes in interest payments on foreign debt.

On the other hand the critical level of income should be indicated in some way by the contemporaneous stock of the debt, implying that the flows of domestic savings are enough to generate a growth trajectory where the income debt ratio will keep at least constant in the long-run. So a steady state will be generated at constant growth of the debt income ratio. Under these circumstances high level of net inflow of foreign funds and a low level of the outstanding debt will ensure low critical income level, given that increasing external borrowing and low debt ensures higher consumption and investment after debt obligations are met.

A set of explanatory variables are proposed to pick the effects of supply factors which may condition the country's behaviour in approaching international capital markets as well as the reaction of creditors. it is believed that economic performance of involved countries will affect the behaviour of creditors in supplying fresh loans, particularly if the probability of rescheduling (default) increases. Various ratio as debt service exports ratio, debt export ratio may be the relationship by which constraints in the capital markets appear. Although its impact on the debt accumulation is positive it may signal at the same time some short-run or long-run payments difficulties.

Other variables proposed are intended to show the effects of important macroeconomic relationships which at the same time uncover the effects of government policies fiscal and monetary. Those variables are the ratio of international reserves on import which indicates short-term liquidity problems, and the potential capacity to import. So if the ratio increases its signals that a reserve accumulation is taking place and consequently the demand for new debt is not affected negatively, since any unexpected drop in export may be clearly financed by borrowing if any deficit in the current account is to emerge. We would say that the ratio of international reserve gives a lot of information regarding the demand for fresh debt.

The investment ratio, variable suggested by Diaz Alejandro (1984), Beenstock (1984), Edwards (1983) may be a good indicator to interpret the resources allocation of foreign finance. If the ratio increases the risk of the country diminishes and signals that a process of capital formation is taking place contemporaneously with the debt accumulation process. Diaz Alejandro further suggests that if the ratio is not significant it may signal that capital outflow may have taken place as private agents reallocate it portfolio due to very objective circumstances. An important variable which has been investigated as picking up the effects of "capital flight" on the demand for debt is the real exchange rate appreciation. See Dornbusch (1984), Edwards (1985), Cuddlington (1985), Martin and Selowsky (1984) inter alia. The general belief is that if the real exchange rate appreciates over time the cost of external debt in terms of domestic goods increases. Gahnem and Kharas (1985) investigate the association between the revalued real exchange rate and the demand for debt on a sample of LDC and found strong support for the proposition above. If foreign inflows grow steadily causing an increase in the international reserves and consequently causing a monetary expansion, a real appreciation of the budget deficits will contribute to this process if deficit is financed with foreign loans. This situation will lead to a decrease in domestic saving and a capital outflow may occur if the nominal exchange rate is pegged.

The above process may be exacerbated if monetary authorities place a sterilisation policy. In the long-run it is expected that a current account deficit and a devaluation in the exchange rate which usually takes the form of a crisis in the balance of payments, the Venezuelan case of 1983 confirms this situation.

Recall that we have partitioned the capital account into both private sector and public sector. The empirical investigation in this section attempts to formalise the determinants of sovereign foreign borrowing according to theoretical postulates reviewed earlier.The model assumes domestic savings are not sufficient to maintain a constant stock of assets, both financial and real in pre capita terms or, alternatively, constant capital output ratio. Thus the access to international capital markets guarantees the means to close the domestic gap, so that capital accumulation need not be constrained by savings, since any ex-ante excess demand over gross national product is satisfied by borrowing abroad. This statement suggests to us that one of the main determinants of external borrow, is the incremental capital output ratio or, more generally, the average capital output ratio. The most important implication is that an infinite excess demand (capital accumulation) requires external debt to accumulate as well. Note that there is a tight relationship between domestic savings and the demand for foreign loans, since the latter accumulates if gross national produce declines following a lower capital output ratio.

In other words a decline in the source of domestic savings such as exports will accelerate the accumulation of foreign debt. Conversely, an increase in domestic saving due to an increase in gross national product following an expansion in exports will decelerate external borrowing. This rationale, in the framework of the theoretical model developed earlier suggest that export growth enters in the model as a determinant of foreign borrowing, together with the incremental output ratio. Bother variables are likely to encompass the diversity of factors affecting excess demand and foreign loans. However, the demand for foreign "saving" is an increasing function of the capital output ratio and a decreasing function of the growth of exports. In other words, in a process of self-sustained growth, export revenues should gradually replace the inflow of foreign capital (loans). Thus the external gap (or domestic gap) will tend to narrow over time, assuming the system is stable, that is, when the burden of accumulated stock of foreign debt does not constrain domestic savings. Without the expansion of export revenues which is a major source of foreign currency, a borrowing country will be infinitely dependent on foreign loans.

The format of the econometric model is as follows:

$$\text{DEBT} = f\ (\text{K/GDP, X, Z}) \qquad (5.57)$$

where DEBT is the stock of debt, and K/GDP is the capital output ratio and X is the level of exports.

Note that these variables represent on their own a different concept and tend to be more directly uncorrelated. The hypothesised effects of these variables is that the demand for foreign loans is an increasing function of the capital output ratio and a decreasing function of exports, because both K and GDP grow at the same rate, in order to have the ratio in equilibrium.

As elsewhere in this thesis, the starting point for the specification search is the autoregressive distributed log (ADL) representation. Linearising the above expression by taking double logarithms we get:

$$\log DEBTR = \alpha_0 + \alpha_1 \sum_{i=0}^{n} \log DEBTR_{t-i-1} + \alpha_2 \sum_{i=0}^{n} \log x_{t-i} + \alpha_3 \sum_{i=0}^{m} \log (K/GDP)_{t-i} + U_t \qquad (5.58)$$

After searching for acceptable simplifications we have obtained equations which conform to the error correction specification; it is particularly appropriate because we are interested in the equilibrium effect of the capital output ratio and exports. Note that the proposition of proportionallity implied by the error correction model only make sense when one variable has an equilibrium relationship with a second variable,i.e they are cointegrated.[117] This reason precluded us from obtaining such a model. Note that we did not test for cointegration directly direction, but rather indirectly.

After several trials the selected equation was thus:

$$\begin{aligned}\log(DEBTR)_t = {} & 1.9890 + 0.293330 \log(GDPREAL)_t - 0.2642 \log(EXPORTS)_t \\ & - 0.2642 \log(K/GDPREAL)_{t-1} + 0.773 \log(DEBTR)_{t-1} \\ & - 0.2178\ D1 \qquad (5.59)\end{aligned}$$

The estimated equation above broadly conforms to the hypothesised effects. However, an important finding above for the effects of the capital output ratio is the negative sign. Instead of dropping this variable and respecifying the model, we attempted to rationalise such findings. The negative sign indicates that a process of desinvestment has taken place. The capital variable (K) aggregates both private and public sector capital. Data indicates that while public sector accumulated steadily, private sector disinvestment has been an important feature of Venezuelan economy after 1968. Note that even inventories were depleted during the years preceding the balance of payments crisis in 1983. Thus the decrease in the ratio indicates that domestic savings were exported at the same time as foreign debts by public sector were accumulating. The accumulation of foreign assets by private sector could be a net result of the accumulation of foreign debt by public sector. A second equation was estimated where the capital output ratio was replaced by the incremental capital output ratio (ICOR) on the grounds that ICOR reflects the concept of efficiency on the part of the economy. Thus the value of ICOR reflects the contribution of the latest capital injected in the economy, providing a better indication of the changes in the efficiency of capital over time.[1] An important result here is that the results confirm the findings of the equation with the average capital output ratio,[119] so:

$$\log(DEBTR)_t = 2.6761 + 0.2973 \log(GDPREAL)_t - 0.3843 \log(EXPORTS)_t - 0.4218 \log(ICOR)_t + 0.7939 \log(DEBTR)_{t-1} \quad (5.60)$$

where ICOR $= \Delta K/\Delta GDP$.

Similar results are obtained by Nikbakht (1983) when examining the accumulation of external debt in highly indebted countries such as Panama, Peru, Chile. Interestingly a positive sign for the same variable was found when examining KOREA external indebtedness. See Appendix 2 for diagnostics and testing.

5.7 The Oil Sector

During the period preceding the nationalisation and after it the most important aspect faced by an oil exporter country as Venezuela is how to transform the effects of a valuable and depletable resource into a constant flow of income. In that respect the domestic policy implications of these objectives required and involved decisions regarding the level of oil production at given prices; the dependence of reserves and investment; the utilisation of oil revenues for current and future consumption and generation of incomes; the allocation of oil revenues to real capital formation and real expenditure, and finally to foreign financing or foreign investment.

This framework is needed when modelling the oil exports as it is the main flow variable from the Venezuelan balance of trade, and the largest generator of foreign exchange. However, it has become clear in the last 20 years that oil exports depend on given prices and some supply constraints which make oil exports week exogenous when analysing individual country's oil exports.

The recognition of competitive imperfection, oligopolies and later on cartels, does not allow one to consider an optimising approach for exports of oil as depending on supply (domestic) and demand (foreign and domestic) factors. But given that oil is produced in some particular circumstances, and driven by market imperfections (oligopolies and cartels) an optimising approach could be transferred to the modelling of oil production given those domestic (supply) and foreign (demand) factors. We know that total oil production is then placed into internal and external demand (exports). Theincreasing domestic demand for oil and the decreasing supply for foreign markets (due to some internal and external constraints) have imposed the endogenueity in oil exports defined as a residual oil oil supplied (produced) and domestic oil consumption which appears to be the most inelastic sector in the way the country has developed in the last 25 years. Accordingly we denote PO total produced oil to be supplied for both domestic and foreign markets, and respectively, thus

$$PO = DS + OX \tag{5.61}$$

$$OX = PO - DS \tag{5.62}$$

PO is oil production, DS is domestic consumption and OX is oil exported. We then have that domestic oil consumption, affects the oil exports, and if, and only if, the Venezuelan quota in OPEC ceilings decrease due to domestic and foreign constraints. The specification of the oil of oil will embody those assumption, and is endogenous defined to depend on the given oil prices, domestic constraints such as proved reserves and other external constraints.

Finally we have to define the behaviour of oil production which, together with the domestic out consumption, explain (not causal) the oil exports given both domestic (supply) and foreign (demand and supply) constraints as follows:

$$OX = PO - DCON \tag{5.63}$$

$$DCON = f\,(Po,\ Y^d) \tag{5.64}$$

$$PO = f\text{ (supply and demand determinants)} \qquad (5.65)$$

$$DCON = \text{domestic oil consumption} \qquad (5.66)$$

The most typical characteristics of exploitation and production (extraction) of exhaustible resources is one of that the demand likely to arise at constant prices might not be satisfied over time and in the long-run given the exhaustibility of the resources in question. Given this important feature of exhaustibility it looks more difficult for any supplier of such product to decide how much it will produce and how much it will conserve in order to withhold for future generations.

The structure of the market in some cases is normally presented as monopolist, oligopolist and competitive situations. In our case we are not taking the monopolistic situation although some have considered the structure of the oil market is monopolistic (see J Stigler 1976). The study of ologopolistic market (structure) is currently orientated within the theories of indifferent products, that is the case of oil market, where the firms that form the oligopol cartel for simplicity set some profit function as:

$$\pi = P(Q)q - G(q) \qquad (5.67)$$

The level of production will be given as the difference between the revenues and the corresponding cost function. The maximisation of the profit function (for each country (firm) as in the OPEC case) will require that marginal revenues be equal to the marginal cost (see Waterson 1984). The Cournot theory applied here because it assumes that each country (firm) or country's output will not be changed if any of the countries changes its output level. In other words the price-cost-margin (oligopol success) is determined by the firm's (country's) size where the industry price elasticity ratio is (see Waterson op cit) given by:

$$\frac{P - C(q)}{P} = S_i/h \qquad (5.68)$$

The above formulation is assumed under the Cournot-equilibrium-condition of non-change in country's output at any change in country's output. Such expression intends also to give us a relation regarding the cost function; the bigger the cost function (marginal cost) the smaller is the size of the country. The oligopol theory has been as well developed as explaining the interactions between members where collusion specification is considered a limiting example. However the collusion is explained by the different cost functions over the firms (countries); that is, given different cost functions their shares in the market have to be as well different, where the share is correlated negatively with the higher cost of come of the members. The collusion model has to be concerned in these differences inside the oligopol.

The second approach is given by the existence of a group of members (or single member) where the industry price is suited to their own industry. However the equilibrium might be present because the existence as well of a fringe of members who treat price as parametric (Waterson 1984). The theory of oligopoly is in fact concentrated on two by more general assumptions regarding the nature of the interaction between the oligopoly's members and covering all the inter-relationship that makes possible the setting of prices and production quotas. This covers the non-co-operative and co-operative situations given the structure of the market (demand) faced by OPEC and the system of prices and quotas. We will consider the co-operative behaviour, where the members are in fact open to negotiations and agreements between the cartel's members in order to give stabilisation policies on prices, quotas and geographical distribution of oil supply. As it is we are facing the oligopol transformation into a cartel as special case, that is, the OPEC behaviour better explained by the cartel behaviour.

In disregard of the problems of cartelization the industry equilibrium may exist. Indeed, given the homogeneous nature of oil production, the problem is then reduced to the maximisation of the above profit function (1) for each country member, while the maximisation of profit function might be given as follows:

- the profit maximisation is for

$$\pi = P(Q)q - C(q) \tag{5.69}$$

for all industry as: $\pi = P(Q)\,\Sigma\, qi = \Sigma\, C(q)$ where $\Sigma\, Qi = Q$.
Such maximisation is made with respect to each country's output, so setting it to zero.

$$\frac{d\pi}{dq} = P + Q\,\frac{dp}{dq} - d\frac{C(q)}{dq} = 0 \tag{5.70}$$

That formulation explains that marginal cost $\partial C(q)/\partial q$ of each member is equal to the marginal revenues

$$MR_i = MC_i \quad \text{and} \tag{5.71}$$

$$\sum_{i}^{n} (MR)_i = \sum_{i}^{n} (MC)_i \tag{5.72}$$

The target is then to test the assumption that in ologopolistic markets (as it is cartel oil) has to be concerned with the strategic interactions between members, since the agents as well are assumed to react to a given pattern of reaction of other(s) members, until the achievement of the co-operative equilibrium, as it is stated by the Cournot point.

The oligopoly or cartel theory, however, in which it accounts for the differences and interactive behaviour inside OPEC to be reflected in their price and production policy is more realistically applicable. Assuming that the members of the cartel try to collude in order to jointly maximise profits given the key assumption on the application of elements of classic cartel theory on OPEC behaviour. As it has been said above this will given enough attention to the cartel's internal bargaining problems in achieving the objective function of maximising returns. The cartel members (J Kosobud 1981) will have to find methods to adjust quotas (production) market shares and determine the rule breaking behaviour of the cartel.

It is worth to account that the joint maximisation objective function should be understood as the joint maximisation of the individuals' countries functions that in fact make the achievement of cartel maximisation profit function, accordingly Kosobud's maximisation function (profit) for a cartel behaviour could be written as:

$$\text{Max } \pi = \sum_{i=0}^{n} \Big(\sum_{j=1}^{m} (P_t(f_{jt}(q_t)q_{jt} - c_{jt}(q_{it}) - \frac{B_{jt}(z_t)}{(1+r)^t} \tag{5.73}$$

That maximisation of II (profit function) is added all profit maximisation of individual countries. Here the profit is maximised for each cartel member. Prices (P) depend upon each member's output of oil at time t, (pT); the fjt (qt) or pt - pt; (qjt) and revenues is given by the all ptqjt (or each individual cartel member). The second member in the objective function is the cost function and is given by the level of oil production of the jth member of the cartel, or Cjt*(qjt). It was assumed that the cost function of the exhaustible resource could depend as well on inventories.

The above function records a new term representing the member bargaining cost or the costs that each individual cartel member assumes in order to maintain the collusion. The term $B_{jt}(z_t)\frac{1}{(1+r)^t}$ considered as the "co-operative factor" given the necessary condition in the bargaining process to achieve the consensus. The term might capture the member cost involved in efforts to detect and deter the rule breaking might as well be considered as the adjustment of the cartel policies to the new situation in the market. At this stage it is relevant to point out that the application of cartel theory to OPEC is regardless that members are not private firms there are countries (governments) where the monitoring of member's production behaviour it is possible. It is as well relevant to point out that OPEC countries in some way have to rely on certain indicators of compliance with explicit and (or) agreements, that is, the problem of market shares, jointly with the indicators coming from the market structure given by either spot prices or posted and contract prices, that is the prices spread could reflect certain amount of stickiness in market shares. The system of market shares applied by OPEC is mostly fundamental in that the marginal costs of all producing members are the same the shares are normally - under the OPEC system - depending on costs, and not on reserves, on revenues needed, population, domestic consumption of oil (crude and products) government expenditure, and finally the market share one period lagged (the shares are revised quarterly by the ministers' meeting).

The OPEC behaviour has shown in fact that extraction of the oil under monopoly (cartelization) markets is highly correlated with the temporal availability of oil (reserve proven). The price setting is given by the world demand for oil and the rate of resource exhaustion, thus the demand (net) facing by the cartel would be given by:

$D_t = T^D - S_t$ Where St is oil supply by the rest of the world and T^D is total demand. (5.74)

because the price is set up by the cartelization procedure the rest of the world supply of oil is given by

$$S_t = S_t\,(P_t,\ S_{t-1}) \qquad (5.75)$$

The maximisation function (profit) given by Pindyck (1987) does not appear to be inconsistent with the facts that joint profit maximisation might be interpreted as of individual country profit maximisation treated all together, integrated over the time exhaustion as:

$$\pi = \sum_{i=1}^{n} \left(\frac{1}{(1-r)^t}\right)(P_t - \frac{m}{R_t})D_t \qquad (5.76)$$

where r_t is discount (interest) rate
R_t are reserves
$\frac{m}{R_t}$ is average cost
D_t OPEC oil supply
t time of exhaustion

Notice that Pindyck's model is referred since he clearly reconciles the maximisation of attainable profit under non-competitive markets of production and commercialisation of one exhaustible resource (oil). The maximisation in this case is of the revenues and not prices, because they will increase at the same rate as the rate of interest.

The maximisation function given above under oligopolistics markets is followed by the process of cartelization, because that ologopolistic structure will produce higher revenues as it is pointed out by Pindyck (1978). One of the most important gains from application of Hotelling's rule to OPEC pricing and production strategies is that under cartelization the result is the conservation of that exhaustible resource. This fact in turn is the highest target and the country's national interest. However there exists evidence that if Hotelling's rule would have been applied from the beginning of oil extractions the fast exhaustion of oil reserves occurred until 1973 could have been averted and in its place one gradual increase of oil prices (in real terms) could be occurred.

If we consider the member country differences in economic development and infrastructure; the capability to absorb oil revenues into their economies in the form of exports, investments, consumption and the level of crude oil reserves and production potential will determine how much of oil production is required by each country member to satisfy their economic needs. These factors are likely to be or to underlie in the country's maximisation function assumed above. That approach has been considered by Ezzaty (1981). The assumption made is that the determinants of country member oil production has to be made subject to the country's economic parameters. Those factors or parameters are associated with the growth of GDP, imports, employment and other indicators and should be analysed in the above context, instead of treating them as "unconditional forecasts" of those parameters if we are to take the OPEC oil production as a whole. However, the analysis will assume that the sum of individual member's production is the OPEC supply of oil as the optimum amount that recognises the maximum revenues.

In the above function that is $P_{jt}q_t$. The total value of oil produced will be given by the sum of the value of domestic oil consumption and the value of oil exports; or alternatively the total value of oil exports is given by the difference between total value of oil produced and the domestic consumption.

$$PO = DO + OX \quad \text{or} \quad OX = PO - DO \qquad (5.77)$$

where domestic oil demand might be expressed as function of GDP and domestic oil prices

$$DO = DO\,(GDP,\ Pd). \qquad (5.78)$$

It is as well very important to incorporate the effects of proved oil reserves, where the quantity of oil produced is as well function of proven reserves, as follows:

$$PO = PO\,(R) \qquad (5.79)$$

or alternatively oil production as function of oil prices given by OPEC as a cartel and considered at least well exogenous. Amount of reserves at the end of the last period and of interest rate if we are to apply some effects of Hotelling's rule.

$$PO = PO\,(POPEC,\ R,\ i_d) \qquad (5.80)$$

The domestic arguments likely to explain the optimal oil production are represented by the desire of the country development. Such as the investments which are usually linked to the desire for diversification of the manufacturing and agricultural sector as means to raise the absorption capacity of the economy. The investment consists of government expenditure on social and capital projects. The most important source of financing such expenditure are the oil revenues.

Those facts could be tested since in the years of higher oil revenues the imports of capital goods, consumption goods and intermediate inputs have increased drastically. The imports of those goods and services have been used in some studies as a measure of the ability to absorb oil revenues (Casi 1976). The absorption capacity is recognised to be one of the major arguments of OPEC price setting and supply policies.

Other important approach not much different than the above one is given by Pindyck (1981) where the exhaustibility theory of one resource such as oil is used to find the path of production which it is assumed to maximise the profit (oil revenues) in the framework of a cartel collusion behaviour. It is assumed that the maximisation procedure given the cartel behaviour is the same as the profit maximisation inside any cartel's member. The procedure which gives the optimal path of oil production under profit maximisation conditions assume oil prices given exogenously to the system, so that producers begin with a known level of proven reserves (R) and with a total cost of extraction given as the cost function with production and level of reserves as arguments. Formally, by putting together all these arguments in the context of the theories reviewed above, we arrive at the cost function in which its arguments, production and reserves are expressed as: C(q,R) The derivatives explain the following short-run behaviour

$$\frac{\partial C}{\partial q} > 0; \qquad \frac{\partial C}{\partial R} < 0 \tag{5.81}$$

and consequently

$$\frac{\partial C}{\partial q}\frac{\partial q}{\partial R} < 0 \quad \text{and} \quad \frac{\partial^2 C}{\partial q^2} > 0 \tag{5.82}$$

As Pindyck (1981) points out (zero production, R) = 0 that producer knows the price of its resource and because it is given exogenous by the cartel OPEC. Applying the Hotelling's rule the price path is $o < p < id$ where id is the interest rate (rate of discount). The objective function for the oil producer then is given by the following maximisation:

$$\text{Max } q^t \int_0^\infty (P_t q_t - C(q_t, R_t))\ edt - id_t \tag{5.83}$$

subject to the following constraints:

$$\frac{\partial R}{\partial t} = -q_t \quad \text{and} \quad \frac{\partial P_t}{\partial t} = \alpha\ pt \tag{5.84}$$

The above expression is clearly an optimal control problem where will be defined in the following way:

Lets define $U - [\begin{smallmatrix}P\\R\end{smallmatrix}]$ as a vector of state variables or instruments

$$\frac{\partial X}{\partial t} - \begin{bmatrix}\frac{\partial P}{\partial t}\\ \frac{\partial R}{\partial t}\end{bmatrix} - \begin{bmatrix}\alpha P_t\\ -q_t\end{bmatrix} \tag{5.86}$$

The control variable is then the optimal production. The expression becomes the following (See Intriligator op cit):

$$I(x,u,t) - [P_t q_t - C(q_t R_t)]\ e^{-idt} \tag{5.87}$$

so that the Hamiltonian is defined as (H):

$$H - (P,R,q,t) \text{ where } X - \begin{bmatrix}P\\R\end{bmatrix};\quad u - [q] \tag{5.88}$$

that is the control variable and the instruments are expressed as

$$H - [Ptqt -- C(qt,Rt)]\ e^{-id^t} - \lambda(kp_t) - \lambda(qt) \tag{5.89}$$

Differentiating the Hamiltonian with respect to the control variable (q^t) - u and setting it equal to zero we get:

$$\frac{\partial H}{\partial U} - \frac{\partial H}{\partial q} - (P - \frac{\partial C}{\partial q})e^{-id^t} - \lambda - 0 \tag{5.90}$$

or

$$(P - \frac{\delta C}{\delta q})\ e^{-id^t} - \mu \tag{5.91}$$

It follows that:

$$\begin{bmatrix}\frac{\delta u}{\delta t}\\ \frac{\delta \mu}{\delta t}\end{bmatrix} - \frac{\delta u}{\delta t} - - \begin{bmatrix}\frac{\delta H}{\delta P}\\ \frac{\delta H}{\delta R}\end{bmatrix} - \begin{bmatrix}-qe^{-id_t} + \alpha u\\ + \frac{\delta c}{\delta R}\ e^{-id^t}\end{bmatrix} - \begin{bmatrix}\frac{\delta u}{\delta t}\\ \frac{\delta \lambda}{\delta t}\end{bmatrix} \tag{5.92}$$

Solving above we get:

$$\frac{\delta \mu}{\delta t} - \frac{\delta \mu}{\delta t} - [\frac{\delta P}{\delta t} - \frac{\delta C^2}{\delta q^2}\frac{\delta q}{\delta t} - \frac{\delta C}{\delta t}\frac{\delta q}{\delta R}\frac{\delta R}{\delta t} - id\ (P - \frac{\delta C}{\delta q})\ ]e^{-id_t}$$

$$- \frac{\delta C}{\delta R} - \frac{\delta P}{\delta t} - \frac{\delta^2 C}{\delta q^2}\frac{\delta q}{\delta t} - \frac{\delta C}{\delta q}\frac{\delta q}{\delta R}\frac{\delta R}{\delta t} - id\ (P - \frac{\delta C}{\delta q}) \tag{5.93}$$

or

$$\frac{\delta C}{\delta R} - \delta - \frac{\delta^2 C}{\delta q^2}\frac{\delta P}{\delta t} + \frac{\delta C}{\delta q}\frac{\delta q}{\delta R}\ q^t - id\ P_t + id\ \frac{\delta C}{\delta q} \tag{5.94}$$

or

$$\frac{\delta q}{\delta t} = \frac{1}{\partial^2 C/\partial q^2}\left((id - \delta)P - id\,\frac{\delta C}{\delta q} - \frac{\delta C}{\delta q}\frac{\delta q}{\delta R}\,q^t + \frac{2C}{\delta R}\right) \qquad (5.95)$$

We assume a quadratic cost function as it is more convenient from mathematics point of view. The above expression describes the dynamics of production given the prices exogenous. We don't need to consider prices because are given exogenous to the system. The solution might be obtain on the simultaneous differential equations:

$$\frac{\delta R}{\delta t} = -q^t \qquad (5.96)$$

$$\frac{\delta q}{\delta t} = \frac{1}{\partial^2 C/\partial q^2}\left((id - \delta)P - id\,\frac{\delta C}{\delta q} - \frac{\delta C}{\delta q}\frac{\delta q}{\delta t}\,q^t + \frac{\delta C}{\delta R}\right) \qquad (5.97)$$

However the price path given by $\frac{\partial P}{\partial t} = \alpha P$ might be plugged into the expression above. The expression resulted for the path of optimal production might be rewritten as the first difference equation in:

$$\frac{\partial q}{\partial t} = \dot{q} \qquad (5.98)$$

or alternatively in first difference as $\frac{\partial q}{\partial t} = q_t - q_{t-1}$
The substituting above yields:

$$q_t = q_{t-1} - \frac{1}{\partial^2 C/\partial q^2}\left((id - \delta)P_t - id\,\frac{\partial C}{\partial R} - \frac{\partial C}{\partial q}\frac{\partial q}{\partial t}\,q + \frac{\delta C}{\delta R}\right) \qquad (5.99)$$

It is clear that oil production treated as optimal production might be explained by prices level of production, level of proven reserves and oil production one period lagged. This latter is consistent with the quotas system of OPEC bargaining.

Having reviewed the literature, we attempt to model in the following context. Venezuelan oil production has been carried out by multinational companies until 1975. The government revenues during that period were given by a regime of direct taxes and royalties. From 1963 when OPEC inaugurated its role to the year of nationalisation of the oil industry the oil production was subjected to the OPEC arrangements no matter the industry was not managed by government. In this period the determinants of the oil extraction or production have been under very tight control of government given the government decision not to give more concession (fields for future production) in 1961.

The important point is to find the determinants of oil production in that period until 1975. After nationalisation in 1975 the whole industry was acquire by government agency or corporations and remained in essence the tax system implied in the period before nationalisation. The above procedure has been used in order to come to the arguments of our supply equation which attempts to explain the production of oil; under conditions of exhaustibility condition (constraint) the procedure follows a microeconomic approach which might be used to explain our main assumptions.

If we consider PO as supply of oil and DO as demand for oil, we might assume some equilibrium given by PO = DO.

The expression give PO (production in oil) (in value terms) in terms of the procedure followed by the small system presented beforehand, where:

$$PO = DO + XO \quad \text{or} \quad XO = PO - DO \qquad (5.100)$$

The domestic demand appears to be a function of domestic prices and output and government expenditure (capital)

$$DO = DO\ (DP\ OIL,\ GDP,\ Ig) \qquad (5.101)$$

where Ig is already explained as government capital expenditure. The exports of oil XO might be expressed as function of OPEC prices (exogenous to our system), world demand given by OECD GDP.

$$XO = XO\ (P\ OPEC,\ DGP\ OECD) \qquad (5.102)$$

The both sides of our system are explained thus the demand side is given above, while the supply side is given for the following expression:

$$PO = PO\ (P\ OPEC,\ Reserves,\ id,\ PO_{t-1}) \qquad (5.103)$$

5.7.1 Oil Production. Empirical Results

Following our exposition above we carried on to the following functional form for oil production:

$$OILPROD = f\ (NRESERV,\ OILPRICES,\ GDPOECD) \qquad (5.104)$$

where OILPROD and NRESERV are in millions of barrels a year.

The supply side is represented by the volume of new reserves which, in some respects, together with the motor oil quota, represent important aspects in the bargaining process of establishing production quotas. Note that new reserves indicate the capacity of oil production in any country. This issue is of particular importance in Venezuela where the decreasing level of new reserves has been an important factor in the decreasing oil production and oil exports during the sample period. This trend seems to be reverted between 1986 and 1988 where important discoveries of oil fields has double proven reserves. On the other hand other OPEC countries have increased their production and exports following the accumulation of new oil reserves. In the case of Venezuela this variable represents an important constraint in the expansion of oil production capacity even inside the OPEC system of distribution of quotas. The remainder of variables is on demand side where gross national product of highest oil importers to some extent effect the quota distribution system and the oil production inside each OPEC country. Similar rationale is represented by the variable prices, with one important difference. A negative sign is expected since, under oligopoly conditions a high price make producers to reduce volume of production.

The expression above resulted as an autoregressive distributed lag which constitutes our starting point for the elsewhere mentioned specification search, thus:

$$\log(\text{OILPROD})_t = \alpha_0 + \alpha_1 \sum_{i=1} \log(\text{OILPROD})_{t-1} + \alpha_2 \sum_{i=1} \log(\text{OILPRICE})_{t-1} + \alpha_3 \sum_{i=0} \log(\text{NRESERV})_{t-i} + \alpha_4 \sum_{i=0} \log(\text{GDPOECD})_{t-1} \quad (5.105)$$

After several trials, the specification search produced the following estimated equation:

$$\log(\text{OILPROD})_t = -7.6643 + 1.9610 \log(\text{GDPOECD})_t + 0.0409 \log(\text{NRESERV})_t - 0.2056 \log(\text{OILPRICE})_t - 0.0878\ \text{time} \quad (5.106)$$

Signs are as expected, and coefficients appear to be well determined, corresponding to the hypothesised theoretical constructs. See Appendix 2 for a summary of diagnostics and other specified tests for selection criteria.

5.7.2 Domestic Oil Consumption, Empirical Results

The approach we follow to model the domestic oil consumption relate the aggregate relationship between energy (oil) consumption and the level of economic activity, in which both income and price enter as arguments. (see Beanstock (1981). Following such an approach we attempt to carry out our econometric investigation by examining the relationship between energy, proxied by oil consumption of GDP and prices. The model follows the generalised econometric methodology imposed by Hendry and associates, by testing for dynamic mis-specification. Thus we will be able to distinguish both the short and the long-run elasticities, and testing the implied proportionality between income and oil consumption.

We would have preferred an approach in which both firms and householders' oil consumption could have been taken separated. However data problems precluded us from doing so. Thus we have aggregated the overall consumption as our dependent variable.

The methodology proposed by Beanstock & al (op cit) of breaking the overall consumption between firms and households, allows us to model the specific determinants in the demand for energy in both sectors. Firms' demand for consumption of oil embodies the specification of its production function in which energy consumption enters as determinant input. Such framework allows the derivation of the demand for energy (oil in our case) in a function of prices, user cost of capital, wages. The implied reduced form for the firm's demand is finally obtained as determined by prices and the level of economic activity. The general to specific dynamic specification could be developed within a CES framework. On the other hand, householders' demand for energy (oil) reflects their utility maximisation behaviour, and accordingly this could be used to derive the demand behaviour for energy (oil) in which prices and the level of economic activity are the main arguments. At our aggregation level we estimate only one demand equation in which both firms and householders are aggregated.

Similar to any consumption function, the domestic oil consumption has been modelling through a simple energy demand function. (Beenstock and Willcocks, 1981). Accordingly it is hypothesised that energy demand, or alternatively demand for oil, is affected by prices and output. Even though the order of aggregation is high, since we have merged householders and firms' demand for oil. On the other hand the aggregation bias is found in the volume of oil demanded since it is obvious that both firms and householders demand different categories of oil products. However, for the purpose of this thesis, we have aggregated both the demand and the supply side.

The econometric methodology departures from a general autoregressive representation of the following functional form:

$$\text{DOMOILCON} = f\,(\text{GDPREAL, OILPRICES, t}) \qquad (5.107)$$

where t is a time trend that represents continuous movement in energy productivity. Thus:

$$\log(\text{DOMOIL})_t = \alpha_0 + \alpha_1 \sum_{i=1}^{n} \log(\text{DOMOIL})_{t-i} + \alpha_2 \sum^{n} \log P_{t-i} + \alpha_3 \sum_{i=0}^{n} \log(\text{GDPREAL})_{t-i} + \alpha_3 t + u_t \qquad (5.108)$$

In the estimation of the above expression we hypothesised that income elasticity of demand for energy (oil) is approximate unity.[120] Accordingly, an error correction representation was estimated with no plausible result. The econometric methodology that we follow in this thesis (see Appendix 5) asks for a testing down procedure for the significance of the contribution of the distribution lag terms in sequential bases. Note that the restrictions found in the specification search indicate no significance on the basis of the dominant variance criterion and on the basis of induced non-randomness in the residuals. The restricted selected model is more parsimonious data admissible and theory consistent model. Thus:

$$\log(\text{DOMOIL})_t = -0.2222259 + 0.7653 \log(\text{DOMOIL})_{t-1} + 0.16033 \log(\text{GDPREAL})_t - 0/0970 \log(\text{PRICES})_t \qquad (5.109)$$

These results show that the long-run income elasticity of value, 0.68, indicates that the economic development grows at a larger rate than oil consumption. Note that in Venezuela most of demanded energy comes from hydroelectric sources. However, part of the domestic oil consumption is made of heavy oils for generation of electricity. The larger part of domestic demand for oil is made of light products, particularly important for motorised householders and transport. In any case such long-run elasticity indicates a slower growth of oil; the demand for oil corresponding to the economic growth. The price of electricity of of the "right" sign but it is small. It implies that when the real price of oil doubles the demand for oil decreases by 1% in the long run. This result seems to reproduce the facts of an oil economy where the price of oil is continuously regulated by government. Even though the central aspect of our empirical work was to apply the error correction term under the assumption of unit income elasticity, the econometric methodology suggested that the relationship between the demand for oil and output is significantly lower than unity. This implies that if the economy is to grow more rapidly in the future the demand for oil will grow considerably more rapidly than the conventional unitary elasticities would suggest.[121] Tests and diagnostics checks are reported in Appendix 2

5.8 The Consumption Expenditure

We can confirm that in general, consumption expenditure constitutes the largest component in total aggregate demand. The analysis of the consumption expenditure - consumption function - appears as being one of the most important aspects of macroeconomics. From a Keynesian point of view, this is so, since the marginal propensity to measure has a large effect on the multiplier (Fisher 1983). Being one of the most investigated aspects of macroeconomics there have emerged from Keynes absolute and relative income hypothesis to the Sargent and Hall variations of Permanent Income Hypothesis,[122] various theoretical developments about the consumptions function, which are aggregated into the Absolute and Relative Income Hypothesis, the Permanent Income. Hypothesis (PIH) and the Life Cycle Hypothesis (LCH) and the Rational (expectation) Approach to consumption expenditures. All these theories suggest different sets of results when relating consumption expenditures and personal income in the long run (average propensity to consume).

The absolute and relative income hypothesis, which is of Keynesian vintage have suggested a simple relationship between the main variables involved, income and consumption, with disregard for thedisregard for the other important consumer expenditure determinants such as wealth, inflation and prices. It states that consumption in real terms depends on the level of real income. The main propositions regarding the consumption-income relationship are that real consumption is a stable function of real income, i.e. $C = f(Y)$; that the marginal propensity to consume lies between zero and one i.e. $\emptyset < mpc < 1$ where $mpc = \frac{\partial C}{\partial Y}$; that the APC is greater than the MPC; ky i.e. $APC = \frac{C}{Y} > mpc = \frac{\partial C}{\partial Y}$ and finally that mpc decreases as income Y ky increases; i.e. $\frac{\partial^2 C}{\partial Y^2} < 0$ (see Thomas (1985) and Fisher (1983) inter alia. In simple mathematics the Absolute Income Hypothesis (AIH) is written in a linear form as $C = \alpha + \beta y$ where $\alpha > \emptyset$ and $\emptyset < a < 1$.

However the empirical formulation of this theory is usually done in logs, which requires that the model is non-linear, i.e. $C = \delta y \beta$ thus $\log C = \alpha + \beta \log y$ which satisfies the above restrictions when $mpc = (C/Y)\ \beta$ for $\emptyset < \beta < 1$. So apc > mpc, and it decreases as income increases. The above formulation is important since it creates a problem for the empirical testing of AIH, as the mathematical formulation is different from its theoretical. (See Spanos (1985)) for a detailed discussion about the empirical validity of the theoretical postulates of earlier consumption theories. One of the main criticisms made to the AIH is its failure to theoretically justify the effects of wealth on consumer behaviour. This mis-specification certainly is the omission of important wealth effects both directly and induced. Another criticism is the highly probable heterocasticity found in the empirical work which surely arises from the aggression of heterogeneous population segments. This is likely to show different propensity to consume (both average and marginal). Duesenberry (1979) attempted to model the consumption function in accordance with the stylised facts. The relative income hypothesis (RIH) developed by Duesenberry (op cit) assumes that consumer expenditure is related to income distribution, since individual's ability is assumed to depend as well on other groups' consumption. Thus the lower an individual's position is in the income distribution scale, the higher his average propensity to consume. Formally this could be expressed mathematically by allowing the average propensity to consume to be the dependent variable, thus:

$$C/Y = \alpha + \beta(\overline{Y}/Y) \text{ where } \overline{Y} = \frac{\Sigma Y}{n} \text{ is the mean for the income group.} \tag{5.110}$$

The above implies that individuals aggregated along groups will result in a stable average propensity to consume (See Spanos op cit). Although Duesenberry's model is non-linear, the necessary and sufficient conditions for the AIH to hold applies as well to the RIH (see Fisher op cit).

5.8.1 The Permanent Income Hypothesis and the Life Cycle Hypothesis

It has long been recognised that the independently developed LCH and PIH of consumption differ more in the manner of exposition than in substance. Each theory tries to explain the apparently contradictory empirical evidence about the nature and relationship between the marginal and average propensity to consume, against the old keynesian proposition that consumption depends on current income.

The LCH had originally focused on deriving an aggregate consumption function from the utility maximising model. As reviewed earlier this aspect motivated Hall (1978) for the rational expectation model under a dynamic optimisation framework. Compared with the Permanent Income Hypothesis, the LCH is more related to the saving and provided compelling arguments to include demographic and wealth variables along with income in the consumption function. According to this, consumers plan their consumption according to their lifetime resources, i.e. net wealth (non human wealth) and the present discounted value of current and future labour income. Thus, consumption is set as a constant proportion (although not necessarily) of those resources.

This intertemporal optimising approach which yields continuous flows of consumption over consumer's lifetime is basically derived from the concept of diminishing marginal utility of consumption. On the other hand, Freidman's permanent income hypothesis rather than focusing on individual utility maximisation motives he drew a distinction between permanent and transitory components of income and consumption. He was concerned with the question of how individual decisions differ depending on whether they perceive current fluctuations in key economic variables as permanent or transitory. Accordingly consumers use their savings as a buffer against temporal income fluctuations, so the income elasticity of consumption should be greater for permanent than for the transitory income since individuals observe the transitory income as a mean zero process. Another aspect which the PIH devotes considerable attention is the way individuals form their expectations about future incomes. This appears to be the departure point for Sargent (1978) and Hall (1978) when developing their rational expectations models. It can be said that both LCH and PIH are integrated within a rational expectation framework and viewed as complementary rather than competing theories. In empirical work the estimable equation always encompasses both consumption theories, as LCH relies more on observable income components which are separated into labour income and non-human wealth. A common characteristic of both LCH and PIH is the addition of other possible consumption determinants. In the empirical world liquid assets, capital earnings, interest rate, inflation, unemployment rate are incorporated when using both PIH and LCH.

Freidman's PIH says that individual's current consumption is determined by its expected income (Y^P) and not by its current income (Y). So by maximising their utility subject to the budget constraint we get that

$$U = U(Co, C1, C2....Cn) \text{ and}$$

$$Co + \sum_{t=1}^{n} C^t (1+id)^{-t} = Yo + \sum_{t=1}^{n} Y_t(1+id)^{-t} \quad (5.111)$$

where U is strictly concave, C_t Y_t are consumption and income and id is interest rate. The budget constraint states that the present value of consumption must be equal to the present value of its income stream, i.e. permanent income (Y_P).

$$C = KW \text{ or } C = KY_P \quad (5.112)$$

On the other hand Ando and Modigliani proposed the LCH where the consumption determinants is lifetime individuals' income. The theoretical framework being similar to Freidman's once they introduced the distinction between income streams and labour and non-human wealth. In this case the budget constraint is modified accordingly and is given by:

$$Co + \sum_{t=1}^{n} C_t(1+id)^{-t} = YLo + \sum_{t=1}^{n} YL_t(1+id)^{-t} + wo \quad (5.113)$$

suggested consumption function is

$$C = C(YL,W) \quad (5.114)$$

But in what is the most simple integration of both approaches and following their suggestions, Hall (1978) added uncertainty to consumption theory implying that the rational consumer's consumption follows a first order autoregressive process (AR), following Lucas (1976). Mankiew (1987) followed Hall and extended it when modelling consumer durables. However consumers' expenditure follows a mixed autoregressive moving average process, ARMA(1,1), but not AR(1). Following Hall (1978) and using a conventional LCH framework under uncertainty, we can say that individual consumers maximise the expected utility of lifetime consumption subject to the budget constraint, i.e.

$$E_t \sum_{1=0}^{n} (1+g)^{-f} U(C_{t+f}) \tag{5.115}$$

$$\sum_{1+0}^{n} (1+id)^{-f} (C_{t+f} - TL_{t+f}) = W_t \tag{5.116}$$

Where E is the mathematical expectation conditional on all information at t, g is the rate of subjective time preference.

In here (Y,L_t) is stochastic with unit root and the source for uncertainty. Thus, individuals consume C_t to maximise its expected lifetime utility conditional on the information available. In other words we could derive a functional form which implies that no information available at period t apart from the current consumption, is useful to forecast future consumption C_{t+1}. However, we note that Hall instead of assuming a particular utility function he derived a random walk consumption process which, apart from a trend on using a reasonable approximation, is given by:

$$C_t = \alpha C_{t-1} + e_t \text{ where } \alpha < 1 \tag{5.117}$$

As noted, in Hall's model no other variable, except current consumption could be used to predict consumers' expenditures. What is important in Hall's formulations is that he did not derive a consumption function, since as noted before, he did not maximise any expected utility function. What he gets is stochastic relationship which is represented by a AR(1) for an optimisation model of individual consumption with uncertainties.

As we can observe, the empirical consumption function will be carried out along these two approaches; first, estimating traditional consumption function and second, verifying the random walk hypothesis. See Hendry and Davidson (1981) for a detailed discussion, in which econometric evidence is assessed under both approaches.

A final aspect which should be reviewed in relation to the consumption function is to assess both theoretically and empirically the role of liquid assets and other wealth variables. From the LCH we know what wealth means for the representative consumer, however measurement problems induce us to consider the affects and the role of wealth. Frequently, the lack of data on the stock of non-human wealth has meant that proxies have to be rationalised, liquid assets components of such wealth is in most cases the wealth variable. We know that wealth is an argument of the utility function on the grounds that it provides directly utility, and its behaves as the 'buffer stock' which helps consumers to hold his derived consumption pattern. If we assume that the desired wealth is proportional to income as Ball and Drake (1964), we have that[123]

$$W_t = WY_t \tag{5.118}$$

but, as $S_t = W_t - W_{t-1}$ or as in Stone (1964)

$$W_t = W_{t-1} + Dd_t \text{ we could argue that} \tag{5.119}$$

$$S_t = (W_t - W_{t-1}) \text{ is a partial adjustment process. By substituting we get that} \tag{5.120}$$

$$S_t = \beta WY_t - \beta W_{t-1} \tag{5.121}$$

as $$S_t = Y_t - C_t, \text{ and substituting above we have} \tag{5.122}$$

$$C_t = Y_t - \beta W\ WY_t + \beta W_{t-1} \tag{5.123}$$

rearranging

$$C_t = (1 - \beta W)Y_t + \beta W_{t-1} \tag{5.124}$$

which is the basic and more simple consumption function depending on wealth. Deaton (1972), in a dynamic consumption model, considers the wealth variables as its deviation from the desired wealth level. By assuming the proportionality between consumption and income. Deaton derived an estimable equation similar to this one:

$$C_t = \alpha_0 Y_t + \alpha_1 W_2 + \alpha_2 (Y + W + iW) \tag{5.125}$$

where iW are capital gains on wealth stocks.

Felner, Huang and Chan (1965) studied the influence of liquid assets. Their consumption function is similar to above:

$$C_t = KY_t^p + \alpha(A_{t-1} - A_t^d) + u_t \qquad (5.126)$$

where A stands for liquid assets holdings.

If $\alpha > 0$, there will be a portfolio adjustment process, thus the effect on consumption is negative. If the desired stock of liquid assets the actual asset stock. But, otherwise, the effect is positive and consumption increases since the desired stock of liquid assets is less than the actual. In here the proportion between liquid assets and income is assumed, i.e.

$$A_t^d = \emptyset y_t^p \qquad (5.127)$$

Substituting A^d and applying the Koyck transformation, after $Y_t{}^e$ as being driven by a process when

$$Y_t^e = (1-\mu)(Y_t + \mu Y_{t-1} + \mu^2 y_{t-2} + \ldots \mu^n y_{t-n}) \qquad (5.128)$$

They produced an equation for consumption expenditures in which consumption is given by:

$$C_t = (1-\mu)C_{t-1} + \alpha A_{t-1} - (1-\mu)\alpha A_{t-2} + \mu\ (k-\emptyset\alpha)Y_t + U_t - (1-\mu)U_{t-1} \qquad (5.129)$$

This equation cannot be estimated. The error term is serial correlated and of the four parameters to be estimated m and k are overidentified and k and $\emptyset$ are underidentified. To see this lets suppose we have the following estimable equation derived from above

$$C_t = \alpha_0 + \alpha_1\ C_{t-1} + \alpha_2\ A_{t-1} + \alpha_3\ A_{t-2} + \alpha_u\ y_t \qquad (5.130)$$

and where $\alpha_1 = 1-\mu$; $\alpha_2 = \delta$; $\alpha_3 = -\alpha(L-\mu)$; $\alpha_4 = \mu(K-\emptyset\delta)$. (5.131)

The author's estimated the above equation ignoring the autocorrelation and the identification problems, using OLS and TSLS to overcome simultaneity. They finally used NLS, and obtained significant values for all co-efficients and providing confirmation of the usefulness of this liquid asset approach to aggregate consumption function.

There are other studies which have analysed the wealth effects (liquid assets holdings) on consumption expenditure in a data based approach. DHSY (1978) model for non-durables implicitly consider the wealth effects without including a wealth variable. Bean (1978) finds evidence of wealth effects on consumption of durables. Hendry and Von Ungern (1981) analysed the liquidity effects on consumer expenditure in which liquidity is incorporated within an integral correction methods in which they embodied the inflation's effects on the liquidity variable. Von Ungern-Sternberg (1981) estimated a similar model for Germany and UK and tested the effects of price level rise on the value of monetary assets and its overall (wealth) effect on consumption. Davidson and Hendry (1981) did a re-appraisal of Hendry and Von Ungern-Sternberg (1981) study using new data. In all of these studies, in more or less degree wealth affects consumption expenditure whether this is on non-durables and on durables. As seen, liquid assets (defined in various ways) have received particular attention. However it is not always clear whether liquid assets have been used as wealth proxies or as a separate component of private portfolios. However the main findings is that the nature of the wealth "proxy" is an empirical matter and it will consider as such in the estimated consumption functions for Venezuela.

One important problem in estimating the wealth effects on aggregate consumption function is the aggregation of durables and non-durables. However, as noted by Fisher (1983) the quantity of liquid assets can be subject to sizeable transitory effects (unanticipated deflation) and transitory effects on wealth may force adjustments among other wealth components (real, as consumer durables) in the same direction as the effects on wealth. In other words there is a typical aggregation bias caused by an incorrect aggregation. Taking this into account we have estimated durables and non-durables separately.

Above we have passed through some 'wealth' effects of liquidity assets. However there is not a clear cut between liquid asset effects and wealth effects in general. We can assume that liquid asset effects are a special case of wealth effects on consumption expenditures; or real balance affect as termed by Pesek and Saving (1967). In what follows we want to comment more generally on the effects of wealth changes on consumption. The issue is important for both empirical work if one is working within a macromodel and one has the presumption that wealth effects matter. The related aspect is the evaluation of the effects of fiscal and monetary policies which alter the private wealth holdings. Such topics are important and depend crucially on the way the wealth is defined and on the 'transmission mechanism' of both fiscal and monetary policies.[124]

In a more rational framework the wealth effects on consumers expenditures is one related aspect of the inter-relationship between expenditure and portfolio behaviour. Early theories of consumption expenditure did not give wealth considerable attention. In the framework of LCH and PIH, particularly the former and within an inter-temporal utility maximisation has given wealth a more prominent role.
In summary there have been recognised two types of wealth effects on consumption expenditures in general. The larger the amount of wealth held the less further saving is required, hence consumption expenditure is an increasing function of wealth. In addition, there is an effect produced by one of the main components of wealth, money, since changes in money balance affect consumption and the acquisition of other assets.

5.8.2 Inflation and Interest Rate Effects on Consumption Expenditures

In recent years much attention in estimating and evaluating consumer expenditure is being paid to influences of price levels (inflation) and interest rate. Usually interest rate effect on consumption expenditure is tested in the context of the Life Cycle Hypothesis.[125] In general it has been found that consumption expenditures is a decreasing function of interest rate, although there are opportunities in which a positive sign has been found (see Fisher (1983) op cit p. 103). However when considering inflation effects under anticipated inflation, it has been found, Boskin (1978) that a real interest rate (ex-ante) may be a more plausible variable. The rationale could be the following; if the real interest rate increases new savings will be added to wealth due to increasing income as the interest rate (real) effects on savings are inverse to those on consumption.

The issue is an important one, particularly when inflation and/or 'real balance effect' is incorporated in the model. Thus, the appropriate variable is the ex-ante real interest rate, or expected interest rate, which is usually generated by a rational expectation method (see Fisher op cit). With respect to inflation effects price variable has been incorporated into a LCH model . When estimating in levels, price levels are hypothesised to have no effect as the model is defined in real terms. However, if this restriction is not valid, and prices affect positively consumption implying the existence of 'money illusion' because consumers perceive that increases in price level, ceteras paribus, must imply an equal increase in money income and money wealth as if they were increased in real money, income and wealth. Deaton (1978) also incorporated into the consumption function. His approach is innovative as he argued that it is the acceleration of inflation which affects negatively (reduced) consumer expenditures. DHSY (1978) tested this Deaton hypothesis and found that the acceleration of inflation affected negatively the consumption expenditures since consumers reduced their consumption because they do not distinguish between changes in the price and relative price levels. We have found similar results in the non-durables consumption function for Venezuela.

An additional aspect which arises from the price effects on consumers' expenditures is the hypothesis that the proportionality between consumption and income is constant in the long run as the theory suggest is not consistent with the observed data during a long period. Hendry and Von Ungern-Sternberg (1981) found that the observed behaviour of the average propensity to consume is due to measurement errors in the disposable income variable. In a later paper Von Ungern-Sternberg (1985) estimated a model for West Germany and found that inflation affects the real value of monetary assets, and for this reason the use of the traditional disposable income variable may not be appropriate.

In summary, it has been empirically demonstrated recently that the ratio of aggregate consumption to household disposable income has tended to decrease if inflation rises. The reason being attributed to a wealth effect, since inflation changes the real value of wealth determined in nominal-money terms, and it does so in an unanticipated way. So, by increasing saving - decreasing consumption, individuals would re-establish the real value of their wealth. However it will require that the real interest rate does not deteriorate further.

5.8.3 The Consumption Function and the Empirical results

The above review of theoretical and empirical works on the consumption function showed that it has been difficult to explain empirically the behaviour of average propensity to savings (consumption). In estimating the consumption function for Venezuela we have followed the "non-textbook" approach, due to Sargan (164), Hendry and Von Ungern-Sternberg (1978) and DHSY (1978) where the dynamics of the model is given by the observed data. The 'standard' procedure of general to specific model was specified in a general dynamic form, testing down until we get a more parsimonious and theoretical meaningful relationship (See Spanos (1987)). The more parsimonious relationship, achieved from a data orientated specification for adjustment equation has the form of the error correction mechanism, which was originally formulated by Denis Sargan (1969), where the theoretical model is viewed as influencing the empirical specification via the steady state dynamics. See DHSY and Hendry and Richard (1983) where the model selection procedure is formalised and where some innovative features from time series are incorporated in the econometric modelling. An Annex, formalises the methodology reviewed.

In our empirical exercise I have followed this procedure allowing some role to be played by the structure of observed data. Thus the Data Generation Process in addition to the relevant theoretical aspects will encompass the resulting empirical econometric. The steady state or equilibrium relationship between income and consumption is assumed to be of the following form:

$C_t^* = kW_t^*$ where C_t^*, Y_t^* are desired (5.132)

values for consumption and income (wealth).

Following DHSY, and Hendry and Ungern-Sternberg (1981) we assume in the above expression the underlying relationship between income and consumption. Note that (W) is real wealth (i.e. the presented discounted value of current and future income). Following Ando and Modigliani, (1964) wealth is expressed as a function of current labour income and non-human wealth. Thus we could still write the above long run relationship consistently with both PIH and LCH. However we know that consumption and income are not necessarily equal to their steady state values, therefore a disequilibrium relationship would encompass lagged values for both relevant variables.[126]

DHSY formulates this by expressing consumption as a function of:

$$\log C_t = \alpha^* + \sum_{i=1}^{T} \alpha_i \log C_{t-i} + \sum_{i=1}^{T} \beta_1 \log y_t \qquad (5.133)$$
$$+ \beta_2 \log y_{t-1}$$

This expression could be simplified by using only one period lag for the 'disequilibrium' terms, so,

$$\log C_t = \alpha^* + \alpha_1 \log C_{t-1} + \beta_1 \log y_t$$
$$+ \beta_2 \log y_{t-1} \qquad (5.134)$$

In steady state solution we get:

$$\log C_t = \alpha^*(\frac{1}{1-\alpha}) + (\frac{\beta_1+\beta_2}{1-\alpha})y_t \qquad (5.135)$$

where C_t^* and Y_t^* represent equilibrium values, and which needs that $k^* = k(1-\alpha)$ and $\beta_1 + \beta_2 = 1-\alpha$ to be consistent with the equilibrium relationship (ii). Thus we get:

$$\log C_t = k(1-\alpha) + \beta_1 \log y_t + \beta_2 \log y_{t-1}$$
$$+ (1 - \beta_1 - \beta_2) \log C_{t-1} \qquad (5.136)$$

which can be rewritten as

$$\Delta \log C_t = \beta_1 \Delta \log y_t + \gamma \log (k^*C_{t-1}/y_{t-1}) \qquad (5.137)$$

The above expression is the disequilibrium version of (i), but the 'disequilibrium' term log $(K-C_{t-1}/Y_{t-1})$ is expressed in levels indicating that the disequilibrium between consumption and income is given by its previous relationship; which in our case is the previous value of the average propensity to consume (APC). Such disequilibrium relationship can be rewritten as $\emptyset = k + \log (Y_{t-1}/C_{t-1})$ which indicates that log (C_{t-1}/Y_{-1}) k; and depends on the growth rates of C_t and Y_t, if both growth rates are equal.

At this stage we introduce the modification of the original DHSY model due to Hendry and Von Ungern-Sternberg (1978). Indeed HUS assesses that there is a latent variable which may affect the changes in consumer expenditure. The major implication is the explicit recognition of wealth effects on consumption. DHSY have accounted as wealth for wealth effects but implicitly in the disequilibrium term and on the prices effects. The direct wealth effects in HUS model assume that consumers want to hold constant wealth income ratio. The model is then expanded and generalised for the wealth effects as a new disequilibrium variable, i.e. log

$(W_{t/1}/Y_{t-1})$ reflecting the previous disequilibrium between wealth and income. Within this econometric framework in mind we now turn to our empirical exercise.

It is recognised that the consumption function contains the consumption of durables and non-durables and that in general both group of goods have different determinants. (See Mizon and Hendry (1980)). Measurement problems as well arise since stock of durables include a variety of heterogeneous groups. For this reason authors have concentrated on the determination of expenditure, similar to an investment expenditure[127] rather than on the stock of durables (see Cuthbertson (1981, 1984) and modelled the effects of changes in stock on expenditure without using stock data.[128]

We assume that consumers derive satisfaction from the flow of service from durable goods, and to acquire new stock to replace amortisated in order to keep us with the introduction of high technology. (See Cuthbertson op cit). Accordingly the consumer durables can be defined to depend on income and on the rate of growth of income. The dynamics of this relationship is left to the observed data since it will indicate the dynamic responses of durable expenditure to variations in income. However, the dynamic representation should take off the purchases made for good's replacement and the new purchases as well as of any logged adjustment of current durable expenditure to actual expenditure.

Another variables found in the empirical literature affecting the expenditure on durables are hire-purchase credit, liquid assets, real interest rate and the relative prices which take care of the substitution between durables and non-durables. The inclusion of interest rate assumes bank borrowing and may be a proxy variable for hire-purchase credit variable. It is expected that the inclusion of bank lending indicates credit rationing effects, important in a developing financial market, and in financial 'repressed' economies, when banks are subject to quantity constraints and interest rate ceilings are fixed by monetary authorities. This aspect makes the modelling of consumer durables function to look like an investment function. In accordance with the economics of bank borrowing, we have included the interest rate (real) to account for the inflation effects, and will proxy nominal interest rate charged by finances on financing durables which is an important characteristics of Venezuelan durable (cars, white products) market. The inclusion of wealth (liquid assets) is on the grounds that consumers make contingency plans for the allocation of their lifetime income. Durables in some respects are considered as part of consumers' portfolio, and thus depend on the desired stock of wealth. The above mentioned variables are organised into the consumer durable model by setting a general dynamic equation in accordance with the econometric methodology developed by Hendry and associates.

Following the above discussion we attempted to develop an economic investigation into the determinants of Venezuela's consumers' expenditures in both aggregated and dissaggregated consumers' expenditures into durables and non-durables goods. The economic theory on which the empirical model should be based contains several restructure assumptions which may not hold simultaneously. Our objective here is to develop an empirical model which encompasses both the economic theory and the most salient features of the data. This means that the model should be theoretically interpretable and data admissible. This approach, which implies that most likely determinants are to be considered in the modelling strategy makes it possible to avoid ad hoc procedures of adding variables when testing for mis-specification. Such procedure becomes important when doing econometric in less developed countries, since the lack of reliable data and some particular economic behaviour which in many cases does not follow the "rational" pattern found in developed countries.

Our goal was to select a model which shows parameter constance, orthogonality between right hand side variable, white noise and innovation disturbances. These features are to be emphasised by evaluation of such criteria is goodness of fit, absence of serial consideration and heterocedastricity, predictive ability, parameter constancy size and determination of coefficients, validity of restrictions. The activity variable, disposable income, was determined indirectly since there is no available data for personal disposable income. Thus we have subtracted taxes and depreciation and added transfers (direct) to consumers to get a plausible measure of personal disposable income. Note that we were not able to exclude undistributed profits since no data for profit is available. The "liquidity ratio" measuring the wealth effects consider our definition of financial wealth. The specification search starts form this general autoregressive distributed lag model (in logarithms)

$$\log(\text{CONSREAL})_t = \alpha_0 + \alpha_1 \sum_{i=0}^{n} \log(\text{CONSREAL})_{t-i-1} + \alpha_2 \sum_{i=j}^{n} \log(\text{YDISPR})_{t-i} + \alpha_3 \sum_{i=j}^{n} \alpha_3 \log P_t + \alpha_4 \sum_{i=1}^{n} \log(\text{WEALTHR})_{t-i} \qquad (5.138)$$

The main objective of this section is to estimate both consumer non-durables and durables separately for reasons that are apparent. However, I report an aggregate consumption function for completeness. According to the economic strategy outlined above we have obtained the following parsimonious model for aggregate consumers' expenditure.

$$\log(\text{CONSREAL})_t = 1.3694 + 0.4044 \log(\text{YDISPR})_t + 0.2554 \log(\text{PRICES}) + 0.3296 \log(\text{CONSREAL})_{t-1} \qquad (5.139)$$

Signs and size of coefficients show they are well determined. However, note that consumers (aggregate consumption) react upwards following an increase in price levels, confirming Deaton's hypothesis that agents have difficulty discerning relative tests.

Note that long run income elasticity is rather low, 0.59, showing that consumers do not follow the pace of income. See Appendix 2 for other diagnostic and further information about the estimated equation. The estimation for consumers' non-durables follows the modelling strategy outlined above. After several trials the specification search eventually arrived at the following estimated equation:

$$\Delta \log(\text{CONNDUR})_t = -0.0350 + 0.1406\, \Delta \log(\text{YDISPR})_t - 0.0177\, \Delta \log P_t - 0.2261 \log(\text{CONNDUR}/\text{YDISPR})_{t-1} + 0.02995 \log(\text{RWEALTH}/\text{YDISPR})_{t-1} + 0.1143\, D \qquad (5.140)$$

The goal here was to apply the error corrections model where the implied unit long run income elasticity represents the apriory theoretical restriction of proportionality. The error correction term and the integral correction term which represents the wealth effects corresponds to the solution in Hendry and Von Ungern (1981). However we did not correct the liquidity ration for the "inflation tax" losses from holding liquid assets. Above we have assumed that both terms in levels ($\log(\text{CONSDUR}/\text{YDISPR})_{t-1}$ and by $\log(\text{WEALTH}/\text{YDISPR})_{t-1}$ are cointegrated[129] even though we have to test due to the sample size. Since the data is annual, only one lag on the level of consumption nd income is sufficient to capture the dynamics. The coefficient on the acceleration of inflation indicating that consumers abstain their consumption in the face of higher inflation so as they are able to expend accordingly to the new inflation. This negative sign may indicate that consumers abstain consumption of non-durables and increase other consumption on durables as alternatives to saving by buying inflation hedge goods. However as we will see from the empirical investigation on consumer durables, consumers abstain also from purchasing durables. This is an important feature of the Venezuelan economy in the last decade, which might be explained by the increased foreign savings of private agents.[130] The lack of wealth effect in the aggregate consumption function and on durables is explained by this behaviour. In fact there are perverse effects in consumer durables since the coefficient for wealth is negative. It is important to recognise that there are some measurement errors in the wealth variable. However, we note that there are direct positive wealth effects on non-durables.

The rationale emphasised by both its economic measuring and statistic properties of the equation above follow the fact that even though right hand side variables are highly correlated they are orthogonal to each other.

On the other hand, right hand side variables should be interpreted as affecting consumption and liquidity, since growth in disposable income and inflation affect liquidity contemporaneously in both directions. The equation has plausible economic interpretation and is statistically acceptable. Other necessary conditions, such as parameter constancy, cointegration, predictive ability, can be inferred from Table X.

5.8.4 Consumer durables

Even though estimation of consumers' durables presents severe difficulties, we were able to estimate the equation with plausible economics and statistically. An important feature of the above result is that wealth is not significantly different from zero. This result can be rationalised by the fact that our wealth measure does not include real assets. On the other hand, as mentioned earlier, the best decade is signalled by an increase in financial wealth but a decrease in consumption of durables can be observed during the same period. Note that there is an accumulation of foreign assets by private agents following the restrictive monetary policy characteristic of such periods. The other aspect is that Venezuelan consumers does not consume durables as inflation accelerates. This is a curious feature of the Venezuelan economy which needs a more careful examination.

The estimation equation indicates the importance of credit for durable consumption, eventhough the interest rate variable does not accurately record the true price of the credit in the Venezuelan financial system. However such a result is important form the point of view of a less developed country since it is currently expected that in less developed economies householder depend on their current income to purchase durables, even though the size of the coefficient is small.
The estimation equation is the following:

$$\begin{aligned} \log(\text{CONDUR})_t = {} & -7.1112 + 1.2092 \log(\text{YDISPR})_t \\ & -0.05997\,(\text{INTEREST})_t + 1.3386 \log(\text{CONDURR})_{t-1} \\ & -0.1836\,D + 0.12222 \log(\text{RWEALTH})_t \qquad (5.141) \end{aligned}$$

These results show a long run income elasticity of 1.8282. This elasticity is larger than the long run income elasticity of non-durables, indicating a more rapid growth in consumer durables than in income. This result presents an important data feature since both variables decline rapidly in the last decade. However, the rate of decline in income seems to be more rapid that durables purchases. Other statistic properties of the estimated equation can be inferred from Table 10.

5.9 THE INVESTMENT FUNCTION

Investment by economic agents is considered as the most important component of aggregate (private) expenditure in the determination of output. Although compared with consumers' expenditure, investment is lower, the dependence on income at both expenditure categories is different. Investment expenditure appears traditionally as depending in a large extent to the expectations in economic agents' investment decisions. Our exposition and discussion of the theoretical aspects regarding the investment function assumes that fixed investment is our main subject. The underlying subject is the importance of investment expenditure in determining the capital accumulation of a dated economy when explaining business cycles, since net investment adds to capital and expands the capacity of that economy to growth in the long term. Keynes version of neo-classical theory[131] implies that investment function could be derived from the demand for capital goods in a profit maximisation approach, subject to technological, innovative and supply constraint. In a microeconomic world, this means that firms acquire capital goods in such measure where the discounted flows of expected after tax profits equals the cost of capital's replacement, where the discount rate within this framework is the marginal efficiency of capital.

This Keynesian framework, developed by Klein (1954), Branson (1979), and Dornbusch (1981) assume that the demand for capital goods or the net investment expenditure depends on income, capital stock and the interest rate, i.e. the marginal efficiency of capital. Thus, investment decisions made by firms is an increasing function of the ratio of the market price of existing capital to the price of a unit of newly produced output. This ratio is called Tobin's "q", and due to Tobin (1969). In other words if "q" is larger than infinity is is profitable to acquire a unit of actual output and use it as capital goods. This constitutes the demand for investment expenditure (see Stein (1981). If "q" is less than one, the demand for investment is negative. This Keynesian investment function developed later to what is called the basic accelerator model or the flexible accelerator. This accelerator model is based on a fixed capital output ratio. Expected capital stock is assumed to be a simple proportion of output, i.e.

$K^* = \mu Y$ Where K^* is the expected capital stock and Y is output: differentiating (i) with respect to time we get

$$\frac{dK}{dt} = \mu \frac{dY}{dt} \qquad (5.142)$$

In discrete time we assume for simplicity that capital stock is always optimally adjusted at any period. Net investment is given by

$$In_t = K_t - K_{t-1} \tag{5.143}$$

or $\frac{dln}{dt}$ in continuous time, we can rewrite (id) to be

$$In_t = pi \frac{dY}{dt} \tag{5.144}$$

or in discrete time $In_t = \mu (Y_t - Y_{t-1})$ (iii).

By defining δ to be the cost of replacement depreciation we can rewrite (iii) and get

$In_t = \frac{dY}{dt} + \delta K$ (iU) note we have made $K* = K_t$ for simplicity

or substituting for (i) we have that net investment is given by

$$In_t = \mu(\frac{dY}{dt}) + \delta Y \tag{5.145}$$

$$\text{or } In_t = \delta (Y_t - Y_{t-i}) + \delta\mu(Y_t) \tag{5.146}$$

This 'simple' accelerator assumes an instantaneous adjustment of K to K* which in turn implies an implicit elastic supply of capital and a fixed of capital/output ratio. By defining implicitly a stock-flow solution in which both capital and investment expenditure interact the neo-classical version of the accelerator model is developed by Jorgenson (1965, 1967).

In this neo-classical framework it is important to recognise the specification of time-path of investment flows. The bridge between the above Keynesian and the neo-classical investment function is then the work of Koyck (1959), which imposes the following time path between current capital stock and expected capital, i.e.[132]

$$K_t = (1 - \mu) \sum_{i=0}^{n} \mu K_{t-1} \tag{5.147}$$

where the flexibility is given by m to be between 1 and Ø; i.e. $0 < \mu < 1$. I f $\mu = 1$ we have the naive accelerator. This model does not consider an instantaneous adjustment of capital towards its expected capital. The dynamics or the investment time path is imposed in a partial adjustment case[133] given by

$$K_t - K_{t-1} = \mu*(K_t* - K_{t-1}). \tag{5.148}$$

Jorgensen's model states that there are lags in the investment function. Accordingly, investment is given cit) by: $In_t = \alpha(L)A_t$ (vi) where the lag process is generalised, and indicates that the stock of expected capital at the end of the adjustment period is made of successive investments starting in period (t -o) or (See Fisher 1983).

$$K_t = A_t - (A_{t-1} - \alpha_0 A_{t-1}) + (A_{t-2} - \alpha_0 A_{t-2} - \alpha_1 A_{t-2}) + \ldots + K_{t-1} \quad (5.149)$$

rearranging the above expression we get this expression:

$$K_{t*} - K_{t-1} = \frac{1 - \delta(L)}{1-L} A_t \quad (5.150)$$

where $K_{t-1} = \frac{\alpha(L)}{1-L} A_{t-1}$ and substituting K_{t-1} above for this expression we get eventually the expression for net investment, i.e.

$$Int = \delta(L)(K_t{*} - K_{t-1}) + \delta K_{t-1} \quad (5.151)$$

where $\delta\ K_{t-1}$ indicating the replacement costs are given by the following gross fixed investment relation, i.e.

$$\frac{dKt}{dt} + \delta K_t = Int \quad (5.152)$$

Recall that $a(L)A_t = (1-L)K_{t-1}$ and substituting into (viii) above we obtain the following expression:

$$K_t^* = \frac{\alpha(L)}{1-L} A_t = \frac{1-\alpha(L)}{1-L} A_t \quad (5.153)$$

or $Int = K_t - K_{t-1} + \delta K_t$.

The same result is obtained when starting from the Koyck model of partial adjustment. So, assume that actual capital stock adjustment towards expected capital stock (K_t^*) according to the partial adjustment scheme,

$$\frac{dkt}{dt} = \mu \frac{dK^*}{dt} \quad \text{where} \quad 0 < \mu < 1 \quad (5.154)$$

where $\frac{dKt}{dt}$ is net investment $(K_t - K_{t-1} = In_t)$ and is a proprortion (m) of the difference between the expected capital stock and the lagged one period (K_{t-1}). This embodies the constant capital output ratio which is assumed in the accelerator model in the determination of the expected capital stock, ie.

$K_t^* = pi\ Y_t$ Sowe obtain[134]

$$\frac{dk}{dt} = \emptyset\ \mu\ Y_t - \mu\ K_{t-1} \quad (5.155)$$

$$\text{or} \quad K_t = \mu\ \emptyset Y_t - (1-\mu)K_{t-1} \quad (5.156)$$

$$\text{or} \quad K_t = \mu\ \emptyset(L)\gamma Y_t \quad (5.157)$$

$$\text{or } K_t = K_{t-1} = \emptyset \sum_{i=0}^{n} \mu\, y_{t-i} \qquad (5.158)$$

indicating that capital stock at time t is dependent as well on post levels of output.[136] In practice such lags effects are attached to [2] Although the notation is different, the derivation follows heavily Fisher (op cit) p.287 delays in the decision making process, administrative developments, delivery lags which result from rigid elasticity of output in capital goods production, as well as adjustment costs. Net investments as given by (xi) can be written as follows:

$$Int = \varphi \sum_{i=0}^{n} m^i y_{t-1} + K_{t-1} \qquad (5.159)$$

where we know gross fixed investment is equal to net investment less the cost of replacement (amortisation) of the capital stock. If depreciation (k) is assumed to be proportional to actual capital stock we have the investment function rewritten in terms of gross fixed investment by $I_t = K_t - K_{t-1} + \delta K_{t-1}$ which yields the following relationship for gross fixed investment

$$I_t = \emptyset\, m\, Y_t + (\delta - \mu)K_{t-1} \qquad (5.160)$$

where according to Thomas (op cit) k and m can be in practice estimated by regressing I_t on Y_t and K_{t-1}, where some prior information for k is important. Such expressions can be further developed by applying Koyck transformation , and obtaining an expression for estimation of gross fixed investment without the need for a series of capital stock.[1] Thus our final expression for investment (gross) is

$$I_t\ \emptyset\mu\, Y_t - (1-\delta)\emptyset\mu\, Y_{t-1} + (1-\mu)\, I_{t-1} \qquad (5.161)$$

which may be considered as a restricted estimable form for the investment function, where as mentioned before the restrictions involved by the partial adjustment scheme imply further restrictions in the dynamics of the model. As in the 'simple' accelerator model this, flexible, assumes the same restrictive assumption of constant capital/output ratio, which must be tested in the empirical work, as it is necessary to reflect data features into the statistical model. However such as in the 'simple accelerator, the constance between output and capital emerges from the type of production function which underlies the derivations of the investment function in Jorgenson (see Fisher (op cit). Recall that such production function is of the constant return to scale type whose factor prices do not account for. This criticism is filled by Eisner and Strotz (1963) (see Fisher op cit) where their model accounts for the adjustment costs in the process of actual capital stock towards the desired capital stock.

In summary we can develop an estimable investment function, starting from the partial adjustment hypothesis for the optimisation process in capital stock accumulation. Although from an empirical point of view we will generalise that model in order to account for the whole dynamics embodied in the observed data, in accordance with the econometric methodology outlined elsewhere in this work. Starting with the flexible accelerator model we define the following partial adjustment scheme, as in Koyck.[138]

$$K_t - K_{t-1} = \mu\ (K^*_t - K_{t-1}) \qquad (5.162)$$

where as before $In_t = K_t - K_{t-1} = , (K^*_t - K_{t-1})$
If desired capital stock is specified as being a function of the user capital cost Uk and expected output $K^*_t = f\ (Uk, Y)$. Using a standard Cobb-Douglas production function, we can derive a simple specification of the optimum capital stocks (K^*_t), so defining the C.D. production function

$$Y = L^{1-\emptyset}K^{0} \quad \text{where L is labour.} \qquad (5.163)$$

The profit maximisation condition will require here that the marginal productivity of capital m.p.k. equals the user cost of capital (Uk), i.e. m.p.k. = Uk or by differentiating the C.D. with respect to K we obtain

$$\text{m.p.k.} = \frac{\partial Y}{\partial K} = \varphi L^{1-\varphi}K^{\varphi-1} = \frac{\varphi L^{1-\varphi}K^{\varphi}}{K} \qquad (5.164)$$

$$\text{so,} \quad K^* = \frac{\varphi L^{1-\varphi}K^{\varphi}}{K} = \frac{\varphi Y}{UK} \qquad (5.165)$$

Along with the variables such as interest rate (id), depreciation (k), investment tax credits (ic), firms tax (tc) are included as components of the user cost of capital. The rationale goes according to the following; investment tax credit allows firms to subtract from the taxes they pay a certain fraction ic of the investment expenditures. These taxes affect positively the investment flows as the user cost of capital drops, since capital goods are cheaper. On the other hand firms taxes affect negatively investment flows since the user cost of capital increases.

Thus the user cost of capital (Uk) could be defined as

$$Uk = \frac{(1 - tc)(ir + \delta)}{1 - ic} \qquad (5.166)$$

where ir is the real interest rate. Substituting into we obtain an expression for the optimal capital stock function (Inet):

$$Int = \mu \left(\frac{\varphi Y(u-ic)}{(1-tc)(i+j)} - K_{t-1}\right) \qquad (5.167)$$

However we may have problems in estimating an equation like this, since no data is available for capital stock and some variables affecting the user cost of capital. In such cases (our case) the investment expenditure might be stated as depending on a proxy for user capital cost, interest rate. The equation is similar to above in which no series for capital stock is needed.[140] A plausible functional focus for is

$In_t = f\ (ij, Y)$, where the dynamics is set according to the data .

Thus we have for the empirical work to interpret the dynamic structure implied by the user cost capital and income effects, i.e.

$$\log I_t = \alpha_0 + \alpha_1 \sum_{i=0}^{n} \log y_t + \alpha_2 \sum_{i=0}^{n} \log i_t$$

$$\alpha_3 \sum_{i=0}^{n} \log I_{t-1} + \alpha_4 \sum_{i=0}^{n} \log Z_{t-1} \qquad (5.168)$$

plus other relevant variables such as trend, for instance.

In a important paper Bean (1978, 1982) and Anderson (1982) define and estimate a model similar to the DHSY data based approach for modelling consumption function, although the underlying theory is the neo-classical model of flexible accelerator he assumes profit maximisation or cost minimisation, and uses a constant elasticity of substitution's production function, with constant return to scale.[141] The long run equilibrium (similar as in DHSY) is given by a constant ratio between gross investment and output,[142] which in turn depends on the rate of growth of income and on user capital cost. These assumptions suggest the formulation of a disequilibrium relationship which characterises error correction models, i.e.

$$\Delta \log I_t = \alpha_0 + \alpha_1 (L) \Delta \log Y_t$$

$$+ \alpha_2 \log (I_t / Y_t)_{t-1} \qquad (5.169)$$

where $\delta(L)$ is the polynomial in the log operator (L). This expression says that changes in investment depend as well on the extent of previous disequilibrium in the levels of investment and income. Oneof the good features of this model is that what is implied is an equilibrium ratio between investment flows and output, and not between capital stock, so eliminating one of the main criticism to the accelerator model since it assumes constant capital output ratio, which may not be feasible in a growing economy: the proportionality.

As in DHSY one of the most important aspects here, and brought about by the referred econometric methodology, is the presence of both short-run and long-run equilibrium. Given that, in case of policy design, the optimal decision is made to take care of the stability and the long run equilibria (see Bean op cit). On the other hand, it allows us to examine the effects of other variables through the autoregressive structure of the residuals, where the testing of those potential variables is made according to the data generation process. In our empirical work, the testing of the model which follows the flexible (neo-classical) model is made following Bean (op cit) and Anderson (op cit) methodology.

From the above review of investment theories it can be seen that the accelerator models in both formulated, simple and neo-classical, no financial variable is considered. It is recognised that the investment process (stock adjustment) embodies current and future commitments as it is likely that investment ventures yields flows over a period of time. Note, however that the neo-classical model to some extent combines income effects with interest rate and user cost of capital effects which represents the cost of financial funds used in investment decisions. However what is becoming increasingly important and particularly in developing economies is not only the cost of used funds but the availability of such funds, which affect, in a large extent, investment behaviour.

Below in the section devoted to investment in developing countries I will present more details about this aspect. Tobin (1969) (op cit) introduced a flow-oriented approach which emphasises the importance of financial variables.[143] Fisher(1983) op.cit. develops a model in which real money balances enters in the production function which represents the firms' demand for real money balances. Another way of measuring the effect of money in investment decisions is through prices (inflation), since such investment decisions tend to be negatively affected by expected inflation. We can follow the effect of inflation embodied in the real rate of interest in the expression for the user cost of capital.

Before we present the empirical work on the Venezuelan investment function we have to give attention to both theoretical and empirical aspects of investment in developing countries and in which there is already large literature.

It has been argued that economic agents investment decisions behave differently than in developed countries due to low level of development in capital markets, some economic and constitutional function encompasses the effects of these constraints by accounting for public sector (government) investment availability of funds measured by the changes in bank credit and the inflow of foreign capital to private and public sector.

The discussion about the behaviour of investors in less developed economy is a main product of the literature on financial repression and its implications for economic growth, which is commonly observed by the relative attractiveness of holding money assets instead of holding capital.[144] Thus the financial repression is synonymous of inadequate level of investment expenditures. By holding interest rate at artificial disequilibrium levels, monetary authorities target the money growth, through an accommodative monetary policy. This interest rate disequilibrium must guarantee increases in the level of investments. Such policies have been widely criticised due to the inflationary effects of the monetary expansion (see Fry 1982).

On the other hand so called structuralists, or better neo-restructuralists models specify and criticise McKinnon and Shaw's models since restrictive monetary policies, which raise interest rate, could lead to stagnation of prices which are determined by fixed work-up over labour, import and working capital increases. They strongly oppose finance liberalisation which is always followed by increases in nterest rates. Their models include a curb market for credit (loans) which plays a crucial role in relation to the formal banking system in financing working capital (investment).[145] The interaction between the curb market and commercial and investment banks is more important when the official policy is one of tight monetary policy, usually carried out after a liberalisation programme - reduce the availability of funds affecting economic growth (see Von Wjmbergen (1983)). The analysis of Wjmbergen goes further by implying a balance of payment deterioration if the effects of restrictive monetary policy is large in the supply side.

The 'financial repressed' economy model of McKinnon (1973) and Shaw (1973) based their models on the case of disequilibrium interest rate due to artificial ceilings. Their suggested opposite to structuralists and neo-structuralists, Keynesians and monatarists, policies; liberalisation programmes under a framework of economic growth. In accordance with his proposition, McKinnon examined the demand for money in less developed countries and suggested his complementary hypothesis in which the demand for real money balances is complement rather than substitute for tangible investment.

McKinnon and Shaw's proposition has produced a sizeable amount of literature in which the debate between "financial repressed" models and structuralists and neo-structuralists lists have developed, the latter based on Tobin's portfolio framework (See Tobin 1969), in which McKinnon's type of model with inside (outside) money incorporates real (productive) assets and neo-structuralists' portfolio models where economic agents hold inside money curb market loans and inflation edges assets. Regarding interest rates, McKinnon's model suggests that by relaxing those artificial rate ceilings, investment increases, because saving increases as a reaction of higher (relaxed) interest rate. So the economy grows because aggregate investment increases. Note that interest rate here is defined as the real interest rate (McKinnon (1973) p. 80), which implies a two-fold policy action;. first, relaxed interest rate concepts, and second, reduced rate of inflation. The important aspect here regarding private sector gross investment is that the increase in interest rate due to the liberalisation process will encourage investment expenditures. The net effect is an optimal result due to maximisation of investment, the efficiency feedback inherent in this process.[146]

In summary, to lower the opportunity cost to hold real money and/or the higher the real interest rate (deposit) the larger the propensity to invest.[147] Thus investment is an increasing function of interest rate. This suggestion contradicts the traditional neo-classical model expended by the inclusion of the user cost of capital in which investment is a decreasing function of interest rate.

This suggestion leads McKinnon to introduce his complementary hypothesis,[148] since the net effect of increased demand for money will be larger the larger the investment ratio.

Although Shaw's (1973) model seems to be different from McKinnon's, as the former included the 'debt intermedication hypothesis (V) represented by the various opportunity costs of holding money. Shaw's complementary hypothesis expanded McKinnon's by including the opportunity costs of holding money into the demand for real money balances. In the context of McKinnon's model, Galbis (1976) specifies an augmented investment function by introducing government (public sector) investment expenditure, as it is assumed in the literature that government investment is an important determinant of private investment decisions.

The empirical results (tests) of the 'financial repressed' theories have been in all directions. Galbys (1979) in a study of 19 Latin American countries obtained inconclusive results. Brotherson (1981) obtained positive relationship between interest rates and savings for Southern Core countries, but the effect on investment expenditure were negative.

In short, testing the 'financial repressed' model is done on the sign of domestic interest in the investment function. However, if the null hypothesis is rejected this must not indicate that the economy in question has developed capital and financial markets, as we can see from our results on the venezuelan economy that the 'financial repression' hypothesis is reject in spite of having Venezuelan many characteristics of the models reviewed above.

Having reviewed the literature and its implications on the private investment behaviour we observe that the discussion about the determinants on private investment in less developed economies is inconclusive. We note that the most relevant aspect of this discussion; is the applicability or not of the neo-classical model of accelerator when evaluating private investment in a less developed economy; the empirical counterpart will not produce favourable results on one side on another side, since the rejection of one does not imply the acceptance of the other. In our empirical work below we do not prejudice our approach by looking at the rejection of acceptance of one or the other theoretical proposition. Following the econometric methodology mentioned elsewhere in this work, I start by characterising the statistical model, theory consistent in which the starting point of our search strategy is the neo-classical accelerator model. Before we present our results let us mention two later works due to Blejer and Khan (1984) and Fry (1988) in which the implied theoretical construct is the rejection of the neo-classical accelerator model. Blejer and Khan (op cit) argue against the application of the optimising investment model in less developed economies; the reasons are the same as the ones implied by both 'financial repressed' and neo-structuralists models. Consequently they developed a theoretical model which focuses on the role of government policies which are transmitted through the variations in domestic (bank) credit and through government (public sector) investment. A particular aspect incorporated in their model is the possibility of evaluating any crowding out which may occur. The issue is important, due to the usually large proportion of public sector (government) investment in less developed countries. However, their model is indeed an extended flexible neo-classical accelerator which incorporates the variables explaining the effects of institutional and structural constraints.[149]

Their major conclusion is the confirmation of the effects of government investment and government policies on private sector investment, where policies effects are measured by the type of policy exercised. If stabilisation programmes are enforced, due to high inflation, the contractionary or tight monetary policy is expected to affect negatively private sector investment. Depending on the size of private sector investment ratio, stabilisation policies could be recessive (indeed they are). However if an accommodating monetary policy is enforced due to expansionary government (public sector) expenditure, crowding out can be measured since public sector (including government) absorb a substantial part of available domestic credit (funds). By implication, we can infer the domestic effects of public sector foreign borrowing and whose net effect could be one of crowding out private sector investment.

In a later work Fry (1988) bases his private sector investment function on the flexible accelerator where the investment ratio depends on the rate of growth income. Credit rationing is measured by its quantity rather than by its price and this is the relevant variable which indirectly indicates the disequilibrium interest rate conditions in which such economy operates. Thus, domestic credit ratio, as a proxy for liquidity ratio enters in the model in both levels or differences depending on the durability of loans (short or long term). The perverse (negative) effects of public sector foreign indebtedness in domestic private investment (see Ize and Artiz (1987)) enters in Fry's model since it is expected that debt service obligations, when high, will crowd out private sector investment expenditures (Kruger 1987). The variable which indicates these effects is the ratio of external debt to gross national product, the final model in Fry, as his predecessors do not consider the effects of the user cost of capital, since financial repression is measured by the quantity rather than by its price. Note that both 'financial repression' and neo-structuralists models, as well as "flexible accelerator" models of Blejer and Khan and Fry have common starting point; the resources constraint which is endemic to less developed countries.

A final important feature found in the models reviewed above is that the problem of data availability, as well as some other institutional factors preclude the author from considering a more general optimising investment framework, such as the neo-classical model, although there are some attempts in such directions. Blejer and Khan, Fry, Tun Wai and Wong can be considered among those. However the empirical characterisation of their models is dominated by the early financial repression models of McKinnon and Shaw which, in our opinion, present the most robust model from both the theoretical and empirical results, disregarding that empirical tests of their model present is not homogeneous. This 'disagreement' in the empirical tests of the financial repressed models is not surprising since the degree of development varies from area to area, and from country to country. It seems more probable and a good confirmation of the financial repression model's postulates that we get different results depending on the data we are using. Indeed it is more probable that if a country shows a negative sign for the user cost of capital variable or its proxy interest rate that the financial repression theory is rejected without accepting the neo-classical optimisation model. By the same token, if the sign on the above variable is positive, it is an indication of financial repression conditions (acceptance of the null hypothesis) but in any case it is an indication of rejecting the neo-classical optimisation model (rejecting the alternative hypothesis). Thus, we recognise that the empirical investigation will reflect the acceptance or not of any of those theories. Our empirical works start from the definition of aggregate investment on the sum of private investment, public investment and stock-building.

$$\text{INVEST} = \text{INVPRI} + \text{INVPUB} + \text{STOCKBUILDING} \qquad (5.170)$$

where notation indicates that INVPUB, public sector investment is exogenous and it is composed of public sector corporations and government (general) government expenditure. Stockbuilding aggregate both private and public sector corporation and its defined endogenous.

5.9.1 Investment expenditure. Empirical results

In estimating investment expenditures we have dissaggregated total fixed investments into private sector and public sector investment, sincere there are fundamental differences in both types of investment. In general public sector investment constitutes long projects in which the profit motive is absent. Furthermore,public sector investments identify with the building of infrastructure and it is more socially oriented. Investment of private sector is singled out even though there are clear induced effects from public sector and government instruments.

Even though there are alternative theoretical constructs of investment expenditures with regard to developed and less developed economies we have not restricted our empirical examination of private sector investment by following a determined theoretical suggestion. Our approach here is similar to the modelling of consumer expenditure in which we allow the economic theory and data to trade-off in an economic interpretable, statistically valid model.

The specification search starts from a general autoregressive distributed lag model expressed as: (in logarithms):

$$\log(\mathrm{INVPIR})_t = -0.0647 + 0.5032\log(\mathrm{INVPRIR})_{t-1} + 0.6577\log(\mathrm{GDPREAL})_t + 0.3913\log(\mathrm{DOMCRE}/_{\mathrm{GDPREAL}}) - 0.1499\mathrm{INTEREST}_t - 0.3141\mathrm{D1} - 0.1648\mathrm{D2} \qquad (5.171)$$

Note that the restrictions imposed on the above model should encompass the elements clarified by the economic theory regarding the specification of the long run. Such disequilibrium specification will take into account the ratio of investment on output similar to what was done in the domestic credit income ratio. Coefficients are well determined, and statistically the model obeys the criteria of the econometric methodology used elsewhere in this work. The marginal propensity to invest out of income is 0.6517. This figure is considerably larger than the rate of depreciation to income observed during the same period (8%) and hence is supportive of the view of a positive association between investment and income approximating internal resources inflows. Note that the long run income elasticity is 1.31 which seems plausible in a less developed country where capital stock is not a decreasing function of income.[150] In what we can define as being a marginal propensity to invest out of financial flows, i.e. the coefficient of liquidity ratio is however less than unity (0.3913), although the long run elasticity is 0.7876, indicating an absorption of credit of about 22%.

The most striking result is the rejection of the financial repression proportion since interest rate is highly significantly different from zero and with the right sign. Recall that to confirm the financial repression proposition the sign of interest rate should be positive as it reflects more savings to which future investment care to be financed out. Note that McKinnon's complementary assumption requires equivalent behaviour for interest rate in the demand for money. As we can see below when reporting the demand for money, our negative interest rate in investment is "confirmed" in the money demand with equivalent sign.

5.9.2 STOCKBUILDING and INVENTORY INVESTMENT

Usually the most volatile component of national product since it is planned for a short term, although stockbuilding investment is usually a small component on total domestic product, however when it is being compared with changes in national output it becomes very significant. The adjustment towards a desired level of stocks during the high section of business cycle is necessary to hold an optimal level of stock which keeps pace with the higher demand characteristics of this part of the cycle. Although stock investment can show high variability - volatility - the adjustment process from actual to the desired level of stock is done rapidly when compared to fixed investment (capital investment). According to these propositions the determination of the level of stock is usually done in the framework of the flexible accelerator, flexible or inventory flexible accelerator model. Treated from the supply side inventory behaviour means that firms plan their expected level of inventories depending on sales, fluctuating in accordance with its demand , in other words, manufacturers' inventory investment could be estimated as depending on the production process and on the demand for such production.

In accordance with this thought the adjustment between actual and desired stock levels is an important factor determining planned production (Davies (1987). By establishing some similarities with the demand for money Rowley and Trivedy (1975) define several types of inventory behaviour, namely transactionary, precautionary and speculative, where transactionary inventory demand is defined as the estimation of costs when holding stock precautionary demand or buffer stock (Fisher (1983)op cit p. 304) and speculative demand which is defined as expectations of shortages, high prices.[159]

Considering that the dominant theory on inventory investment is the so-called precautionary inventory demand we approach this section by assuming that inventory investment refersto investment in stocks of terminated goods and work in progress; that is Fisher's buffer stock investment. The underlying flexible accelerator principle which is supposed to derive inventory investment is similar and equivalent to the flexible accelerator fixed investment model of the last section was developed by Lovell (1964) and Evans (1969).

In the context cof the accelerator principle Fisher (1983)op. cit. develops an inventory investment demand given by the following expression:

$$Is_t = \gamma (Is_t^* - Is_{t-1}) + \mu (S_t^e - S_t) \qquad (5.172)$$

where the second term allows for anticipated errors, f the production adaptation co-efficient, S_t are sales and k the adjustment parameter. If f = 0, inventory investment adjusts to his desired level according to its planned output. If f $\neq$ 0, planned inventory investment deviates from actual changes (See Aristos and Hadjimatheou op cit). Thus the resulting inventory investment demand function is then given by the following expression

$$Is_t = \mu\gamma S_t + (\mu\delta + \beta) \Delta S_t - \mu(I_{t-1} - I_{t-2}) \qquad (5.173)$$

which is the Lovell (1964) estimable equation. Differences between terminated goods and work in progress are introduced into the above expression (see Lovell (1964), since both types of inventory investment required 'sticky' or 'rapid' responses, so adjustment lags differs according to the type of industry and with the production plans. In this regard the partial adjustment scheme for the aggregated inventory investment does not appear to be the best dynamic process for modelling dynamic adjustment of inventory investment in aggregate, due to the apriory restrictions in the dynamics of exogenous variables implied by the partial adjustment.

Following the tradition in estimating flexible accelerator models for inventory investment Maccİny and Rossana (1981) estimated a model devoted to an analysis of the adjustment speed in this particular investment behaviour. They related inventory investment to expected sales, raw material prices and interest rate. In most empirical works of inventory investment within the accelerator principle it is found that the holding of precautionary stock of investment is important to mitigate the business cycle effects. In its expanded version allowing interest rate to affect inventory investment (Lovell (1974) specified a model in which monetary policy could be used to affect inventory investment reactions to business cycles.

The estimation of inventory investment for Venezuela is done along the lines of the theoretical and empirical models reviewed above in a similar fashion as with fixed investment specification. The specification assumes that firms desire to hold a constant proportion of their expected sales in the form of inventories, where expected jobs are considered as equivalent to current sales. Inventory demand would be expressed as:

STOCKSR = α SALES where SALES is approximated by gross national product as the economic activity variable. Note that the empirical work must take into the analysis the true distribution over time of the stock output ratio, since inflationary expectations are likely to increase the stock output ratio. Inventories were accumulated over the whole sample period to get an approximate measure for the stock variable. Thus stockbuilding is determined as the first difference of stocks (see Davies (op cit)).

Similarly, it is assumed a long run relationship between the stock level and the economic activity variable; gross national product, Lack of data precluded us from measuring the effects of capacity utilisation. The inclusion of capacity utilisation emphasize the 'buffer stock' function of inventories when the business cycles deviate from their trend path, see Fisher (1983) and Davies (1986). Interest rate affects are considered since there exists the presumption that stock are accumulated at the same pace of economic growth which is implied by a fall in interest rate. Thus interest rate emphasize the transmission mechanism of monetary policy and wealth effects. The estimated equation follows closely the proposed methodology by Davies (op cit).

Alternatively to the use of national output as a proxy for SALES, we could have the SALES as being formed from final purchases, excluding, of course, inventory investment, both in domestic and in the foreign market. Hence this variable would comprise of consumption, gross fixed capital formation, government expenditure and exports.

So, SALES/P = CONS/P + GOVCON/P + INVESTFIX/P + X/P (5.174)

This measure makes SALES $\neq$ GNP, and k as the proportion of sales that firms are willing to hold as inventories.

Similarly, and defined from the supply side, the inventory supply represents the amount actually available for economic units and is given by the following true relationship:

$STOCKS^{S}$ = STOCKS (-1) + INVENT where invent is the difference (5.175) between flow availability of goods and services and final purchases (sales) in the period, thus:

$$\text{INVENT} = (\text{GNP} + \text{DEPREC} + \text{IMPORTS}) - \text{SALES (in real terms)} \qquad (5.176)$$

where the term in brackets is the sum of net output, depreciation and imports refers to the total availabilities in flow terms.

Furthermore the disequilibrium in investment inventory is defined as the difference between demand and supply for inventories:

$$\text{excess STOCKSR} = \text{STOCKSR} - \text{STOCKSR or}$$
$$\text{excess STOCKSR} = \text{STOCKS-1} + \text{OUTPUT} + \text{DEPREC} - \text{MR} = (1 + \alpha)\ \text{SALES}$$
$$\text{where} \quad \text{OUTPUT} = \text{GDP} + \text{NFP} - \text{DEPREC}$$
$$\text{OUTPUT} = \text{GNP} - \text{DEPREC} \qquad (5.177)$$

where GDP gross domestic product
NFP net factor payments from abroad
DEPREC depreciation (5.178)

Below, we present our results where the activity variable is the gross national product. Results using the final purchase variable, SALES, are similar to estimations using gross national product, are not reported.

5.9.3 Inventory Demand. Empirical results

Demand for inventories are considered to be influenced by long term financial decisions relating to the capital structure of firms, including the allocation of resources between profits and retentions and new investment. These decisions are taken according to prior decisions relating to fixed investment, and other decisions concerned with the competitiveness of the firm. One important feature of such decision making process is that these financing decisions provide feedback effects similar to the approach developed by Davison et al (1978) and Hendry and associates.[152]

On the other hand there are complementary investment decisions which behave as a buffer stock in-between expenditures (investment) and its corresponding financial counterpart. It is this buffer stock which determines the short term and long run adjustment of investment expenditure.

Inventory investment is modelled on a firm basis as formulated in an accelerator framework such as reviewed above. Financial variables are allowed to play a role here with the target stock output ratio depending on financial flows such as liquidity, wealth and interest rate. Note that alternative models can be used to design the behaviour of measured as the difference between production and sales. In this case, stockbuilding can be modelled as a production process from the supply side and the demand for domestic manufacturers. Thus, the difference between actual and demand stock levels appears as a factor affecting desired output:

With those elements in mind we started the specification search with a general autoregressive distributed lag model (ADL) as follows: (in logarithms)

$$\log(STOCKS)_t = \alpha_0 + \alpha_1 \sum_{i=0}^{n} \log(STOCKS)_{t-i-1} + \alpha_2 \sum_{i=0}^{n} \log(GDPREAL)_{t-i} + \alpha_3 \sum_{i=0}^{n} \log(DOMCRE/GDPREAL)_{t-1} + \alpha_4 \sum_{i=0}^{n} INTEREST + U_t \qquad (5.179)$$

The unrestricted estimated equation suggested that parameter parsimony is achieved by a first difference transformation of this stock equation since we use annual data. Thus, these restrictions were nested and tested in order to check for model admissibility. By testing down procedure applied to the estimable equation involved testing for dynamic unspecification. Accordingly we arrived at the following estimated equation, which presents the advantages that enables the precise form of equation (levels). Thus the stockbuilding changes over time is influenced by changes in the predetermined variable and in past deviation of the dependent variable from its steady state solution or "proportionate error correction".[1]

So: $$\Delta \log(STOCKS)_t = 0.4833 + 0.6843\, \Delta \log(GDPREAL)_t - 0.0537\, Interest_{t-1} - 0.0683 \log(STOCKS/GDPREAL)_{t-1} - 0.5463D1 - 0.2946D2 - 0.2382D3 \qquad (5.180)$$

The behavioural equation above determines the level of stockbuilding with the flow of stockbuilding determined as the first difference of this stock. The selected specification postulates a long run homogeneous relationship between the level of stock and the aggregate demand given by gross domestic product and interest rate modified in the short run by the rate of growth of the activity variable.

The economic interpretation of the above results suggests that stock build when the economy expands and when interest rates fall. Diagnostics suggests that the equation fits fairly well, see Table 11. Note that even though we have no significant direct liquidity (wealth) effects, the interest rate effect ensures that an important transmission mechanism is present, i.e. financial effects. Unfortunately we were not able to detect the buffer stock functions since no data is available for capacity utilisation.

5.10 Labour Market, Inflation and Money Wages

The specification of macroeconomic variables in this block complete the specification of the real sector in the model we are presenting. Prices, defined endogenous as a general deflator and as a measure for inflation, i.e. changes in prices. For simplicity in our exposition we will refer as inflation dynamics as a process resulting by changes in prices, given the fact that we try to circumscribe the theoretical framework to a situation where changes in prices accumulate over time. In relation to this, and retaining the generalisation of inflation it is recognised that both inflation and unemployment can be featured by low and high levels of inflation. However, in the context of developed economies, in the last two decades rising inflation has been accompanied by increasing unemployment. Such situations have cast doubt on the Phillips curve results of the sixties, as no trade-off between inflation and unemployment exists was suggested. On the other hand, as we can see below, when we move to the environment of less developed economies, the situation of high unemployment with inflationary ressure is an historic one,[153] i.e. structural unemployment in line with structural inflation. According to this we switch from the theoretical postulates around unemployment, inflation and demand for labour in matured industrialised economies to less developed ones and particularly to Latin American in particular, where a large literature has already accumulated.

After the General Theory, the main theoretical postulate suggests that in the determination of income and unemployment the main role was played by aggregate effective demand. Accordingly with this, fiscal and monetary policies are used to diminish unemployment by expanding aggregate demand.A new equilibrium with no inflation was expected.

As a further development of the above keynesian theoretical statement, the Phillips Curve.[154] whose major implication is that there is a trade off between inflation and unemployment. The policy forescription is evident. The evidence seems to be inconclusive, at least in developed economies. In less developed economies, the monetary approach and neo-classical theorists have refused the plausibility for the same reasons as for developed economies. Indeed the underlying theoretical proposition in the monetary approach to inflation implies the rejection of Phillips Curve trade off. Since the policy of sustaining a low level of unemployment behind it "natural rate" will produce an acceleration in prices charges and drive the economy towards stationary inflation, the argument has played a notorious role in the stabilisation programmes following balance of payments crises, where no recognition of high level of unemployment is made, and where monetary passivity is suggested. Thus no existence of long-run Phillips Curve can be more formally represented by the following expression:

$$\frac{\dot{W}}{W} = ed + \gamma\dot{p}^{E}/P \qquad (5.181)$$

where $\gamma = 1$ if the the natural rate hypothesis is to hold in the long run,[155] and ED is the excess demand variable which could be represented by unemployment rate, for instance. Clearly to have zero inflation the above expression breaks down to be:

$$\dot{W} - \gamma\,\dot{p}^{e} = ED \text{ if } ED = 0 \qquad (5.182)$$

$$\dot{W} = \gamma\dot{p}^{e} \text{ and since } \gamma = 1 \qquad (5.183)$$

$$\dot{W} = \dot{p}^{e} \qquad (5.184)$$

The policy prescriptions for such theoretical propositions are clear enough.

A more 'extreme' approach where even the long run vertical Phillips Curve from the monetarists is rejected is the so called 'rational expectation school'. The main argument is that economic agents are rational. This 'rationality' makes agents discern for themselves the correct specification for prices and wages accordingly: while Friedman modelled expectations of inflation as a weighted average of past inflation neo-classics pointed out that as agents are national people instead of looking forward to forms expectations, they rather are forward looking by using all available information. For instance, expected inflation is likely to be affected by current changes in money supply, so, since economic agents act rationally they will not make consistent mistakes, even though the economy could be operating under random stocks. Thus only genuine, random shocks are allowed to alter and deviate economy from its stable path.[156]

In summary the neo-classical approach assumes that unemployment is exclusively a supply side phenomenon, time tuning as policy to fight unemployment is ruled out, and that increased unemployment given a fixed demand curve for labour implies lower real wages. Thus, income policies are accordingly excluded. Their policy prescriptions havecertain appealing if we consider economy with strong supply side constraints. In what follows we start to review the literature by breaking down this block into prices inflation, unemployment, wages and labour demand. Each topic review will be followed by our empirical results and final model.

5.10.1 Prices and Inflation

One of the more discussed topics in the last twenty years is the inflation and its causes. In the context of less developed economic and particularly in inflationary Latin American theoretical and empirical works about prices and inflation have developed along two main schools; structuralists (neo-structuralists) and monetarists. Both schools of thought suggest different mechanisms by which inflation is generated. Since both models have been developed both theoretically and empirically, particularly after the sounds hyper-inflation and balance of payments crisis, it becomes less clear to make such distinctions between monetarists and neo-structuralists. So we must bear in mind the arbitariness of such classification although we refer to both monetarists and structuralists as a matter of convenience.

Monetarist approach to inflation price have encompassed the neo-classical proposition of anticipated and unanticipated inflation of rational expectations[157] and it is today 'officially' recognised in stabilisation programmes where trade and financial liberalisation are a required determinant for the success of these programmes[158] and where inflation is determined by imbalances in government finances (excess demand). On the other hand neo-structuralists advocate that the inflation obey to structural disequilibria in the doméstic economy (internal balances which manifests in its relation to world market (external balance).[159] This theoretical construct encompasses the so called inertial inflation[160] and the inflationary effects of relative price variability.[161] The latter had been considered as an autonomous theory of explaining inflation but in essence we can consider it as a special case of structuralist approach.

From the empirical point of view it is important to mention at the outset that most empirical work relates to hyper-inflation and explaining inflation in inflationary environments. This is not the case of Venezuela where the historical sample period used in our econometric investigation shows that prices have been repressed during most of the period, even though domestic and external disequilibria are similar to the ones found in the empirical literature. Note that to the best of my knowledge there is no empirical investigation related to prices in Venezuela.

In general the monetarist approach (classical monetarist) identifies disequilibrium in government finances as one of the main causes of inflation. Government deficits increase aggregate demand, as income moves towards full employment. The key factor here is the inability of government to finance its deficits by other means that by discretionary monetary policy. This assumption was theoretically developed by early monetarists (See Harberger (1963)). In its classical version the monetarist approach assumes perfect competition, 'well defined' price elasticities and equilibrium between prices and wages where price volatility becomes a monetary phenomenon. As a consequence of this, income is effected only in the short run. To avoid external disequilibria both exchange rate and interest rate should be adjusted to price changes in order to hold around its long run purchasing power parity, and since short-run effects do not last, averages and salaries are adjusted accordingly weakening the short-run growth. In the long run the net result is a new level for prices and high inflation.

The expansion in aggregate demand caused by the government deficits is the accelerating factor behind inflation, as asserted by monetarist, however note that Keynesians and neo-keynesians and structuralists affirm that variation in aggregate demand could be a cause of instability due to its effects on interest rate. This issue is important since as argued by monetarists, if the demand for money is interest elastic, we could have an excess supply of money if interest rate falls according to the above rule of money financing budget deficit. These short-run effects will evolve perversely since in the long run, output stagnates and inflation is heritage.

The monetary approach is developed from the modern quantity theory of money by Friedman, but concentrating on the demand for money function. Horberguer (op cit) extended Friedman's model to explain the inflation in terms of both demand and supply for money starting from:

$$MV = PY \tag{5.185}$$

where V, velocity of circulation or its inverse the ratio of the demand for real money balances to real income is not constant, as it was assumed by the classical quantity theory. However it should be a stable function of income and on the opportunity cost of holding real balances. Thus, the demand for real balances ratio V^{-1} can be represented by

$$V^{-1} = y^{\alpha}\, i^{\beta} \tag{5.186}$$

where rewriting (5.185) and substituting in (5.186) we obtain

$$M/P = V^{-1}(y) = y^{\alpha+1}\, i^{\beta} \tag{5.187}$$

This expression indicates that monetary equilibrium implies that both supply and demands equal, thus:

$$y^{\alpha+1}\, i^{\beta} = M/P \tag{5.188}$$

where by solving for P and differentiating we obtain the rate of change relationship:

$$\dot{P}/P = \dot{M}/M - \gamma\,[\dot{Y}/Y] - \beta\,[\dot{i}/i] \quad \text{where } \gamma = 1 + \alpha \tag{5.189}$$

expresses the heart of the monetary inflation model (see Cagan (1963)).

This equation embodies two important suggestions; fist if interest rate deviates from the interest parity condition, the effect could be inflationary, and second; the money term (M) is the target variable if prices are to be held stable. Under the assumption that government finances disequilibria (deficits) are money financed, the causality between money and inflation (prices), according to equation (Y), confirm the monetarist proposition. The policy suggestions coming from this simplification are clear in regard to stabilisation programmes. The balance of payments crises which can be seen even in the short-run, and the inflationary pressures are the main reasons behind the policy prescriptions and the mentioned monetarist model for inflation.

As noted, the specification of inflation could be plausible for a closing economy since monetary disequilibrium (excess money) creates an excess demand for goods and assets, so if the supply is not elastic, prices increase. On the contrary in an open economy, the excess of money is destroyed via balance of payments disequilibria, which in turn affects the foreign component of the monetary base. This 'self-equilibrating' mechanism acts by attenuating the inflationary pressures of accommodating monetary policy and fiscal expansion. Such as it was discussed in Chapter III, this is the basic argument of the monetary approach to balance of payments. We note that the above analysis, though simplistic has been used in great extent to test the monetary foundations of inflation, although it can be criticised since it accounts for only two channels for the adjustment of the current expansion of real money to its expected expansion. It can be argued then, in the short-run, with keynesian unemployment, output can respond to accommodate monetary policy. But in this monetarist framework it is assumed within a production function where capital and labour determines real output,[162] and as such, it looks appropriate for less developed economies where supply restrictions dominate opposite to the keynesian postulate above, which dominates in developed countries. In less developed economies the policy objective is to increase the factor inputs into the production and productivity via technological progress. Thus the monetarist proposition assumes output to be predetermined.

In what appears to be an extreme assumption, Harberguer and his predecessors apply a model theoretically designed for closed economies, since it neglects the external demand of adjustment, to open economies as Latin-American economies. In a middle way solution between both extremes, Harberguer's closed economy and Johnson's open economy, Blejer (1977), developed a model in which it is allowed that both channels of adjustment towards equilibrium operate, depending on the degree of openness,[163] even though his model carries the assumption of restricted capital mobility.

Blejer (op.cit.) modifies the monetary model by introducing non-tradeable goods, so, (see Blejer op. cit.)

$$Md/p = Md\ (Y,\ i) \quad \text{where } Md/p,\ Y,\ i \text{ are as before} \qquad (5.190)$$

by differentiating

$$\dot{M}d/Md = \dot{P}/p + (\dot{M}/\dot{p})/(M/p) \qquad (5.191)$$

where the second term is the rate of inflation plus the demand for real money. Accordingly

$$\dot{M}S/MS = \dot{m}/m + \dot{D}C/DC + \dot{I}R/IR \quad \text{where } m = \text{money multiplier} \qquad (5.192)$$

and MS = m (DC + IR) is the reserve-flow equation and MB is the monetary base, and DC and IR as before.

Blejer specifies the rate of inflation as being partially determined in traded and non-traded goods, so

$$\dot{P}/p = p(\dot{P}T/p) = (1 - f)(\dot{P}_{NT}/P_{NT} \qquad (5.193)$$

and where f is the weight of traded goods in total expenditure.
The monetary disequilibrium is denoted by Blejer as the ex-ante money gap (MG) follows from above, (see Blejer (op. cit.) p. 470).

$$MG = (DC/MB + \dot{m}/m) - (\dot{p}/p + /\dot{M}d/\dot{p}/Md/p) \qquad (5.194)$$

when the MG is is different from zero, the gap is filled ex-post via balance of payments and by increasing domestic inflation (non-traded inflation); but if MG is bigger than zero there will be an excess in expenditure and balance of payments deficits, since the supply of money exceeds the demand for money. The net effect is an increase in inflation since non-traded inflation will increase it. The basic result in Blejer's model is that excess demand for domestic, non-traded goods, presses the relative price (pNT) upwards according to this:

$\dot{p}NT/pT = Ke^{f\,(MG)}$ where f is the elasticity of relative price of non-tradeables and MG the monetary gap.

Taking lorgarithms and differentiating we get:

$$[\dot{P}_{NT}/P_{NT}] = (\dot{P}r/P_T) = \mu\,\dot{M}G \qquad (5.195)$$

and substituting above yields;

$$\dot{P}/_P = \dot{P}_T/P_T + (1 - \emptyset)\ f\ MG \qquad (5.196)$$

Thus, domestic inflation is given by foreign inflation and the excess demand. Further Blejer developed a similar expression for international reserves in which he encompassed the two adjustment channels, and included both inflation and balance of payments which are functions of prices abroad and monetary disequilibria, where the value of elasticities (f) depend on the degree of openness. As can be seen, there are some extreme restriction in Blejer's model; first he assumes fixed parameters in the transmission of monetary disequilibria. This restriction emerges from his restricted capital account. He does not take into account the country's response to varying the level of exports. Another restriction found in Blejer's model is that the balance of payments is presented as the reserve flow equation. Usually the composition of the balance of payments is important since, for example, a deficit in the balance of trade could be compensated by a surplus in the capital account due to a foreign loan and give an overall result of surplus in the balance of payments. This major restriction could alter Blejer's conclusions, since monetary disequilibria is not the only determinant of the balance of payments.

Other determinants as exports, imports, debt payments and capital flows must enter in the equation if one wants to represent the interaction between the monetary disequilibria, supply constraint and inflation. We have deviated from our main topic in this section to highlight the theoretical construct and consistency between the monetary approach to inflation and the monetary approach to the balance of payments (see chapter IV for a review of the latter).[164]

Having reviewed the main theoretical constructs of the monetary approach to inflation, let us, in this section, briefly review some of the already large literature of empirical works.

In general Harberguer's equation expressed in its stochestic form

$$\log P_t = \alpha_0 + \alpha_1 \log P_{t-1} + \alpha \log M + \alpha_3 \ \log P_{t-1} + \alpha_4 \Delta \log M_t - \alpha_4 \Delta \log M_t - \alpha_5 \Delta^2 \log M_t \qquad (5.197)$$

or

$$\Delta \log P_t = \alpha_o + \alpha_1 \log M_t - \alpha_2 \Delta \log P_{t-1} + \alpha_3 \Delta \log M_t + \alpha_5 \Delta^2 \log M_t \qquad (5.198)$$

which says that inflation follows the money supply with some inertia and subject to shifts in the money velocity as a reaction to changes in inflation, expenditures or the growth rate of new money.[165]

Although the above equation represents the contemporaneous monetary inflation model used in the literature to test the monetary proposition, its derivations indicate some restrictions which are not usually tested. However our main objective here is to present the empirical results. To begin with, Horberguer estimated a model using Chilean data for the period 1939-1958 and found strong confirmation for the monetary proposition that accommodating monetary policy was the most immediate determinant of inflation in Chile. He modified his original model, including wages in order to test for cost-push effects on inflation. The results were disappointing in this respect. Other studies using the same stochastic equation above have had similar results, see Diz (1970), Vogel (1970), Blejer (1977), Leiberman (1982).

The other extreme in the theory analysing inflation in less developed economies and particularly in Latin-American is the so called structural or structuralist approach developed by Oliveira (1964) and which has been re-edited by neo-structuralists following the inertial character of inflation in many Latin-American countries, particularly those in the south cone; See Taylor (1982, 1983), Van Wajnberger (op.cit.). Structuralist macroeconomics find the real causes of inflation in the structural rigidities inherent in the supply of agricultural output,[166] in the inelasticity of world demand for primary exports, in the inelastic government revenues and in the immobility of factors of production and inadequate infrastructure. The factors above aggregated into sectorial disequilibrium always play a more important role with respect to the deflation than the money growth.

Structuralists claim that the tight fiscal and monetary policies recommended by the monetary approach hinder the output growth. By implication inflation viewed as a by product of structural sectorial disequilibria will accompany economic growth while such disequilibria and supply constraints remain! So inflation is seen as the price of economic expansion,[1] even though it always implies a 'trade off' between the level of inflation 'permitted' and the rate of growth which in the long term will eliminate the mentioned disequilibria.

Thirlwall (1975) argues that some inflationary financial policies could have positive affects for economic development (growth). First, the 'inflation tax' captured in inflationary periods as fiscal disequilibria are money financed, providing a supplement to government revenues. Obviously, Thirlwell does not consider the negative wealth effects due to inflation tax and its contractionary repercussions.

Second, financing development by inflationary means fosters the developments and innovations of financial systems, as there is on offer new and alternative financial instruments as a substitute for a real and physical assets.

Taylor (1983) adopts Oliveira's definition of 'passive money' or accommodative monetary policy under inflation in a two sector model of inflation and growth. His model describes inflation arising from conflicting claims to product between workers and profit recipients under conditions of lagging food supply. (See Taylor op. cit., p.161). The relationship between inflation and growth is an important one in the structuralists' Macroeconomics literature.

It has been demonstrated by Taylor (op. cit.) that the monetary recipes against inflation can even accelerate inflation under certain circumstances, slow down the output expansion and deteriorate real wages in the long run. Thus, high monetary policy of whatever class, could lead to stagflation in the short and medium term. (See Chapter 6 in Taylor (op cit) where an analytical demonstration is carried out.) It is interesting to note that structuralists advocate full indexation or at least wage indexation to past inflation. However, if orthodox policies structuralist denomination for monetary constraint policies and inflation is accelerated, the real wage will fall due to the lags in the indexation rule. Accordingly, money wage bill increases due to workers' pressure as a means to regain their lost purchasing power. Taylor ends his impressive analytical presentation of structuralist macroeconomics by suggesting a set of policies orientated to a steady economic growth and to eliminate the structural imbalances, where with respect to inflation he summarises that in order to understand the real character of inflation, structuralist macroeconomies is armed with a consistent framework. So, three mechanisms are observed; first, there exists conflicting chains between workers (wages) and capitalists (profits). The increases in food is an example, since workers will press for an increase in money wages as food prices rise. Such situations could evolve into an inflationary process.

Second, somehow related to the first one, relates inflation and workers to a situation where employment is high. Thus workers are more strong (weak) when inflation is high (low) and employment is high (low). Thirdly, is related to some institutional factors, as indexation rules. As in most cases indexation rules adjust wages with some lags, an acceleration of inflation will deteriorate real wages. The important policy suggestion exercised by Taylor and associates is the relaxation of monetary 'rules' in the short-term as it is expected that prices will reduce by holding interest rate constant, as the latter acts as a cost-push effect on prices. The rationale behind Taylor's proposition lies in the fact that an initial increase in the supply of money will increase inflation initially. Since indexation policies have a lagged adjustment rule, the real wage will fall. Workers' reactions is to press for a rise in money wages and regaining some of lost purchasing power. The net result is depression of savings and the fall in investment (real). Demand falls accordingly and inflation starts to decline. As the ratio of money to output rises, interest rate decreases. The wealth effect of lower interest rate is a higher real wage and low inflation (long-run).

Finally there exists an increasing literature which develops a more eclectic model by allowing both money, structural and exogenous factors as import prices affect the general level of price in a date economy. Sheehey (1981) developed a 'monetary' model in which structural and exogenous factors were allowed to affect domestic inflation.

Intersectoral disequilibria are introduced in the inflation model proxied by an excess demand variable measured by the percentage deviation of gross national product above its long-run trend. Price expectations enter in the model which is a resemblance of an expected-augmented Phillips Curve, as the expected inflation incorporates the effects of money wage changes, since nominal wages tend to vary with expected increases in prices and its impact on the relative price variability.

Here, the expectations augmented Phillips Curve appears as a special case of a more general 'monetary' model allowing for exogenous import prices, and for 'structural' factors due to the indexing rule and/or wage cost-push factors. Sheehey (1981) estimated the Harberguer model expanded by money wages, import prices and price expectations so thatin the simple Harberguer's monetary model, the import prices explain cost pressure. He concludes by suggesting that a monetary model is more successful in identifying domestic and import sources of inflation.

In summary the literature surveyed above investigates the causes for inflation emphasizing on the importance of different wage control schemes, freeze of money wages, government adaptive indexation, political changes and rules for contract bargaining, general indexation rules and measures of inertial inflation for nominal wages, and minimum wages. These 'institutional' factors should be taken into account when investigating the inflationary process in most Latin-American countries. Note that although Venezuela has not recorded (during the sample period of investigation) a continuous inflation, most of the above institutional factors which highlight the importance of wages entering in the inflation equation can be found in Venezuela as well. However, if we look at the dynamics of Venezuelan inflation during the sample period, we would observe that these are signs of repressed inflation which is exercised through administrative price control and system-wide subsidies and periodical (inertial) indexation.

As mentioned before, apart of Hojman (1986)[167] work, there are not empirical works to which our investigation is this area could have been encompassed. Our model which does not incorporate sales variables or aggregate demand effects could be used to hypothesise some aspects of the Venezuelan inflationary dynamics. As it is known, the main characteristic in the sample period is one of repressed inflation, with "stable" exchange rate and balance of trade openess.The latter,due to the accumulation of foreign reserves particularly from the first oil shock.

According to the expression above this means that the first two variables reflect the small variations and the smooth variations of Venezuelan inflation . However the periods in which prices hikes are identified corresponds to the periods ofhigh variation in relative prices.

Before we end this section and present our econometric investigation, let us mention some important inter-relations between the right hand side variables. Supply shocks affect in great extent the 'flexible' prices variables, since institutional wage indexation policies (important component of inertial inflation) can affect this particular market, which in turn accelerates the inflationary dynamics which feed back into the system affecting an important latent variable; real wages; the overall process sets in motion as unitory wage costs increase. However, the model does not tell us which factors 'start' the inflationary dynamics. Thus we assume that we do not start from a zero inflation position. This is one of the most important theoretical aspects of so called inertial inflation,[168] no matter it is repressed or not. Frankel (op cit) substituted the lagged value of the changes in the overall measure of inflation for the unit wage cost variables, in order to account for the wage indexation 'rule'. In our case I do leave the dynamics process of dynamic inflation to generate room for the indexation 'rule' when it is necessary. This follows from the econometric modelling methodology applied to the empirical work.

It has been in many cases suggested Under the homogeneity assumption that the relationship between prices and wages introduce real wages effects into the model. However we note that the indexation 'rule' suggests an adaptive expectation behaviour of agents, as by implication, indexation is made to respect to past inflation, which suggests an adjustment path between wages and prices (vice versa).

It is important to mention here that some institutional factors affect the adjustment path between prices and wages which can be represented in disequilibria. In our empirical investigation I will refer to this aspect in the explicit incorporation of such disequilibrium term. On the other hand, the wages equation reflects this inter-relation since the equation relates to changes in nominal wages.

A final thought with respect to this more eclectic structural approach[169] we can conclude by remarking on the following aspects: first, although relative prices are stable, it is clear that some level of inflation exists, in Frankel's words, disequilibrium inflation, but better known as inertial inflation, independently of that relative price variations are associated with the inflationary dynamic process, since supply side shocks feed into the system altering relative prices both flexible and tradable. Secondly, variations on the nominal exchange rate (maxi devaluations) alter the prices of tradables with respect to untradables and feed immediately into wages by altering the 'equilibrium' between real wages and prices. The underlying devaluation of the real exchange rate represents future shocks in domestic markets as foreign prices feed into the system through import prices (denominated in foreign currency) adjusted by the new level of nominal exchange rate. The most salient feature of such inflationary dynamics seems to be far from the usually suggested demand push inflation or money expanded inflation. What is important for this inertial and structural inflation is that this inflationary dynamics process is in principle autonomous with respect to business cycle between economic activity and employment which characterises more developed economies. Paraphrasing Frankel we can suggest that the application of orthodox stabilisation policies could be inefficient as well as counter-productive, as more supply side structural disequilibria can be created. Although I do not follow a specific suggestion I prefer to follow a more eclectic approach in which most likely determinants are incorporated and investigated. However, some other ad. hoc. methodologies could be followed to test any hypothetical assumption. In this particular aspect, Grauger-Causality Test has been used largely in the controversy about the monetary feature of inflation and stabilisation policies,[170] likewise using the structuralist framework, causality test can be used in the controversy indexation inflation.

Aside from being endogenous variables in our structural model, prices serve to connect blocks and variables, introducing economic meaning to several macroeconomic and microeconomic relationship present in the model. Accordingly we have estimated the following 'prices' variables; wholesale price index, imported prices and wages, together with labour demand, labour supply and unemployment conform what we call the price-labour block. The wholesale price index was chosen as a general measure, deflator, and as an indicator of inflation, since we have followed the procedure of estimating changes in this price index. So the 'price' sub-block is estimated in first differences, which arose from the econometric modelling process used elsewhere in the empirical work. Data for other prices exists, but we have chosen this approach in order not to estimate several prices variables or deflators in this highly aggregative model. It is clear that for further development of model other prices must be brought into the model. We assume that for the objectives we have ourselves imposed, the study of the balance of payments and the policies affecting it, the estimation of the general overall prices is a robust approach. However let us mention that empirically it would not make a big difference to estimate several prices equations when they move together in levels and on changes. On the other hand, the wholesale price index indicates a more freely moving price index, since it does not suffer from the constraints of a consumer price index or gross national product deflator since in a highly intervened economy where price controls and a system-wide subsides control prices at the level of consumers. The consumer price index can be a misleading indicator. Thus, wholesale price index incorporates all factors as well as it is accordingly a best indicator for price inflation.

Our approach does not over emphasise structuralist and/or monetarist propositions. However, structural factors are reflected in the dynamics of the equation, such as inertial inflation and disequilibria between nominal wages and the price level, relative prices enters in the model by including import prices and exchange rate simultaneously, so import prices enters in domestic currency.

Hojman's inflation equation is a part of a simultaneous model in which output, wages strikes and collective bargaining are all endogenous links between variables is by directional. Such models require a highly disaggregative tradable and non-tradable goods[171] and prices, as existing in Sweden and Israel, see Hojman (op. cit.).[172] Accordingly, Hojman relied in proxies and on simplified assumptions. The estimated equation for inflation is, in our notation:

$$\dot{P} = \alpha_0 + \alpha_1 \dot{P}m + \alpha_2(\dot{w} - \dot{m}ph) + \alpha_3 e\dot{m} + \alpha_4 \dot{P}_{t-1} \qquad (5.199)$$

where $\dot{P}m = p_f^e + \dot{e}$ import prices are given in domestic currency; $w - mPL$ as the labour costs net of labour productivity. This equation does not include a money variable although it includes an excess demand variable which anyway is not a significant difference from zero. The lag value for the dependent variable which Hojmam accounts for as a partial adjustment process could alternatively indicate inertial inflation given by the indexation rule. Note however that there has not been indexation rule during the sample period, but policies for indexation existed and where carried out periodically as indexation or wage compensation, for past inflation. In general Hojman's equation belongs to a more general structural inflation model where supply shocks are fully accounted for.

In our empirical investigation several experiments using money as determinants rejected the monetarist[173] (and monetary) hypothesis, although it did not mean that the structuralist hypothesis is accepted by default (type II error). The final equation is an equation where structural factors are relevant.

As it is elsewhere in this thesis I have started from a more general autoregressive distributed lag model accounting for all mentioned factors relevant for our eclectic theory. So monetary effects are considered to be passive, which does not mean that they are not important.

5.10.2 Price and inflation. Empirical results.

Prices and/or inflation constitutes one of the most important behavioural-link equations in the model since it operates as a general deflator as well as the inflation measure. For reasons outlined at the beginning of this section we are using a general measure for prices,the wholesale price index. However there are additional reasons emerging from the limitations in building a more dissaggregated and larger model. In any case, all prices measures in Venezuela show a strong correlation which does not invalidate from the theoretical point of view our working assumption in choosing wholesale price index as a general deflator.

Our empirical investigation starts from a general autoregressive distributed log similar to the design used in the other sectors of the model. Thus, the specification search follows Hendry and associates' error correction design which encompasses both theory and data.

The basic goal was to optimate a generalised dynamic model of the following form:

$$\log(\text{GEPRWS})_t = \alpha_0 + \alpha_1 \sum_{i=0}^{n} \log(\text{IMPRWS})_{t-1} + \alpha_2 \sum_{i=0}^{n} (\text{GERPRWS})_{t-i-1}$$
$$+ \alpha_3 \sum_{i=0}^{n} \log(\text{WAGES})_{t-1} + \alpha_4 \sum_{i=0}^{n} \log(\text{M1})_{t-1} \qquad (5.200)$$

This general dynamic constrained design incorporates all variables theoretically, justified by both structuralist, neo-structuralists and monetarists. Our objective was to allow data to shape the theoretical insight of the model where a more parsimonious reparameterisation might indicate the theoretical framework explaining Venezuelan prices and inflation. Estimated models are to be selected by the dominance variance criterion, so that the restricted model is a nested model of the unrestricted model. Dropping lagged variables as well as other restrictions takes the form of testing parameter constraints, so that the restricted estimates imply parameter parsimony which is achieved by applying the error correction methodology. As we use annual data, variables, when transformed by first differencing, indicate short term behaviour while variables in levels indicate theoretical justifications. The more parsimonious model is of the form, e.g.

$$\Delta\log(\text{PRICES})_t = \alpha_0 + \alpha_1 \Delta \log(\text{IMPRUS})_t + \alpha_2 \Delta \log \text{M1}$$
$$+ \alpha_3 \Delta \log(\text{WAGES})_t - \alpha_3 \log(\text{PRICES/WAGES})_{t-1}$$
$$- \alpha_3 \log (\text{PRICES/M1})_{t-1} \qquad (5.201)$$

Such a model makes us test the homogeneity restriction that a monetary wage price elasticity and embedded with one period lag indicating at the same time some inertial inflation which characterises the indexation rule. Another important feature of the model is the possibility of disentangling short-run and long-run elasticities.

The estimated results indicate that money does not affect prices, i.e. rejection of the null hypothesis, which constitutes a monetarist assumption in less developed countries. For completeness I report the three step procedure in testing the theoretical constructs outlined earlier in this section, so:

$$\begin{aligned}\Delta \text{ logPRICES} = {} & 0.0047 + 0.1780\ \Delta\ \log(\text{WAGESIND})_t \\ & + 0.6874\ \Delta\ \log(\text{IMPRUS})_t \\ & - 0.1168\ \log(\text{PRICES/WAGES})_{t-1} \\ & + 0.0299\ \Delta\ \log(\text{M1})_t \qquad (5.202)\end{aligned}$$

and

$$\begin{aligned}\Delta \text{ logPRICES} = {} & - 0.1792\ \Delta\ \log(\text{WAGES})_t + 0.8034\ \Delta\ \log(\text{IMPRUS})_t \\ & - 0.0959\ \log(\text{PRICES/WAGES})_{t-1} - 0.0379\ \text{D1} \qquad (5.203)\end{aligned}$$

Note that dropping the money variable, the more parsimonious model "reflects" the monetarist hypothesis of money affecting prices. However, it is clear that the causality issue is conclusive. We have been only able to detect no money affect into prices at certain levels of significance which does not rule out completely the causal effect referred to above. For further diagnostic and design tests see Table 12 for both models. The selected model indicates that import prices and wages are the most important variables affecting domestic prices. A unit long-run elasticity is found between wages nd prices in a country where unions exercise their power in the bargaining process as well as giving some indication of the indexation rule. Note that changes in import prices (expressed in domestic currency) exert an impact upon the domestic inflation (changes in prices) greater in proportion to the proportion of imports on gross national product, indicating that import prices have an accelerated effect on domestic prices, even though the co-efficient is significantly lower than unity, rejecting to some respect the monetarist propositions of one to one positive relationships between the domestic and foreign prices. See Table X for a summary of the econometric selection criteria.

5.10.3 Wages and Unemployment

A W Phillips' celebrated paper set up the basis for the modern theory of wages and unemployment. By studying wages and unemployment relationships in the UK over the period 1861-1957 he found a significant non-linear relationship between the rate of money wages and unemployment.

Later on, Samuelson and Solow (1960), following Phillips' results, claimed that the long-run relationship between money wages (inflation) and unemployment offered a menu of combinations between inflation and unemployment.

Freidman,[174] sceptical of the long-run relationship and within a Walrasian framework, assumed that only real wage changes can be expected to produce permanent changes in the level of unemployment. This assumption brings about the notion of price expectations, as workers anticipate inflation, by interpreting nominal wage increases as real increases. The expectations augmented Phillips' curve implies that factors such as trade unions, government intervention, and labour market segmentation generate that full employment equalise to an equilibrium rate of unemployment, i.e. the natural rate hypothesis. With the national rate hypothesis justifying certain levels of equilibrium unemployment, government policy to reduce the unemployment below its "natural level" money wages tends to increase. Prices will react accordingly and real wages will deteriorate. If workers anticipate price increases and interpret nominal wages as real wages, their behaviour will change in accordance. As workers' expectations are formed adaptively the economy will come back to the level of equilibrium unemployment. Following this zigzag movement inflation rises and unemployment reduces. However expectations make unemployment rise and so on. The net result is a series of small and short Phillips' curves differentiated each other by the different level of inflation. It is clear then that the long-run curve could be vertical. The heritage in the long run is infinite inflation, since it is the only way to hold unemployment to below the natural rate. The suggestion is that the Keynesian Phillips Curve holds only in the short-run. Such Phillips Curve relationship both short-run and long-run suggests that money wages changes can in the short-run influence the level of unemployment. The policy implications are that money wages matter in the balance between inflation and unemployment. The difference in the way economic agents (workers included) form expectations becomes vital in the neo-classical rational expectation hypothesis of Lucas (1981) and Sargent (1986).

The Phillips Curve is forward sloping since expectations are rational. This means that if inflation is accelerating agents will not underestimate it and will respond accordingly, using all available information. Rational expectations hypothesis rules out any trade off between unemployment and inflation, and rest on the assumption of full market clearing, although it is possible to accept the optimisation principle underlying full general equilibrium disregarding the principle of fully clearing markets.

In a labour market context, the rational expectation proposition assumes that the demand curve for labour is normalised with the supply curves.[175] One 'supply' curve shows the number of workers willing to accept job a date wages. The second supply curve shows the wage at which workers actually are. The difference between these two supply schedules shows labour looking for a job as well as frictional unemployment. In other words the difference is indeed voluntary unemployment since the hypothesis rests on the assumptions that the number of workers that firms want to employ is equal to the number of workers who actually accept the jobs. By transferring Freidman's ideas the difference between both supply schedules gives the natural rate of unemployment. The major implication is that increased unemployment, assuming a fixed demand schedule for labour, is consistent with lower wages.

Following recent theoretical development, based on Keynes' work, neo-Keynesians[176] developed a model where wages and prices are fixed and only quantities change, opposite to the Walrasian model. Barro and Grossman (1976) provided a model where equilibria in one market could reinforce disequilibria in other markets. This assumption conducts to a market where both money wages and prices are characterised by its stickness given by the slow adjustment. The proposition is that firms working in a highly competitive market are not willing to cut money wages since perversely efficiency and morale could be affected (Kaufman 1984). The implication is that wage stickness is not simply a result of interaction between government, firms and trade unions. However there are some institutional factors which work on the lines of nominal wage stickness.

Unemployment could be the cause of medium or short-term wage stickness when economic circumstances change unfavourably to firms. Assuming imperfect competition there are models in which product markets are prices by firms on the basis of a 'desired mark-up' over some primary production costs (see Davies (1985)). The mark-up price wages ratio is the reciprocal of real wages. Here the degree of competition is crucial. If competition is perfect as assumed by Layard and Nickell (1985) the desired level of the price wage ratio is directly related to the level of aggregate demand of the dated economy which can be proxied by real balances. Accordingly workers claim a reciprocal of the mark-up (real wages) which depends directly on the level of aggregate demand.[177]

The above review into theories explaining wages allows us to concentrate on the theories which are the basis for most of the empirical works in the latest years, ie the Phillips Curve and expectations augmented and the so called bargaining theory. The latter implying the importance of the role of institutions and institutional factors.[178] Note that the effects of those institutional factors such as contracts between government and public sector or corporations and unions affects the level of wages in general since other unions bargaining with private sector may follow suit, as government sector is likely to offer better contract conditions. This is the case with Venezuela. However, and more generally, indexation rules, real wage resistance plan an important role in the wagedetermination process. Empirically, bargaining models implies a certain wage target, i.e. real wages. The real resistance model due to Sargent (1964), Henry, Sawyer and Smith (1978). This model of real wage resistance rests on the argument that changes in money wages occur because trade unions aim to guarantee a desired level of real wages in the bargaining process. Bargaining models include inflation expectations as well as a variables explaining the state of the labour market. This makes it difficult to establish a proper distinction between Phillips curve models and bargaining models.[179]

Holden et al (1976) arguing observational equivalence find that both types of models lead to equations involving the same set of information and accordingly the same right hand side variables. Formally andfollowing Holden et al (op cit) (p.41) the observational equivalence is shown by the following expressions:[180]

$$\dot{W} - \dot{P}^e = \alpha\,[(\dot{W}/\dot{P}^e) - (\dot{W}/\dot{P}^e)_{t-1}] \qquad (5.204)$$

real wage resistance (bargaining model)

and $$\dot{W} - \dot{P}^e = \alpha_0 + \alpha_1 (\dot{W}/\dot{P}^e)_{t-1} + \alpha_2 Z \qquad (5.205)$$

The bargaining model as a general approach has been applied in less developed economies, which in spite of a strong presence of institutional factors, show a high degree of unionation, Hojman 1986, develops a bargaining model for Venezuela in the context of an simultaneous model where wages and the collective bargaining enter explicitly in the model. Later I will turn to this aspect and comment on Hojman's results.

Before we examine empirical works related to less developed economies within the framework of both augmented expectation Phillips curve and the bargaining model let us fix some theoretical developments regarding labour market and wage formation in less developed economies.

In the analysis of labour market and money wages we have reviewed the most important theoretical aspects such as the determination of nominal wages, under both so called cost-push approaches and the optimalisation behaviour of economic agents. In the first approach the degree of unionation of labour force introduces the monopoly power of unions and its behaviour in the determination of nominal (real) wages. Even though it has been mentioned that the line differentiating both approaches is very thin. More general models include both anticipated prices and bargaining arguments. Although most part of the literature has in mind industrialised developed countries, the high economic growth and the consequence of the stabilisation economic policies in less developed economies has led to an increasing literature where wages and unemployment are investigated in the light of the theories reviewed above and on the 'particularities' of the labour market in LDC.

Within less developed countries and particularly in Latin-American countries the significance of institutional factors in the wage determination process has been widely studied. On the one hand, the wage control policies and income policies have been relevant to break the causality link between wages (prices) and prices (wages). Frenkel (1984) developed a model in which political changes and wage bargaining are important in the adjustment of real wages. Cortazar (1983) shows the effects of periodical indexation with respect to past deflation. Jaramillo and Montenegro (1984) developed a bargaining model where the unions power is a crucial determinant on the indexation, which could arise by contract renegotiation: failing a deterioration in real wages and on anticipated inflation (future indexation clausule). Uthoff and Pollock (1984), examined the importance of legal minimum wages periodically adjusted to compensate post real wage deterioration.

Hojman (1983a)(1984)(1985b) develops the theory of legal minimum wages and its effects on the real earnings in the Chilean labour market. His paper refutes Drobni (1983) which is based on Badia and Taylor(1983). Using Brazilian data, he tries to test the hypothesis that real wages are affect by the level of legal minimum wages in spite of the political regime or what is the same, in spite of the institutional factors involved (see Hojman (1985b) p 49). Alternatively, Hojman 1984 develops an argumented Phillips curve where money wages vary according 'to the size of disequilibrium in the labour market' (p 53).[182] In the next section I come back to these Phillips curve specifications.

The importance of institutional factors affecting the labour market is highlighted by Frenkel 1984 by refusing the market clearing paradigm in the theoretical representation of the labour market. Thus, any general theory about it was refused as well. What is implied in his model is the development of a wage theory under the particular circumstance of less developed countries, where cultural, habit and ethics norms, union bargaining power, and political constraints are variables entering in the wage determination process. All these 'institutional factors', which can be found in industrialised developed economies, are characterised by unstable behaviour in LDC. The most adequate example is the wage bargaining model, where the institutional factor is assumed to be stable. The instability of the 'institutional factor' is an important constraint in the determination of wages, according to Frenkel (op cit). The reference here is the deterioration of real wages in periods where wage freeze, adjustment rules, indexation rules and even political pressure were utilised to break the dichotomy between inflation and wages. Naturally, it is extremely difficult to have both theoretical and observational presence of those factors within the context of the standard economic theory and the macroeconomics.

In what could be one of the most important institutional factors affecting the process of wage determination we can mention the legal framework for indexation policies which characterised recent history in Brazil (see Chajad & Luque (1984)) and other Latin-American countries. It is argued that the constraint imposed by the wage bargaining process, through the alternative, indexation rule, required certain political conditions. The reference here is to the different political and institutional factors, i.e. Venezuela, Costa Rica, Colombia and Mexico, in other countries workers are bound to exercise their union power and the collective bargaining. In the former countries, the wage bargaining process is largely determined by contracts with periodical government income policies.

Let us now consider in more detail what is considered by the literature as one of the most important constraints to the determination of money wages, i.e. the indexation rule to past inflation. In what follows we refer to either nominal average wages or minimum wages.

The most popular model of wage bargaining in many Latin-American countries is the one which incorporates the indexation to past inflation. Recall from the previous section that money wages are formed according to such rule by their expression $W_t = f(P_{t-1}, Z)$ where P_{t-1} corresponds to past inflation and it is a proxy for the indexation rule. Expectations are formed adoptively[183] where the consistent forecasting errors made by workers leave a gap between actual wages and current inflation, implying an important inertial component in the wage formulation process. (See Bresser and Nicomo 1988). However it can be shown that such specification corresponds to augmented Phillips curve if the other factors affecting wages are the disequilibrium in labour market. We could argue that most variants of wage models, where it is implied any kind of adjustment (say, indexation) constitutes a special case of a more general augmented Phillips curve.[184] Note that we are considering for the time being short-term money wages. Frankel's model departs from a disequilibrium position where money wages are partially determined by existing wage conditions. The wage indexation corresponds to certain institutional environment. See Frankel (op cit) for a survey of the empirical works in which the indexation rule is found as a consequence of institutional arrangements. In the analysis above I have concentrated on the price effects on wages and on the different forms this effect takes place. The other variables, such as business cycle and labour market disequilibrium are considered in the revisions below of the application of Phillips models in less developed economies and particularly in Latin-America.[185]

5.8.4 Phillips Curve in Latin-America

Most of the empirical investigation about the wage determination in Latin-America (and in less developed economies) corresponds to the application of the Phillips Curve relationship,[186] although with mixed results, even controversial ones.[187] There is a continuous argument in pro and in contra the application of Phillips' curve model in less developed economies since there is no homogeneous thinking about the way labour market operates. The major constraint is the institutional factor which affects the labour market behaviour according to the assumption to which the speed of money wages change is dependent on the way labour market disequilibrium (unemployment) operates.

Another important reason which 'invalidates' the applicability of Phillips' curve is that the labour market operates quite differently in countries where agricultural population dominates, (Nugent I op cit). The argument is supported following a neo-classical concept of marginal productivity, i.e. the demand for labour which is derived from a production function is a decreasing function of the real wage rate, whereas the supply of labour is an increasing function of real wages. Following Nugent, but using our conventional notation, the above relationship is given by

$$Ld = f(w/pe) \; ; \; \partial Ld/\partial(w/p) < 0 \qquad (5.206)$$

$$Ls = f(w/pe) \; ; \; \partial Ls/\partial(w/p) > 0 \qquad (5.207)$$

$Ld = Ls$ is the equilibrium in the labour market. (5.208)

The underlying assumptions of price-setting power by firms and price-taker by workers together with insufficient information about prices and wages are not suitable for less developed countries with high proportions of agricultural labour (see Nugent J op cit p 325). He proposes to invert the relationship of the above expression. The reasons being that labour demand is short-term life, lack of bargaining power and sticky wage rates in the short-run. The net result is a Phillips curve upward sloped. The argument, although assumedly appropriate for less developed countries in the pre-industrialisation stages, looks quite extreme for less developed countries, in which industrialisation process is undergoing, such as those countries mentioned earlier. However augmented Phillips curve has become the dominant specification of nominal wages in LDC, even though those 'structuralists' and 'institutionalists' models break down as generalisation of Phillips curve models.

More eclectic models encompass both wage bargaining and Phillips curve. The dynamics of the wage determination from an econometric point of view lets us know the inertial component and/or the indexation (adjustment) rule (speed). However, other problems such as lack of reliable data for unemployment (Hojman (1984) is an important factor in the mixed results obtained by Phillips curve applications. Several proxies have been used, i.e. the Okun gap (see previous Section's review) to measure labour market conditions. Hojman (op cit) uses real wages as a proxy arguing that real wage is the direct determinant of labour demand and labour supply. The remains of the specification augments the Phillips curve by incorporating expected inflation.

The minimum wage hypothesis which is a very popular assumption in Latin-America (see Hojman 1985 and the literature therein) is tested by inverting the Phillips curve equation and estimating a real wage equation. However minimum wages were found to be not significantly different from zero, contrary to other works for Brazil and Costa Rica (see previous section) and Hojman (1985). finally, in a recent paper Hojman (1986) estimated a Phillips curve model using Venezuelan data, as part of a simultaneous model for wage, price, strike, wage bargaining output. This approach employs a standard Phillips curvefor money wages, where as in other works the disequilibria in the labour market is proxied by the real wages, as it affects supply and demand for labour positively and negatively respectively. Unfortunately these results are not strictly comparable with ours since we use a series for unemployment ratio constructed from the average supply and demand for labour. The lack of an employment (unemployment) register because no social security scheme exists, does not preclude the construction of a more reliable proxy for the actual unemployment.

The novel approach used by Hojman is the endogeneity of the collective bargaining and strikes. Unfortunately the information used to construct a collective bargaining models and used to specify augmented Phillips curve wages equation shows to be not sufficiently different from zero. The AR estimation reflects mis-specification as no common factors test is supplied. However, the model could produce better results if proper data is used and more appropriate econometric methodology is used.

In what follows We develop the theoretical model and the subsecuent empirical work. Thus,

$$P_t = f_1(W,Z) \qquad (5.209)$$

$$W_t = f_2(P_t^e,W) \qquad (5.210)$$

P_t^e price expectations are assumed to be a process where expectations of future price increases are driven by a general autoregressive distributed lag of past changes in prices. Thus, the more for price increase is has lower effect, due to geometric declining weights. The implied restriction is that coefficient (weight) add to one.

So, $$P_t = \sum_{i=1}^{m} \mu_i P_{t+1+i} \qquad (5.211)$$

In addition the unemployment variable is derived from the following expression

$$U = LS - Ld \text{ (Employment)} \qquad (5.212)$$

$$UNEPRU = \frac{(LS - LD}{LS} * 100 \qquad (5.213)$$

$$EMPLOYMENT = f3\ (W,Z) \qquad (5.214)$$

$$LABOUR\ SUPPLY = f4\ (W,Z) \qquad (5.215)$$

5,10.5 The empirical work: Wages and Unemployment

Starting from the assumption that nominal wages are conditioned to unions' decisions we allow for a real wage objective. Furthermore, assuming that the target follows a log linear trend (proportional), the demand wage target can be written as

$$W/P = ke^{\mu t} \qquad (5.216)$$

$$\log W - \log P = K + \mu t - \log P \qquad (5.217)$$

the homogeneity assumption makes

$$\log W = K + \mu t + \log P \qquad (5.218)$$

After suitable reparameterisation and augmented to take into account disequilibrium in the labour market the model can be rewritten as

$$\Delta \log W_t = K + t\mu t + \Delta \log P + \log (W/P) + V_t + Z_t \qquad (5.219)$$

Where U_t is the unemployment rate and Z other exogenous variables accounting for wage bargaining, strike, output deviations (Okun gap); the variable log $(W/p)_{t-1}$ takes the assumption that workers (unions) are conscious of the inflation effects, and since money wages could grow slower than prices, and deteriorate real wages, they will mount pressure in order to correct the level of the real wage again. This term, accounts for the proportionality between wages and prices andit is in essence a disequilibrium term[1] (levels) in the differenced reparameterised autogressive distributed lag model.

Indeed the model is of the variety of the hybrid family of Phillips curve and wage bargaining models, (see Hall et al (1983) op cit). The model is then consistent with the Real Wage hypothesis or real wage resistance. Inflations spectations are assumed to be static, since there are doubts that unions and firms use available information in an efficient way. Furthermore, particular institutional factors establish restriction which avoid workers and firms from behaving forward looking. However, the implication of the error correction mechanism explicit in the equation takes into account a feed-forward reaction. The standard procedure from general to specific is applied in the money wage equation as well. The starting point of the specification search is given by the following autoregressive distributed lag model:

$$\log(\text{WAGES})_t = \alpha_0 + \alpha_1 \sum_{i=1}^{n} \log(\text{WAGES})_{t-i-1} + \alpha_2 \sum_{i=0}^{n} \log(\text{PRICES})_{t-i} + \alpha_2 \sum_{i=0}^{n} \text{UNEMPR}_t \qquad (5.220)$$

After several trials and following the outlined procedure of general to specification modelling similar to the specification search used in the prices equation, we arrived at the following more parsimonious restricted error correction representation:

$$\Delta \log (\text{WAGES})_t = 0.0984 + 0.8542\ \Delta \log(\text{PRICES})_t + 0.2956\ \Delta \log(\text{WAGES})_{T-1} - 0.2962\ \text{LOG}(\text{WAGES/PRICES})_{t-1} - 0.0101*\text{UNEMPR} \quad (5.221)$$

These results emphasise the indexation rule and the inertial inflation as indicated by the disequilibrium term. There is long run unit elasticity between wages and prices, even though the short-run elasticity is high, which might indicate a rapid adjustment of wages to increases in prices. Unemployment ratio is found to be significant even though the size of the coefficient is small reflecting the fact of a country with open and chronic unemployment. See our discussion in the demand and supply for labour and the empirical results therein. The selection procedure criteria are outlined in Table 12, where other diagnoses highlights the statistical properties of the model.

5.10.6 Import Prices

In this section we examine the behaviour of import prices of goods and services.Similar to Llewellyn (1974), and Llewellyn and Pesaran (1976) we are concerned with the issue of import prices given in domestic currency being affected by changes in domestic prices and by the so called imported inflation. Another aspect of the model we attempt to develop is the extent to which import prices are affected by variations in the exchange rate. Note that the sample period in which we carry out our investigation is characterised by a fixed exchange rate regime which is exogenously adjusted. This aspect is of crucial importance since it is usually expected that import prices affect domestic prices as well as the balance of payments. The process spills over directly through finished goods and indirectly by affecting the cost of imports in the manufacturing sector for instance. The effects described above constitute the first round of effects; the second round of effects is observed due to the domestic price feedback effect. According to our first assumption it is expected that world inflation has an effect on the import prices of Venezuelan exports. Since we could not rule out a feedback effect on import prices when given in domestic currency through effects of changes in the nominal exchange rate (devaluation) as domestic inflation rises, direct and indirect effects are observed. The former due to an increase in the price of the intermediate imports and the latter through the price of commodities. (See Llewellyn, op cit,p 10).

The theoretical background for such import price behaviour in which an increase in the world prices are matched by similar increases in import prices, lies in the "law of one price" since under competitive and efficient markets each individual producer is a price taker.[1] So all products are uniformly priced.

The assumptions that import prices are affected by domestic inflation requires that exporters to the domestic economy want to participate in the domestic market. Although this may require an economy of large size which could successfully affect import prices.[189] Another channel by which imported prices can be affected is by allowing the exchange rate to vary. This case has important implications, since if domestic inflation deviates from world inflation, the only way to have constant relationships between both inflations is by altering the exchange rate by the dame deviation and holding constant the real exchange rate. Another case likely to occur is the variation of the exchange rate more rapidly than the deviation of domestic inflation from world inflation. Thus, a nominal exchange rate depreciation is bound to cause import prices to increase affecting domestic inflation in the same direction until a new devaluation occurs, or until the whole effect in domestic inflation fades away. However, note that increase in domestic price (inflation) will affect real wages. Import prices in domestic currency will record a feedback effect as the domestic inflation produces the corrections in the exchange rate.

The process seems to be unstable if domestic inflation accelerates. Obviously we can differentiate a hyper-inflationary environment from a mild one. I pay attention to this aspect following the inflationary effects of the series of devaluations in Venezuela after 1983 and in many other Latin-American countries, following a stabilisation programme in which devaluation played the important role of stopping capital flowing out and restraining inflation from producing balance of payment surpluses which could improve the reserve position (debt income ratio).[190]
Note that Hoggarth (1983) refutes Brown (et al (1982) in that domestic prices do affect import prices (p 7). Llewellyn and Pesaran (op cit) found empirical support for this thesis. ultimate objective. Note that in

general is assumed that the exchange rate elasticity of international reserves is expected to be positive.

In modelling the import price equation, we have followed the standard procedure of choosing a general model including all relevant theoretical variables and most salient data features. The objective is to model import prices by looking at the short-run behaviour and the steady state path. After a process of testing in order to obtain a parsimonious explanation of the data theory consistent we constructed an error correction model of the form:

$$\Delta \log IMPPRICE = \alpha_0 + \sum_{i=0}^{n} \alpha_i \log USAP + \sum_{i=j}^{n} \alpha_i\ a \log ER$$
$$+ \sum_{i=j}^{n} \varphi_i \log ERt-1 + \sum_{i=0} \delta_i \log USAt-1$$
$$+ \sum_{1=0}^{n} \varphi \log Zt-1 \qquad (5.222)$$

Import prices are given in the national currency so that they are determinated inside the system. The econometric work was based on the same methodology such as in domestic prices and wages. The general autoregressive distributed lag model represents the starting point of the specification search, so that

$$\log(IMPRUS)t = \alpha_0 + \alpha_1 \sum_{i=0}^{n} \log(IMPRUS)_{t-i-1}$$
$$+ \alpha_2 \sum_{i=0}^{n} \log(USAPRICES)_{t-i} + \alpha_3 \sum_{i=0}^{n} \log(e_e)_{t-i} + Ut \qquad (5.223)$$

The above expression includes an expected depreciation in the exchange rate, since import prices are given in domestic current, USAPRICES are American export prices and are introduced in the equation since theUnited States is the largest trade partner. More than half of Venezuelan imports stem from the United States. After several trials the error correction representation which encompasses important advantages in the model building process is given by this expression:

$$\Delta\log(IMPRUS)t = -3.9568 + 0.0063871\ \Delta \log(USAPRICES)t$$
$$.00290\ \Delta \log(EXRATE) - 0.4821 \log (IMPRUS/USAPRICES)t-1 \qquad (5.224)$$

Coefficients are well determined and signs are right according with the hypothesised effects. Note, however, that the sizes of the coefficients in USAPRICE and EXRATE are rather small, indicating small implied by those short-run elasticities. However, the important result is that import prices are proportional to foreign prices (adjusted by the exchange rate changes). The long run elasticity is unit, and it is embedded in the disequilibrium - error correction - term. The statistic properties of the model are summarised in Appendix 2.

5.10.7 Labour demand, employment and labour supply:

In general, there are two measures of the demand for labour; first, unemployment level and the second is the number of notified vacancies. Both measures are related to the business cycles. Labour demand is determined through a production technology, with constant return to scale. Separability between value added and inputs is assumed. That model which is based on a mark-up for prices on marginal cost implies that marginal product of labour is equal to the product of the same mark-up and real wages (Layard and Nickell, (1985)). Thus the demand for labour is independent of the price mark-up and the employment-capital ratio is dependent on real wages. If prices are set as mark-up on average cost, then marginal product of labour is a decreasing function of real wages and an increasing function of aggregate demand.

The required level of employment is a function of the production and the existing capital and technical progress which is assumed to be labour augmenting with firms output depending on K, A, N. Assuming constant returns to scale output is given by

$$Q = \emptyset (A,N,K) \qquad (5.225)$$

Inverting this expression we get that the desired equation of labour is a function of A,K, $\emptyset$

$$N = \emptyset(Q,A,K) \qquad (5.226)$$

As the marginal product of labour is assumed to be equal to real wages W/P and as prices are set up as a mark-up on marginal cost, we get a labour demand function of the following for: NA = ($^W/P$, K, Y) (see Nickell (1985) and Layard and Nickell (1985).

The most important feature for the above expression is the real wage effect on labour demand[190] which is an innovation development due to Layard and Nickell and which we use in our model.[192] The above equilibrium model concentrates on the instantaneous adjustment of wage rates in order to equalise supply and demand for labour.

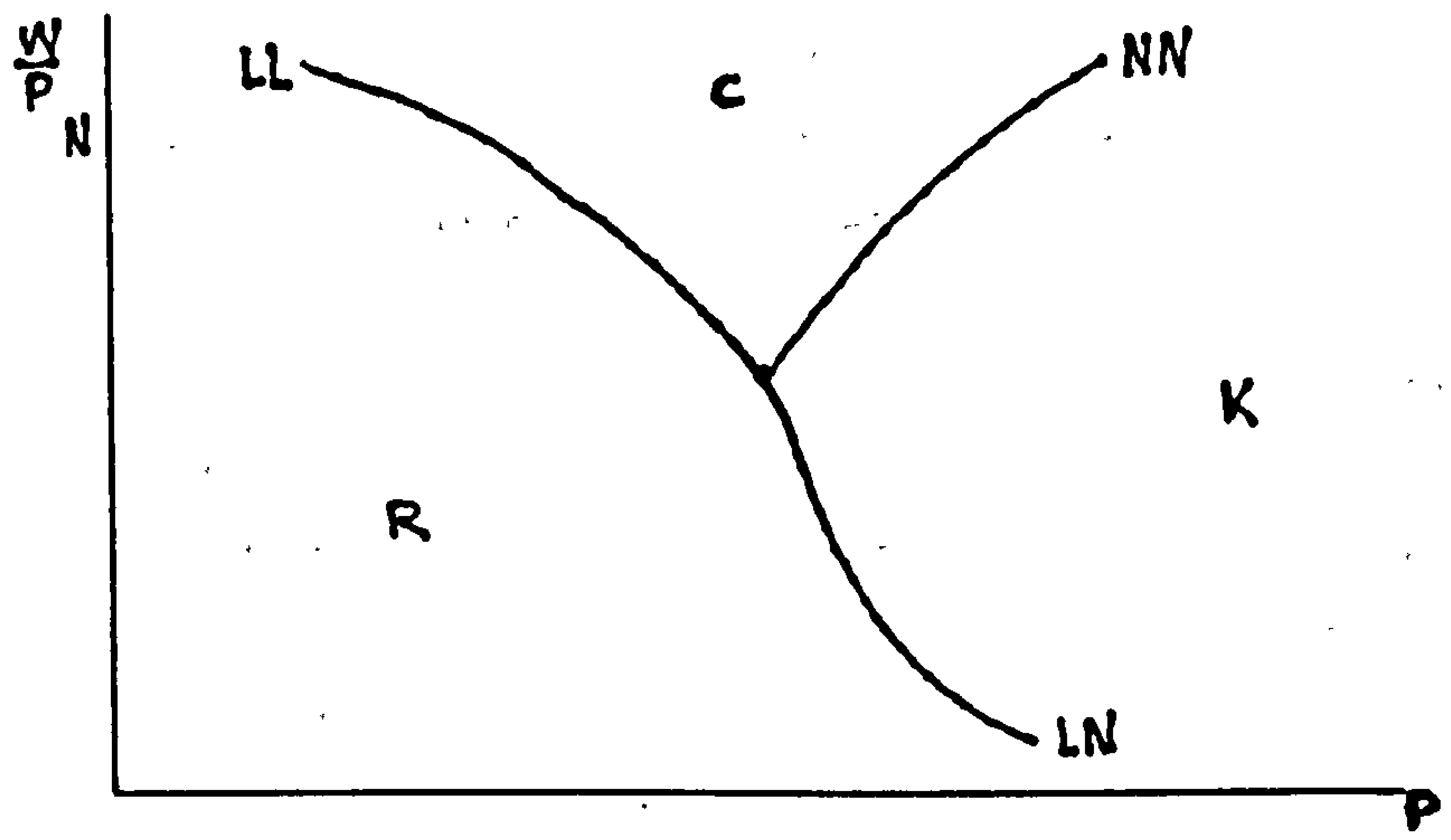
Taylor (1985) criticised this neo-classical model because of the hypothesis of competition, easy factor substitution "lack of credibility in industrial economies, let alone the third world" (Taylor, op cit p.28). The implication of such strong assumptions is that higher levels of profit correspond to a decreasing increment in the output capital ratio.[193] On the contrary there is a world where there is no full employment (Keynesian) and in the sense that capacity is not fully utilised and output is not fixed. This Keynesian - structuralist -proposition, when based on developing countries emphasises the structural factors behind the disequilibrium between investment and saving, and the dynamics of the deagrarisation process, which make the supply of labour infinitely inelastic.

It has been argued from a more extreme position that workers do not offer labour in accordance with real wages, or desire wages in an anticipated prices fashion since the lack of social security produces an infinite labour supply. Based on the same structuralist -Keynesian proposition of inherent labour market disequilibrium in less developed economies, Van Wijnbergen (1984) developed a theoretical model in the framework of the Dutch Disease model. Particularly, he notes that the employment response to increased oil revenues is not an equilibrium phenomenon in some oil countries such as Venezuela, Indonesia and Egypt. His model was a Malinvoud type disequilibrium model to which a Phillips curve solution is attached. The corresponding labour demand for tradables and non-tradables sector is derived from a neo-classical production function with CES between labour and capital.Assuming labour supply is exogenous, given the structural features of population growth and economic development labour demand condition is given by (keeping our notation)

$$N = NNT\ ({}^{W}/P)NT + NT\ ({}^{W}/P)NT^{*}er \qquad (5.227)$$

where er is real exchange rate. This equilibrium condition requires labour market to be in equilibrium, and a real depreciation on the exchange rate, since labour demand in a neo-classical work- declines if real non-tradables (NT) product wage increases, at given real exchange rate.

One key assumption in this model is the lack of employment benefit and social security, which in condition of structural imbalances, and theinclusion of work force distribution by occupation and age makes labour supply infinitely inelastic (exogenous). The disequilibrium assumption enter in Wijnberguer's model in the labour and in the non-tradables market. Thus consumers do not cut back their labour supply if rationing dominates in the goods market (see Wijnberguer op cit, p 237). To illustrate these propositions I reproduce Figure II from Wijenbergeur, p 237.



In Region R there is an excess demand for labour and non-traded goods, i.e. repressed inflation. In region C, there is an excess demand for non-traded tools because high real wages, i.e. Classical unemployment, and finally in region K there is an excess supply of non-traded goods; here there is an excess supply of labour, i.e. Keynesian unemployment. The main conclusion here is that economies will be driven from one region to another depending on whether the overall price index has a large component of traded or non-traded goods. (See Wjnberguer op.cit.p.237).

Another approach to analyse the labour market is the thesis of disequilibrium on the Phillips curve. Rosen and Quandt (1986, 1987, 1978). This hypothesis allows for the possibility that real wages do not adjust in a way in which labour demand and supply equations. Thus unemployment arises when the supply of labour exceeds the demand for labour at given real wages.[193] These disequilibria models arise from the empirical observations of labour market in industrialised countries.

Although the assumption of sticky real wages and its disequilibria results in the labour market cannot be ruled out in less developing industrialising countries it is likely that the disequilibria in the investments saving assumption in these countries in conjunction with strong correlation between the population growth and labour supply are the main causes of the open unemployment conditions in these economies.

On the other hand there is evidence (see Heady (1976)(1986)) that the increased differential between real wages in urban areas and real wages in agriculture in some respects is not correlated with the deagrarisation effects of such wage differentials. In other words real wages have increased along the increased urban unemployment. This situation could clearly indicate some aspect of the inelastic labour supply schedule which in turn is tightly related to the deagrarisation process and growing urban unemployment. However note that such labour supply streams have not affected wages (real) to a great extent.[194] However, note that there are important factors which have to be pressed in order to 'hold' the value of real wages in some less developed economies, and which are mentioned above in the wage section, in the framework of bargaining theory, minimum wages legislation, income policies, etc. In the case of Venezuela, the unions's factor is extremely important. The labour law in Venezuela imposes legal constraint on firms in hiring and firing under industrial disputes as well as imposing double compensations for living.

Finally, before we present our empirical investigation for the demand and supply of labour in Venezuela we would like to emphasise some historical, institutional and economic factors which condition thelabour market to operate in the region of open unemployment and excess labour supply in less developing economies, according to Wijnberguer propositions.

In these economies and in Venezuela in particular unemployment is likely to be related to the speed people move from agriculture to non-agricultural and urban occupations. Although this can be framed as frictional 'unemployment' note that the duration period between the previous occupation and the new could ne rather long and uncertain since the adjustment of new skills and some cultural adaptations are involved too.

Another factor, exogenous, but extremely important in less developed economies is the steady population expansion which is produced by a drastic reduction in the rate of mortality. Such gap, together with the age-distribution which arise from a high population becomes a latent factor in the already mentioned inelastic labour supply. Thus it is important to consider the differences of what is 'frictional unemployment' in industrialised economies and those in less developed economies, even though we do not rule out completely the proposition of frictional unemployment.

The more realistic assumption is to adjust such frictional unemployment with the mobility of labour from non-urban agricultural area to arable industrialised area. The relevant aspect here is that the effects of both 'Dutch disease' and substitution effects in the agricultural sector works at a faster rate than the demand for labour in the urban or industrial areas. On the other hand, market conditions in the non agricultural areas can affect the rate at which the demand for labour adjusts. Usually import substitution policies exercised in most developing countries, and in Venezuela are carried out by imposing new technologies which guarantee high profitability since a profit repatriation is involved. High technology has been another factor which affects the demand for labour. Here the business cycle effects combine with the non-market effects mentioned earlier.

Some kind of dual market can be envisaged. This implies the concept of disguised unemployment introduced by Lewis (1954) to which we can name the gap between both components of the dual market. In Venezuela this phenomenon can be observed when the oil industry established after the first quarter of this century and dominated during a long period, and started fading away as a consequence of the import substitution policies in the sixties, which were accompanied by important structural and institutional changes in the agriculture and ones closed by the effects of both oil shocks which caused important migration stream from neighbouring countries, as the economy, particularly as a consequence of the first and second oil shock-moved towards a full employment position. An important consequence due to the secular effects of the 'import' of high technology industries and both oil shocks is that an increasing 'informal' sector has emerged, which is correlated with the long stagnation in the economy running from 1978.

Having reviewed the most important theoretical aspects and empirical works in both developed and less developed economies we turn to the presentation of our empirical results.

Unemployment is defined by the following identity:

$$U = LS - Ld \qquad (5.228)$$

where equations for both LABOUR SUPPLY and EMPLOYMENT are derived. The employment equation is modelled departing from a production function whose arguments are derived labour capital and technological progress. The employment equation is derived by rearranging the marginal productivity condition for labour with a profit maximisation framework. Thus:

$$Q = of\ (N,K,A) \qquad (5.229)$$

where the marginal productivity condition for labour employed is given by the real wages function, so

$$\dot{W} = f\ (N,K,A) - \dot{P} \qquad (5.230)$$

by rearranging both expressions we eliminate capital (K) and solving for labour we get the employment function[195].

$$N = L_d = (W,Q,A) - P \qquad (5.231)$$

where

$$\delta Ld < 0; \quad \delta Ld > 0; \quad \delta Ld \leq \qquad (5.232)$$

The above expression represents a 'trade-off' between firms and workers, although as for the demand for labour we prefer to define it from the point of view of firms. This specification does not consider firms as price-takers, since capital stock is not directly specified. So we have a more general model which incorporates supply side and demand variables. However we do not expect that there is a long run proportionality between labour and output (income). Thus a labour productivity is expected to be constant, the real wage rate above represents the real cost of labour to the firm, and it affects the demand for labour negatively because of the possibility of substitution between capital and labour.

On the other hand the effect of technological progress on employment is ambiguous.[196] Although capital stock (K) is not in the model, it is clear that it affects employment indirectly since increase in real wages is an increasing function of capital (K). Thus the effect on the demand for labour is unambiguously negative. In the long run, however, due to expected proportionality between capital and labour demand capital the elasticity of employment is one.

The empirical investigation and the specification search starts from a generalisation of above theoretical model which in estimable form is:

$$\log Ld = \alpha_0 + \alpha_{1j} \sum_{i=0}^{n} y_{t-1} + \alpha_{2j}A + \sum_{i=0}^{n} \alpha_{3j}L_d$$
$$+ \sum_{i=0}^{n} \alpha_{4j} (W/P_{t-j}) + \sum_{i=0}^{n} \alpha_{5j} (Ld/y_t) + \sum_{i=0}^{n} \alpha_{6j} Z_{t-j} + U_t \quad (5.233)$$

Where notation as conventional.

The econometric methodology is similar to the one used elsewhere in this thesis and outlined in the appendix.

The objective in specifying a general autoregressive distributed log as above is to derive a more restricted and parsimonious model in which both short run and long run, as a theoretical basis, coexist. The error correction methodology could in these circumstances define a dynamic model such as:

$$\begin{aligned} \Delta \log (Ld)t = {} & \alpha_0 + \alpha_1 \Delta \log (GDPREAL)t + \alpha_2 \log Ldt{-}1 \\ & + \alpha_3 \Delta \log (WAGES/PRICES)_t \\ & - \alpha_4 \log (Ld/GDPREAL)_{t-1} \\ & + \alpha_5 \Delta \log Z_t \end{aligned} \quad (5.234)$$

Such an expression contains the term k4log (Yd/GDPREAL)t-1 which ensures that short-run employment decisions are consistent with the long-run equilibrium decisions derived from a cost minimising with constant return to scale. Alternatively, this feedback and/or disequilibria term indicates the theoretical insight of the productivity behaviour of the demand for labour, assuming that productivity is approximated by the ratio of labour demand to output (Ld/GDPREAL).

In other words the term would "guarantee" the long run unit elasticity of labour demand with respect to output. Unfortunately such restriction is not validated and the assumption above is broken down since the long run elasticity is difference form one, i.e. 0.80 as it emerges from a situation of open unemployment. See our discussion above and the structuralist propositions contained in the Wijnberguen (1981). The resulting estimated equation is as follows:

$$\log Ld = 1.2257 + 0.103339 \log (GDPREAL)t - 0.0844 \log(WAGES/PRICES)t + 0.8709 \underset{(5.235)}{\log (Ld)t-1}$$

This more parsimonious model is chosen on the basis of dominance variance criterion. The alternative error correction model which was estimated but not reported is similar to error correction model above but with the additional variable kj log(GDPREAL)t-1 which ensures the collapse of the hypothesised income unit elasticity. In the selection equation labour productivity is not significantly different from zero. It is dropped in order to enforce the dominance variance criterion. Coefficients and signs are as expected. However note that real wages have a weak effect in the employment decisions.

This result is quite consistent, since we are dealing with a country of open unemployment. On the other hand, errors in measurements are not ruled out since the wage variables is a proxy (see Data Appendix). Note that the short-run income elasticity is to some extent weak. A preliminary conclusion can be drawn from those results and this is that the open unemployment assumption is embodied in the empirical results. In other words the usual finding is the employment decisions are not taken at the same rate as output expands. Thus, a drop in income affects largely the demand for labour. The contrary does not show a symmetric behaviour. By testing down the specification search[197] the reparameterisation would yield an expression where the assumption of constant return to scale given by an elasticity of the demand for labour with respect to income is unity, and is represented by the error correction term. $(\log (L_d/Y)_{t-1})$ was rejected by the data. Other diagnostics and tests are reported in Appendix 2.

Labour supply is defined as the economic active population. The reference here is to the numbers of individuals who are willing to supply labour. This category consists of those who are employed and those who are unemployed. Labour supply here does not refer to its flow definition due to the lack of data. We are constrained to use the labour stock dimension. The lack of social security measures and unemployment benefit conditions us to use the broader category of individuals at age of work as our measure of labour supply. No adjustment is done to this category since data restrictions enable us to consider a more specific measure.

This definition of labour supply affects the definition of unemployment. It is likely that our measure of unemployment is biased upwards. Unfortunately, the nature of this work enables us to redefine the labour market concepts according to available data. We do not attempt to follow others in constructing pseudo data, given the fact that already there are measurement errors in the data.

An important measurement error is given by the census which is carried out every 10 years,. Thus we expect that every 10 years there is a large adjustment in the population survey which is critical for our 'definition' of labour supply. However, labour force or labour supply equation would in principle be specified as an aggregate participation equation, where the proportion of the population of working age entering in the market is dependent on demographic variables such as age and sex, structure of population of working age, on custom, of social conventions, since social conventions could exert pressure on males of prime age to work. Women face a different set of social conventions and customs, as in some circumstances, and particularly in high population rate of growth, women stay home since family responsibilities enable them to supply work. However, in Venezuela, in spite of its high mortality rate and low morbidity, approximately 23% of total working are women.

The conditions prevailing in less developed countries, and in Venezuela as well, indicate tht the supply for labour is infinite. However we have estimated an equation where the supply for labour is explained by the rate of growth of population.

The estimated results are:

$$\log Ls = 0.0179 + 0.2627 \log(\text{POPULATION}) + 0.7203 \log(Ls)_{t-2} \qquad (5.236)$$

We have made an attempt to demonstrate a long-run unit elasticity of labour supply with respect to growth of population but without success. The major explanation for this is that there is a growing change in the age structure of the economy which underlies the rate of growth of population even though the latter shows a perfect trend during the sample period. The results above indicate this fact since the labour supply variable appears with second order lag. See table for the statistical properties of the estimated equation.

5.9 The Monetary Sector

Before we outline the specification of the economic categories of the monetary sector, let us consider some of the issues which emerge from the specification of the monetary sector and it subsequent integration with the real sector. In designing the monetary sector of an open economy four important issues emerge: first, whether the monetary sector and its components' behaviour should be studied as an integral part of a financial sector; secondly, what monetary aggregates (assets) should be considered as money; thirdly, how we choose a policy instrument; and fourth, how the monetary policy transmits its effects on the whole system.

The money market approach[198] provides a model of the stock and the demand for money without considering other financial and monetary assets. This model is specified by a money supply function for banks which increases the function of reserves and a market determined interest rate. Money, narrowly defined (M1) is explicitly modelled as a demand determined variable - transaction demand for money. All monetary and financial aggregates add up to the private sector portfolio wealth. Private sector is assumed to decide whether it allocates its portfolio, money and government-bonds according to demand functions. They are determined by interest rates, wealth and activity variables. Interest rates are exogenuously fixed by monetary authorities which, depending on the policy instrument they use, affect the supply of money. This is an implied equilibrium (disequilibrium assumption) which is derived empirically as a residual. We did not specify in the model banks' behaviour since there is not enough information for the sample period of the flow of funds and on the banks' behaviour in asset and liability management.

In summary, this sub-sector is somewhat eclectic, particularly due to the possibility of examining a broad range of policies whose affects that spill over the whole model can be analysed. The private sector's portfolio behaviour is analysed from both the supply and demand side. The specification allows the integration of both real and financial (monetary) sectors when the model is used for policy simulations and forecasting. For example, interest rate changes (exogenous defined) will affect the money supply (demand) according to the financing rule exercised by government.

5.9.1 Money definition

This second issue somehow related to the features of the model of the monetary sector is dependent on the characteristics of the economy in consideration. The class of financial assets recognised by the monetary sector in Venezuela comprises of currency in circulation, demand deposits (not interest rate bearing), savings and several types of time deposit. As mentioned earlier, we consider all main aggregates in our portfolio-monetary base approach in a Tobin (1965) and Keynes liquidity motive. However we note that the design of a monetary sector within a macromodel requires a somewhat practical approach and is indeed empirically defined. Implicitly we are distinguishing between assets that can serve as a medium of exchange such as currency and demand deposits (M1) and those that stem from the portfolio holders' decisions, such as savings and time deposits and various certificates.

The implicit demand for money is a narrow transaction demand for money in which the interest rate is a single opportunity cost. Monetary based models usually belong to this class of models. In these models, non-borrowed reserves operate as a target from Central Bank monetary policy, which imposes regulations linking the level of bank credit to a required level of bank reserves. The discount rate - base rate- by monetary authorities is used to estimate the differential between non-borrowed and borrowed reserves. Thus, the uses side of banks' reserves are required reserves (RR) plus excess reserves (ER). The source side of banks' reserves (BR) is composed of borrowed reserves (BR) plus un-borrowed reserves (NBR).Equalising both uses and source side we get:

$$BR + NBR = RR + ER \quad (5.237)$$

$$\text{where } RR = BR + NBR - ER, \quad (5.238)$$

and where free reserves is the differential between excess reserves (ER) and borrowed reserves (BR), so RR = NBR - FR. This simplified model gives the way central bank can exert control over money supply, as the money creation process is represented by the multiplied expression of base money.[199] A second approach to specify the monetary sector assumes that economic agents react to the demand and supply for a broader range of assets simultaneously. The term structure of interest rate is usually defined endogenously although it does not rule out that monetary intervention set exogenous some interest rate.

Our empirical examination of the monetary sector follows a combined approach in which a broader money category - currency plus demand and short term deposits - is endogenous specified by the money base/multiplier approach. Simultaneously economic agents hold a broader range of monetary and financial assets in which the narrow money demand is defined as a transaction demand for money. Other assets such as mortgage bonds, time deposits (banking and non-banking) as well as government bonds complete the portfolio - wealth - holdings of private sector and in equilibrium an excess of money can can be specified as a residual derived from both demand and supply for money. However excess demand plays no role in the system since it is derived in order to have information on the disequilibrium on the money market.

Our specification of the monetary sector of the broader financial sector implies the similarities between the banking system and non-monetary intermediate since they create financial claims and liabilities. The portfolio approach enables us to specify the demand of each component of private sector's wealth, whereas money is assumed in equilibria given by the demand and supply side.

In a little more detail the model treats the broader monetary aggregate M4 explicitly modelled as its components are endogenous part of the portfolio demand model for financial and monetary assets. The simple structure of the Venezuelan financial structure[200] allows our simple portfolio approach to capture the private sector behaviour with respect to financial and monetary aggregates according to market conditions. Such broad aggregate is derived as the sum of certificate of deposits, other time deposits and demand deposit (part of M1). We have found that such classification is consistent with the Venezuelan data as we will observe in the next section, and in the econometric results of money multipliers' components. With respect to all specifications we have put most of our attention on the role of money from a transaction point of view. Although we did not rule out the utility maximisation approach to money demand,(see Freedman (1956)) the third issue of the transmission mechanism, or the way money growth transmits its effects on the whole economy.

In the macroeconomic literature the channels through which the transmission mechanism follows are interest rate, credit availability, wealth and income. Monetary policy affects expenditure throughchanges in relative assets returns and on wealth, thereby affecting private sector's portfolio holdings.[201]

In a Keynesian context financial and real assets are not necessarily perfect substitutes. If the monetary policy is expansionary - due to a deficit financing policy, for instance, the resulting increase in the supply of money will be expended in purchasing financial assets. Once the effect is passed on to the real sector - through its interest rate effect - the economic activity is influenced as expenditure increase, where its net effect on expenditures are the wealth effects (Goodhard 1982, p 171). From a monetarist point of view, since money is regarded as any other substitute asset - including real ones - the increased supply of money following an expansionary fiscal policy will be expert in both real or financial asset. Accordingly asset returns fall causing economic activity to expand since expenditures increases.

The wealth effects generated by the monetary expansion are rationalised as the effects following an interest rate reduction leading to a higher capitalised value of portfolio's components. There is as well a direct addition to wealth in use of a monetary expansion representing expansions in outside money. The first case - indirect effects - are not applicable efficiently in the case of Venezuela, since interest rate is administered by monetary authorities. Although its link with money is empirically demonstrated in the demand for money (M1).

The second channel follows an expansion on net asset holdings of the monetary sector (central bank) which is a component of outside money (high powered money) in which it flows through a monetisation of external borrowings in order to attain desired money holdings, leaving net wealth constant or, alternatively, through a generation of current account surpluses. There could be a case in which money creation is of inside variety leading to an increased domestic credit which in financially repressed and credit rationed economies - most less developed countries - could stimulate expenditure in spite of the fixed interest rate. The so called financially repressed models develop these ideas by testing hypothetically a positive sign of interest rate (real) in investment expenditures and by assuming that the qualities of available domestic credit rather than its price (interest rate) is the variable affecting expenditures.[202] In our case the financial repression hypothesis was found to be not acceptable in both consumer and investment expenditure.

The transmission mechanism in our model would be standard, although somewhat restricted since interest rate is exogenous. We would expect that capital formation, and inventories would be an increasing function of interest rate, and direct wealth effect in the consumption function. Direct effects of interest rate change on expenditures can be traced. However the full interaction between real and financial through its interest rate effects will not be present, since during the sample period in examination the interest rate is set up administratively.

Finally, with respect to the policy variables and the monetary policy options, they relate to both the supply and demand side, and depend upon the specification of the money supply process and on the specification of both expenditures and asset (money) demand equations. Thus the policy options are limited to the use of variables like interest rate, monetary base, reserve requirements rationing credit assistance to banking system. Monetary policy as well as fiscal policies are extensively reviewed both theoretically and empirically in the next chapter where the model validation and policy simulations are carried out. Finally the monetary sector is represented by behavioural equations for the following variables:

i)demand for narrow money (transaction balance (M1)
ii)demand for time deposits (asset balance)
iii)demand for currency ratio
iv)demand for time deposit ratio
v)demand for required reserves and identities

and bridge equations linking both demand for money assets and money supply, where the money multiplier is fully endogenised. (see appendix for a full listing of the model (VENMODEL).

A final aspect and which is extensively examined in this thesis is the issue of controllability of the money supply. The issue we will examined when presenting the money supply and the multiplier in both its theoretical and on the empirical examination.

5.11.2 The demand for money

The need for reliable estimates of the parameters of the demand for money balances is always regarded as an important pre-requisite for the evaluation of fiscal and particularly monetary policies. Interest elasticities and the stability of the demand for money matters for the relative effectiveness of monetary and fiscal policies. For instance; if the interest elasticity is small the implied monetary multiplier will be large in size. The stability is important because it is far easier to predict the effects on expenditures of a given increase in the stock of money. Monetarists argue that compared to fiscal multipliers, due to an increase in government expenditures, monetary multipliers are more stable. In this regard the money demand function is actually a central aspect in the implementation of monetary policy. Due to the above reasons, the demand for money has been one of the most important macroeconomic relationships subject to empirical investigation. Although the model we are developing requires the specifications of the transaction's demand for money (M1) I will review some aspects of the literature in the issue of which definition of money is important from a macroeconomic point of view.

Fisher (op cit) surveying the literature classifying money according to its definition in several approaches. Monetarists argued that money is defined according to its aggregation and each aggregate (definition) is convenient given the particular purpose we are examining. They suggest that the best definition should correspond to the underlying tasks which money performs (Fisher (op cit) p 129), i.e. to the stability issue.

In its most simple form, the monetarist model of money demand is given by: $Md = f(i)W$ where W refers to wealth.

Linearising the above expression and taking logs we get

$$\log Md = \alpha \log i + \beta \log W \qquad (5.239)$$

This has been the standard model most used in the literature by both monetarists - neo-classics and Fredman's model and modified by Cagan (1956) which analyses the money demand in the context of expected high inflation (hyper-inflation). The price homogeneity assumption implies a demand function in real terms with real scale variable (expenditures or wealth); since it is reasonable to assume that one could ask how much of the variation in the quantity of money demanded can be explained by variation on prices and income, since money is held for services it provides to owners, and since these services arise from its being above the purchasing power it follows that the demand for money is one that is determined in terms of units of constant purchasing power. Thus, is a demand for real money balances (see Ladler op cit, p 59-61).

In accordance with the above criteria Fredman's model of demand for money can be rewritten as:

$$Mdp = f\ (W,\ id,\ \dot{P}e,\ Y/P) \qquad (5.240)$$

Here the expected rate of change in prices is included as done by Cagan in order to test the hypothesis that expected change of prices dominates in hyperinflation. Cagan's assumptions are that the expected real money balance is equal to actual money balances and that expected inflation depends on actual inflation. This is the adaptive error learning process suggested by Cagon to test the price change effects on the demand for money in periods of high inflation. Then the above expression breaks down and the only variable on the right hand side is the expected inflation. This is clearly the extreme case of total dominance of expected inflation.Another aspect in Freidman's model is the distinction between human and non-human wealth. If wealth is to be taken into account in place of income as the budget constraint affecting the demand for money, then the variable to consider is total wealth, which includes both human and non-human; that is the the way both variables, income and wealth enter separately into the model. The expression above yields the following derivatives (signs) indicating the effects' direction:

$$\frac{\partial(Md/P)}{\partial(i - \frac{1di}{idt})} < 0; \quad \frac{\partial(Md/P)}{\partial(\frac{1}{pe}\frac{dP^e}{dt})} < 0 \qquad (5.241)$$

Note that Md/P or letter kMd/kP indicates that when it is a marginal change in the price level, the demand for nominal balances changes as well proportionally in the same direction. Thus, the ratio remains unvaried. In other words, the rationale implies that if prices rise and the purchasing power of money has fallen, more nominal quantity of money is necessary to hold so that the real demand for money may continue to remain unchanged (Ladler op cit). On the other hand

$$\frac{\partial(Md/P)}{\partial(Y/P)} > 0; \quad \frac{\partial(Md/P)}{\partial(W/P)} > 0 \qquad (5.242)$$

Above we have briefly described the modern monetarist demand for money (real) balances due to Friedman and Cagan (op cit). These demands for money were designed from a macroeconomic point of view.

Keynesian models on the other hand have developed along three important models, namely:

i)The transaction motive, see Beaumol (1950) and Tobin (1952)
ii)The precautionary motive, see Gray and Parkin (1973)
iii)The speculative motive, see Tobin (1958)

If income grows, the transaction demand for money will grow as well and so will increase the demand for money to accomplish the precautionary motive. Both transaction and precautionary demand for money depends on the level of income. If income rises both demand for for money will rise. Tobin (1958) in his analysis of the speculative demand for money paved the way to the portfolio approach, by showing the different combinations of money and bonds even for an individual speculator. The most important result from the transaction costs on the demand for money approach is that in aggregate the demand for money depends on the distribution of income as well on its level.

The transaction motive (costs) and the demand for money suggests a role for money in reducing the costs in carrying out transaction for real goods and financial assets. That is, money is considered to function as an 'exchange means'.

Having said that, the emerging demand for money is a process by which individuals save resources when engaged in transactions. The motivation for this kind of demand for money according to Beaumol (op cit) is that money serves in an inventory control problem. The generalisation of the transactionary motive in the demand for money is due to Saving (1971) who examined the role of money in the case of the individual consumer, in the framework of maximisation of the consumer's intertemporal utility function, where consumption in services and leisure enters as an argument; i.e.

$$\text{Max } U = \mu(Ct, Lt) \quad \text{for all } t = 0.....T \qquad (5.243)$$

Subject to the constraint

$$Yt = f(Wt, t) \qquad (5.244)$$

the desired demand for money (transactionary) is

$$(^{Md}/P)t = f\ (i,y,t) \qquad (5.245)$$

Having discussed the most salient theoretical underpinnings of the demand for money, let us to review some material related to the empirical investigation of the demand for money and the most common econometric problems in the estimation of the demand for money.

The first aspect is the issue of the measurement of money. Transaction demand for money usually considers the measure of currency and demand deposits (most interest rate bearing). Those assets are readily available and constitute the relevant measure of the money supply according to the transaction demand theory. In the framework of the Venezuelan financial structure, this definition of money is appropriate since both currency and demand deposits are clearly most interest demand assets. Measuring the activity variable (income) and the size of portfolio (wealth) on the explanatory variables in the demand for money is not always due without controversy. Income level is taken as measuring the volume of transaction.

In accordance with this definition, it is usually regarded as the activity (scale) variable in the demand for money, as such, it is usually the variable which picks up the level of economic activity. In line with most empirical work we include in our model the gross domestic product. On the other hand the measurement of wealth presents some difficulties as it is not always directly available. As wealth, a scale variable, which indicates the size of the private sector's portfolio including real and financial assets, it definition always depends on specific empirical circumstances. Generally gross wealth presents the problem of double accounting. Do we use a gross measure of wealth or do we use a net out wealth when expressed as financial wealth? The answer is not clear cut. Artis (1983) suggests that the measure of wealth either a net or a gross measure is an empirical issue which should be solved accordingly. Similarly Artis suggests that wealth effects on the demand for money are more likely when the money aggregate in question is a broader category. In our empirical work we will leave to data and the specification search to decide the true nature of wealth effects in the transaction demand for money in Venezuela.

The interest rate or alternative cost variable affecting the demand for money is not a straightforward business and, as with other variables, the class of the demand for money which is estimated usually imply different interest rate. There are long and short run, alternatively cost and own interest rate. The specification of the money demand will decide about the interest rate to be used. The empirical work in demand for money - broader category - has shown evidence in favour of using more than one interest rate in the demand for money. Accordingly the own interest rate appears with positive sign and the other rates measure the alternative costs of holding money. The own interest rate is usually present in the asset demand for money or time deposit showing an increasing function. Our demand for asset money (time deposits) tests successfully the own interest rate effects.

Finally another important issue is the effect of prices and the expected change in the level of prices. This aspect is important as it implies the assumption of absence (presence) of money illusion. The dominant assumption in empirical works for demand for money is the monetarist view of defining money in nominal terms when specified from the supply side and in real terms when it is defined from the demand side. Empirically the adjustment of money supply to price level changes is specified by deflating the lagged money at the beginning of the period; i.e. in logs:

$$\log ({}^{Md}/P) = \alpha_0 + \alpha_1 \log it + \alpha_2 \log Yt + \alpha_3 \log Wt + \alpha_4 \log ({}^{M}t\text{-}1/Pt) \qquad (5.246)$$

On the other hand, the effects of the expected changes in prices (inflation) is regarded as being important.

The seminal work of Cagan (op cit) brings evidence of inflation effects under condition of accelerating inflation and hyperinflation. The issue is particularly important and we will turn this point when discussing the money demand in less developing countries in the next section. In these environments high inflation rates are quite common. The inclusion of inflation rate in the demand for money has not very clear theoretical foundations (Fisher op cit p 188), however a great deal of empirical work has been done along those lines. Some theoretical reasons have been discussed by regarding money as a substitute for real assets since the use of real interest rate is appropriate (see Donovan (1978)).

Another aspect concerning the estimation of the demand for money balances is the issue of small open economies. Some empirical works have suggested the opening up of the demand for money by allowing foreign assets to be included in domestic private sector's portfolio. The effects of accumulating foreign assets can be traced by including foreign interest rate into the demand for money equation. Some of the arguments for the opening up of the demand for money is the implicit reliance on the portfolio balance model of asset demand.

Monetary authorities buy and sell foreign exchange demanded and supplied by the private sector. If the exchange rate is exogenous the assumptions regarding asset substitutability applies since assets are gross substitutes. This indicates the inclusion of assets' rate of return including the rate of return for foreign assets, i.e. foreign interest rate.

A related aspect is the possible reaction function by domestic monetary authorities when setting up the level of interest rate. The implied demand for real money balances could accordingly be specified as follows:

$$\log(^{Md}/P) = \alpha_0 + \alpha_1 \log yt + \alpha_2 \log id + \alpha_3 \log if$$
$$+ \alpha_4 \log et + \alpha_5 \log e^e + \alpha_6 \log Wt + \alpha_7 \log Pt$$
$$+ rt \qquad (5.247)$$

where $\dot{e}$, $\dot{e}^e$ represents exchange rate and exchange rate depreciation. (See Arango and Nadiri (1981)). Along this line the currency substitution literature has increased considerably in the last years, following the 'dollarisation' in some Latin-American countries.[203] Currency substitution is measured by the foreign rate of return adjusted for the expected exchange rate depreciation of the domestic money, so $if = if + \dot{e}^e$ which is the expected return on the demand for foreign assets. Cuddington (1984) suggested that the effect of exchange rate depreciation on foreign assets holdings is negative, indicating a fall in the domestic demand for foreign assets. This direct effect diverges from the effects of an expected exchange rate depreciation which oppositely implies a motive for accumulation of foreign assets. Interestingly these effects we can derive the direct and indirect effect on the demand for money.[204] Morquez (1985) estimated a demand for model function using Venezuelan data. His model is derived from the Cambridge demand for money. Data problems arise as there is no direct measure of foreign currency held by domestic residents in Venezuela. Another difficulty found in this work is the assumption of constant speed of adjustment for all variables as well as for his assumption of a random walk for exchange rate depreciation in a country with a fixed (unchanged) exchange rate until 1983.

It has been argued for a long time that the specification of money demand above is not applicable to less developed economies. Within this group of models we consider McKinnon's; alternative money demand model. In both works McKinon (1973) and (1982) he proposes a monetary model that is not based on the assumption of perfect capital models, since in less developed economies capital markets, if existing, are underdeveloped and fragmented. By treating both capital and money balances as gross substitutes, McKinon introduced his "complementarity hypothesis". McKinon's formulation of the demand for money in accumulating capital shares and all the ingredients of prevailing theories. These include the determination of the price level by the demand for and supply of nominal money, the significance of expectations, determining actual money balances held by individuals and the monetary authorities' role of controlling the nominal rate of return. The difference, however, is the economic environment in which these activities take place. A consequence of the specific economic environment is the emphasis on lending by banks which are capable of utilising money's attractiveness as an asset to attract more depositors.

McKinon demonstrated his "complementarity hypothesis" between capital and money by stating that if the desired rate of capital accumulation rises at any given level of income, the average ratio of real cash balance to income will also rise. He then specified a real demand for money balance function which included the investment ratio as one of the independent variables determining the real money balances. The direct implication of this model is that the liquidity function incorporates the demand for money arising directly from the process of capital accumulation. Income enters as well (transaction motive) and the real rate of return on holding money balances, i.e. kd - p* is the opportunity cost to wealth holders of holding money.[205] So the linearised model can be written as:

$$\log(^{M}/P)t = \delta_0 + \delta_1 \log Yt + \delta_2 \log(I/Y)t + \delta_3 \log(ij - P) \quad (5.248)$$

where all partial derivations are positive. The test for McKinon "complementarity hypothesis" is given by the coefficients of the investment ratio (I/Y)t being significantly different from zero. Further modification of this model is the substitution of the investment ratio for a variable proxying the average return to capital.[206]

Finally before we present our empirical results,we will devote some lines to review some empirical works in estimating money demand functions for Latin-American countries.

It has been shown that the 'standard' money demand specification is not so simple to implement empirically in economic environments without developed capital markets and where interest rate expressing credit rationing and strong government intervention. Usually no consistent interest rate is available, so many authors have included instead price changes or inflation as 'opportunity cost' of holding money. It is argued as well that expected rate of inflation is a measure of the potential decline in the value of real cash balances. Adaptive expectation, and other proxies procedures for error learning processes including rational expectation should be used to generate consistent price change variable helpful in describing the demand for money function.

Our discussion in this section is carried out by discussing the money demand's implied elasticities, i.e. interest and income elasticies. Diz's (1970, op cit) estimated a long run income elasticity for Argentina as 1.17, Silveira's (1973) estimate for Brazil is 0.75, Deaver's (1970) estimate for Chile is 0.63. In general it is expected that this income elasticity is close to unit suggesting that velocity tends to its steady state value, zero.[207] In most of those studies the opportunity cost measure gives inconclusive results. An important fact is that those countries showing significant interest rate effect are sometimes those counties which experienced higher and more variable changes in prices. Cordozo (1982) estimated the demand for money for Brazil where the inflation rate and interest rate co-exist in her specification. An important result is that inflation is not significant in the static model. However after assuming some kind of dynamics (partial adjustment), the only way through which inflation affects is to the extent that it is necessary change nominal money levels so as to adjust real money balances to their desired levels, i.e.$\log(^{M}t-1/P)$. Cordozo confirms the standard theoretical results for the demand for money in Brazil, i.e. unitary long run income elasticity, significant interest rate. However her results imply a restricted dynamic adjustment which arises from the assumption of the (?)

5.11.3 The demand for money in Venezuela. The empirical results.

As seen from the above discussion the literature of the demand for money is large. However, the estimation of the 'standard' model is confined to explain the demand for money in developed countries. Direct applications of such standard models in economic environment with imperfect capital market have produced mixed results. An important aspect being the adjustment path (dynamics) and the effects of inflation comparatively higher in less developed economies. In this regard it is argued that such conditions make income and price elasticies high in less developed economies.

In what follows we present an empirical analysis of the demand for money in Venezuela. Money markets are organised, informal money markets do not exist and bank credit behaviour is in part subject to central bank rationing policies through its discount and rediscount operations. Information about the financial return of different financial and monetary instruments exist and it is easily available to the general public.

In general there is financial and monetary assets which are easily substituted. We did not find for the sample period in which we investigated evidence to support the thesis that money should be highly sensitive to the return on real assets, proxied by the relative changes in prices. In our specification search we did not find a role for price variants and inflation in terms of long and short run effects. The only other work in that area consists of Marquez (1985) who specified a model where an optimal money balance is held by the public in the context of a currency substitution effect. No information is presented regarding the stability of the money demand. The parameters were obtained using a partial adjustment specification. Indeed we examine the stability question in the context of a model which encompasses the usual partial adjustment specification. Our reparameterised equation results in the success in estimating error correction model with both levels (long run) and differences short run elasticities comparable with the proportional long run steady rate.

The proportionality assumption is tested in Venezuelan data for the transaction demand for money. Spurious regression and multicollineority were circumvented through the use of appropriate first differenced variables, but kept as the long-run information. This specification in levels and differences allows the measurement of the long-run influences and short-run dynamic adjustment. However we found that the assumption of unit long run income elasticity was rejected as well as inflation effects which is a reflection of low level of inflation observed during the sample period.[208] The specification search starts from a general autoregressive distributed log expression in which we aim to capture the most salient features of the data.

The specification search considers the following general model as a starting point:

$$\log(Mt/Pt) = \alpha_0 + \alpha_1 \sum_{i=0}^{n} \log id_{t-1} + \alpha_2 \sum_{i=0}^{n} \log Y_{t-1} + \alpha_3 \sum_{i=0}^{n} \log P_{t-i} + \alpha_4 \sum_{i=0}^{n} \log (M/P)_{t-i-1} - \alpha_5 \sum_{i=0}^{n} \log Z_{t-i} \quad (5.249)$$

After several trials we have arrived at a stable demand for money transaction, expressed below:

$$\Delta \log (M1/PRICES)t = -3.6805 + 0.2858\, \Delta \log (GPRESL)t\text{-}1 - 0.0417 INTEREST + 0.3270 \log (GDPREAL)t + 0.4329\, EXRATE - 0.3027\, (M1/PRICES/GDPREAL)t\text{-}1 \quad (5.250)$$

Coefficients and signs are right, even though some particulars emerge which are concerned with the effects of exchange rate variation in the context of an open economy.

The literature about money demand in open economies emphasises the impacts of foreign monetary developments in domestic money, as well as the likely affect of exchange rate variations (Arango and Nadry 1981). It is hypothesised that as well as foreign interest rate effects, exchange rate expectations play an important role in portfolio decisions concerning the degree of substitution between money and foreign assets. Thus money demand is an increasing function of exchange rate and a decreasing function of expected depreciation.

Such positive effects found in the level of exchange rate is sometimes termed as the "rebalancing effect". The rationale is that changes in the exchange rate (devaluations) increases the demand for cash balances (M1) as there is a portfolio reallocation between domestic and foreign assets. Our results seem to confirm these economic rationales.Based on the diagnostic and misspecification selection criteria summarised in Appendix 2, the model is well specified in a statistical sense. So it is the economic interpretation of the extracted coefficients. Note that the stability properties are tested and confirmed by the application of both predicative failure and parameter stability test. However, let us mention that we have carried out a profound stability checking by estimating recursively the above model, whose results are summarised in the statistics mentioned even though we do not report the recursive estimation of coefficients.

In what concerns the hypothesis of long-run price homogeneity and long-run income elasticity the following comments emerge. First, expected long-run unit income elasticity is a likely result for developed countries where the transactionary and portfolio demand for money are clearly identified following a developed financial system. We have found that in our empirical investigation that this, although true for developed countries, might not be accepted using data for less developed economies. The implied long-run income elasticity is 2.015, double than expected, implying that the economic agents base their demand for money more on precautionary motives than anything else.[209] Other factors are the degree of financial instability characteristic of the Venezuelan economy in the last decade and market imperfection. Thus, we have found empirical support for the cash economy.

5.11.4 The demand for asset balances.

The second demand for money estimated is the asset money balances. it has been our assumption that the asset motive is predominant in the demand for this so-called greasy-money. This needs the formulation of the demand for such balances in terms of wealths. However data·limitations restricted us to approximate the underlying optimising behaviour in a simple relationship where the asset motive is sensitive to the own interest rate, where it is expected that its partial derivative is positive. The activity variable is similar to the one used in the demand for cash balances. The econometric estimation and the specification search utilised follows the same pattern as in the demand for money. See Table 14 for a summary of the results.

5.11.5 The money supply

In the specification of the money supply much attention was given to the question of controlling the money supply. The central question to be answered is whether the monetary authorities exerts control on the money supply, which is crucial in determining its exogeneity, or whether the monetary authorities have an influence on it.

For reasons outlined at the beginning of this section the money supply is defined endogenous through the money multiplier process.
Let us define that money supply (M2) as composed of

$$M2 = CC + DD + TD \qquad (5.251)$$

We now introduce a new variable, the monetary base (MB) which is the sum of currency in circulation, CC, plus bank reserves (BR)

$$MB = CC + BR \qquad (5.252)$$

By dividing M2 by MB we get

$$\frac{M2}{M3} = \frac{CC}{MB} + \frac{DD}{CC} + \frac{ID}{BR} \qquad (5.253)$$

Dividing the right-hand side by DD we get

$$\frac{M2}{M3} = \frac{CC/DD + DD/DD + ID/DD}{CC/DD + BR/DD} \qquad (5.254)$$

further algebraic manipulations we get

$$\frac{M2}{MB} = \frac{c+t+1}{c+r(t+1)} \text{ where } c = CC/DD;\ t = TD/DD$$

$$\text{and } r = BR/DD + TD \qquad (5.255)$$

which is the expression for the money multiplier (m) Rewriting we have that

$$M2 = \frac{c+t+1}{c+r(t+1)} * MB = m * MB \qquad (5.256)$$

The money multiplier is an endogenous variable decomposed into the part which is determined by the non-bank public and the part which is determined by the banking system and by the monetary authorities. The derivation of the multiplier is rather general and depends on what factors one wants to stress. For our model we have chosen the M2 multiplier which has been for many years the target variable of the monetary authorities. some aspect are important to remark on at the outset. Usually it is argued that if the money multiplier is stable, an increase in the monetary base is accompanied by a multiple expansion of the money supply.

The above formulation of the multiplier allows these asset money holders' behaviour to affect the multiplication process of creating money, since if C (currency ratio) and r (reserve ratio) remains constant the money supply will be affected. Wealth holders use its motive for asset money demand.

This formulation of the multiplier shows the channels through which the monetary authorities affect the money stock. As can be seen, tight control is impossible, since the multiplier is completely endogenous. Central Bank can affect the multiplier by affecting the reserve ratio indirectly through the financial assistance to banks and by controlling the part of the bank reserves which are required according to the policy action. However, by affecting only the reserve ratio the largest components can only be affect with some log. Similarly the control over the monetary base is diminished as the bank reserves' component of the money base is not precisely the largest. Monetary authorities should rely on the traditional components for monetary policy, since restricting the money supply creation process through its qualities variables may introduce disturbances to the determination process of banks and other financial institutions.

5.11.6 The money multiplier

The decomposition of the monetary base allows the categorisation of various influences on the money supply partly determined by the non-bank public; partly determined by the banking system and partly determined by the monetary authorities. Such influences on the money supply can be examined through the evolution of the monetary base and through the decomposition of money multiplier. Optimal combinations of these influences determines the efficiency of monetary policy instruments. For instance, when monetary authorities set bank reserve requirements, its objective function is to affect the magnitude of the money multiplier of the money creation process, ceteras paribus.

The decomposition of the money multiplier reflects the portfolio allocation parameters of both the public and the banks as well as some policy parameters. In accordance with the decomposition of the money multiplier it can be proof that changes in the money multiplier cause discrepancies between the growth rate of the money base which can be influenced by monetary authorities and the growth rates of the underlying monetary aggregates. For this reason the predictability of the multiplier relative to the stability in both short-run and long-run of the income velocity of money (money demand) enables us to reconsider the selection according to the superiority of inferiority of a rescue aggregate versus interest rate policy (Johannes and Rasche (1979)).

Since the money multiplier is defined by the ratio of money to the high powered money it is clear that it is affected by changes in the required reserve requirement - usually by law. The relevance of the money multiplier, and the policies attached to it, is related to the foreign exchange rate regime. If this is fixed, any expansion in the monetary base is in practice due to an increase in foreign exchange reserves (or vice versa). Thus, making the money base subject to substantial short-run variability and long-run instability, if its velocity becomes erratic. The above is related to capital movements, short-term basis, triggered by currency speculation and other factors such as financial instability and lack of business confidence. Note that, apart from the seasonal variations, currency in circulation and the level of required reserves are in the short-run estimable categories. However, as borrowed reserves are a minor item, short-term capital variations are bound to affect mainly the the level of free reserves. If the system of exchange rate is flexible, the determination of foreign reserves adjusts differently. The intervention in the market ensures that fluctuations keep within desired bounds; however, these fluctuations can be dampened without major shock. In the case of fixed exchange rate, usually a high shock sometimes referred to as maxidevaluation is called in to bring some 'order' to the market.

The expected net effect on the money supply is that it adjusts more or less rapidly to a change in higher powered money when economic agents, i.e. public, banking and monetary policies have complete information and and adjust to their desired portfolios without much cost. It is obvious that such conditions are rarely fulfilled. The net effect is that banks which form expectations about future developments of the money base can in some respect evaluate the process as to what extent a change in the money base is due to a deterministic policy or to a stockastic shock. Deterministic or anticipated changes in money base affect the money supply adjustment. On the other hand, stockastic shocks are generally absorbed by variations in the reserves of the banking system. (Butler et al (1979)).[210]

As we say, by decomposing the relationships inside the multiplier, the credit creation process is simple. The intertemporal aggregation across the economic agents of various portfolio decisions. According to this definition, and the underlying economic rationale, we have developed a money multiplier sub-model for Venezuela, where we expect that predictable portfolio decisions by banks and the public exploit a given amount of base money.

The main target is the modelling of the component's behaviour and differentiation of influences on the money stock. In this regard fiscal, monetary and external factors are seen to influence the money supply through their effects on monetary base[211] and the variables which affect the magnitude and variation of the money multiplier.Note that the basic framework of analysis of the money multiplier is analogous for less developed and developed economies. The difference exists in the process of money supply expansion (contraction) which in developed countries is highly differentiated and is correlated with the degree of financial and capital markets integration. Financial fragmentation, even though allowed to model the money multiplier, is restricted to basic public behaviour and an inefficient bank lending behaviour. At the same time that enables monetary authorities to intervene inefficiently, permitting process of reserve mis-allocation, which in most cases tends to have perverse effects on the money stock as well as on the whole economy. Such economies, on the other hand, face exchange control, internal financial instruments not legally enforces, and high deficit monetarisation which eventually dumps effective monetary policy.

Through the money multiplier we can observe that stabilisation policies, which usually require restrictive monetary policy, brings into the system perverse effects, since the banking system, which usually is assisted by central bank with the advances and discount polices, becomes useless. Bankruptcy is in many cases the final result. All these aspects can be traced and predicted, knowing the expected behaviour of the agents entering in the multiplier.

While some empirical studies (see Khatkhate et al (1974) and Khan (1974)) on the money multiplier for Venezuela have relied on a simple framework of the money supply process given by MS = m MB the derived structure for the multiplier (m) started from the simplified assumption of deriving the money multiplier components with respect to time deposits. Following this approach, private sector and banking sector are assumed to be fragmented and a weak portfolio behaviour is assumed accordingly. By deriving the currency ratio and time deposits ratio with respect to time deposits the portfolio decisions which are assumed exist across economic agents produce a highly 'stable' relationship, the money multiplier. Obviously by allowing portfolio decision between public and bank systems to operate fully we need the multiplier to be derived with respect to the monetary aggregate which in the best way reflects the development of a monetarised economy; namely demand (cheque) deposits. This aggregate is also an indicator of the spread of a banking system over the country and at the same time indicates that the portfolio behaviour of economic agents is subject to the most liquid component of money supply. By defining the money multiplier in this manner we can get a relationship in terms of the preferred portfolio functions of banks and the non-bank private sector.

Prior to deriving a specific formula for the multiplier it was necessary to provide the definitions for the variables involved; money stock and monetary base. In this study the money stock variable is M2. The choice of the monetary base is for the uses side, and conceptually it encompasses those aggregates which restrict the process of money creation, i.e. bank credit.

From section (5.9.5) it can be seen that the money multiplier is a non-linear function of the corresponding ratios; c, currency ratio (CC/DD); t, time deposit ratio (TD/DD); r, reserve ratio (BR/ DD+TD). All observed ratios C and t are the result of the portfolio behaviour of the non banking and banking sectors.The changes in 'c' and 't' and 'r' determine the variations in the money multiplier. One of the questions which immediately arises from this formulation is relative to the constance over time of the multiplier. It can be proved that the process of capital market development and financial integration produce a decreasing 'c'; an increasing 't' and a decreasing 'r', such cross relations cannot produce a stable multiplier. It is expected that the multiplier trends over time, indicating non-stationarity. If this is so, the money stock is endogenous and only partially, monetary authorities can affect the monetary base.

The underlying relationship is that portfolio decisions between non-bank land banking sectors cannot be approximated by simple proportions.

By totally differentiating the log of the money supply equation we get money stock expressed in proportional changes of the monetary base and the money multiplier.

$$\frac{dMS}{MS} = \frac{dm2}{m2} + \frac{dMB}{MB} \qquad (5.257)$$

This expression shows that assuming a multiplier constant by focusing exclusively on the monetary base may be misleading. Indeed, this assumption is not supported by the Venezuelan case, since the multiplier has not been fixed in the period of the sample.

It can be seen from Table 15 that the M2 multiplier, as defined above, has considerable variations. A close examination of the ratios gives the reasons for a non constant multiplier.

Where the coefficient of variation is shown by the last line of the table, a unit standard deviation increase in the multiplier will increase the money supply by some per cent. Both figure X and Table 15 show that the variation in m and money base are important in explaining the money supply process.[212] Similarly we can show the relative importance of the financial ratios in explaining the variation in the multiplier. That influence depends on the historical variation of each financial ratio and on the size of change induced in the money multiplier due to changes in the ratio itself.

This study assumes that the financial ratios, c, t, and r are determined within the system. The relationship between the endogenous financial ratios and the explanatory variables were tested, although elsewhere in this dissertation a more general framework was used in order to account for the generated dynamics. In general various interest rate, inflation rate and an activity variable were used.

5.11.6.1 The currency ratio .Empirical results.

This financial ratio has an important feature embodied in it. That is both numerator and denominator consist of very liquid assets. The difference being that demand deposits (DD) circulate within the financial system and it is a close substitute for saving time or fixed deposits and, as such, a rise in interest rate will affect positively those deposits by transferring funds from demand deposits to interest bearing deposits. Increases in the inflation rate will be affectedpositively as economic agents switch from liquid demand deposits to interest bearing deposits. The rationale being that agents want to preserve the real value of those assets.

On the other hand, a rise in income will affect negatively this financial ratio. The rationale being that income growth in tandem with the sophistication of financial markets, thus, financial intermediation gets quicker and the volume of cheque deposits tends to increase, as it is a superior form of payment. The specification of currency ratio must encompass the portfolio decision of the public whether to hold their liquidity in currency or as bank deposits, in spite of those being not interest bearing deposits. Note that this important pact implies no great differential between both. Apart from the likely effects of interest rate, inflation and economic activity, there are some other factors such as banking habits, seasonal payments and other currency substitutes, as all variety of credit cards. (Johnson (1972) p 137-8). Among potential variables affecting the currency ratio, Beenstock (1985) enumerates payments of wages and salaries since since these are mainly made today by cheque. The investment ratio, according to Beenstock (op cit), could approximate the activity variable since the currency ratio will vary inversely with respect to the investment ratio.

As it is commun in this study the empirical work is based on the specification search characteristic of the general to specific econometric modelling methodology.The objective is to obtain a model in which both short run and long run properties of the data are theory consistent.The starting point of the specification search is the following autoregressive distributed lag model(ADL):

$$\log(c)_t = \alpha + \beta(L)\log(y)_t + \Gamma(L)\log(c)_{t-1} + \mu(L)idt + \delta(L)\log(z)_{t-i} \tag{5.258}$$

It is expected that the lag response of the currency ratio to changes in the rigth hand side variables can be very flexible,so lags are determined by the data. The testing down procedure resulted in a first order partial adjustment model for the behaviour of economics agents in the determination of this financial ratio,thus we obtained this final specification:

$$\log(c) = 5.0230 - 05263\log(gdpreal)t + 0.3849\log(c)t-1$$
$$+ 2.4748\log(deporate)t - 0.2834D. \tag{5.259}$$

Signs are as hipothesized and coefficients are well determined. The long run elasticity of 0.8556 indicates that even though cheques transactions have increased considerable there is still a large participation of cash transactions.Recall the empirical estimates of the demand for money in which the long run elasticity larger than 2 indicated a particularly "cash economy".

In other words our results confirm that ofboth very liquid assets, cash and demand deposits(not interest bearing) cash transactions dominates. Wealth effects measured by interest rate indicates that an interest rate increase will attract relatively more funds from demand deposits holdings than from cash holdings,in spite ofthe simplified structure of the financial system in Venezuela. The statistically no significant of inflation rate indicates that there is not an important switch from interest bearing assets to non interest bearing assets.The same result is obtained if acceleration of inflation is used instead.See Appendix 2 for a summary of the diagnostics and statistics as well as for others evaluation criteria.

5.11.6.3 Time deposit ratio. Empirical results.

Time deposit ratio is an increasing function of the interest rate.

This ratio indicates the portfolio behaviour of the public in its preference for holding asset money against non-interest leasing. It is expected that the time deposit ratio is a positive function of inflation since funds are transferred away from the liquid aggregates; currency and demand deposits into interest bearing banking assets. Economic activity is likely to positively affect the time deposit ratio.

The main hypothesis in the estimation of this ratio is to measure the sensitivity with respect to interest and economic activity, even on conditions of a financial repressed economy.The empirical estimates confirm that,The estimated more parsimonious equation is given by this expression:

$$\log(t)t = -0.1869 + 0.7675\log(t)t-1 - 0.01\text{inflation} + 5.0813\log(\text{deporate})t - 0.3841D \quad (5.260)$$

Note that those results suggest that an increase in the economic activity(gdpreal) does not affects the demand for time deposits relative to the demand for demand deposits.On the other hand a rise in interest rate results in a net substitution of time deposits for demand deposits similar to income effects.A rise in prices affects idirectly the demand for time deposits relative to demand deposits as long as the real interest rate remains positive.Evaluation criteria and diagnostics tests are summarized in Table 15.

Banks will maximise their profits when the marginal rates of return of each asset they hold is the same. The holding of assets will involve varying degrees of risk, so that the relevant marginal rates of return re those that have been adjusted for risk. Accordingly, if the loan interest rate and bonds increase the risk adjusted marginal rate of return from such assets rises and commercial banks will be forced to make small (marginal) switches between cash (bank reserves) into loans and bonds, thereby diminishing their reserve to deposit ratio. If the active interest rate drops, holding loans and bonds are less attractive. Thus, there will be marginal switches out from such assets with a net effect of a larger reserve deposit ratio.

There could be a situation in which optimal reserve ratio is directly related to the rate of interest. Let us suppose that there is some absolute minimum reserve ratio that banks must observe in order to accomplish with the legal bounds of required reserves (RR).[213] In this case the supply curve could become vertical implying that an increase in the banks reserve base would be expected to switch the supply curve to the right, with banks making larger volume of loans and other investments at given interest rates.

The above economic rationale, although mainly regarded to developed countries with highly integrated capital markets, are not excluded from our investigation. However we could find additional factors affecting the reserve ratio in a less developing economic environment. In Venezuela a factor affecting the reserve ratio could operate through the level of bank reserves, both required and free reserves. That factor is government expenditure. The level of bank reserves is directly related to budget based activities.[214] The loans demand by economic agents depend on firms used for liquidity for financing their commercial and investment activities. Note that there could be an excess demand for bank borrowing since government usually sets the rate of interest on state banks below the market rates[215] prevailing in other financial institutions. Credit rationing which is assumed in a financially repressed environment has been affected through a system of regular and close relationship between public and private sector financial institutions.

If in addition we account for the policies usually applied by monetary authorities to constrain or relax bank credits we might get a situation in which the reserve ratio is weekly correlated with fluctuations in loans demand apart from being insensitive to the levels of government set loan rate.

In what follows we set up our empirical investigation for the determination of the financial ratios.

5.11.6.3 Reserve ratio.Empirical results.

Reserve ratio is affected by decisions of the banking system and by monetary policies. The specification search results in the following estimated equation:

$$\log(r)t = -0.4272 - 0.1297\log(reqres)t - 3.0868(discount)t -0.2236D1 - 0.1461D2 \quad (5.261)$$

There is an important aspect that should be mentioned when analysing those estimates fo the reserv ratio.Generally in developed economies the prime motive affecting banks portfolio decisions (reserv ratio) is the demand for credit whichs operates through demand deposits.[216] In Venezuela there is afactor of similar strngth which operates through the demand for baks reserves. This variable is the changes in government expenditures which to large extent determine the volume of required reserves. This particular institutional feature of the Venezuelan financial system defines the stance of monetary policy, because government deposits at Central Bank and commercial banks affect their portfolio behaviour.

The empirical estimates confirms this hypothesis.Another related aspect affecting bank's portfolio behaviour is that government and public sector bonds are usually swapped by banks reserves.The net result, even though the volume of banks reserves is not affected following a swapp between bonds and bank reserves, is that the demand for borrowed reserves increases as liquidity from the financial system has been crowded out by the fiscal policy.Note that bank reserves does not earns interest in another relatein Venezuela.Another related aspect which can be inferred from the specification above is the issue of credit rationing which is generated through the system of close consultation between commercial banks and monetary authorities. To a large extent this relationship is the framework for the advances and rediscount policies by Central Bank. The equation confirms those effects.

Finally we shouldcomment on the missing interest rate effects on the reserv ratio. Usually it is expected that interest rate affects the desired reserv ratio directly since bank reserves doen not earn interest.However in Venezuela this variable does not show important effect due to the credit rationing issue.Interest rate are usually held bellow its equilibrium level, breaking the relation between the desired reserv ratio and the demand for credit. See Table X for a summary of the diagnostics, checks and evaluation criteria. See Appendix 2 for testing and evaluation criteria.

5.12 The Government Sector

The government sector closes the model and constitute itself in an important link in our simple stock-flow model. Its importance arises from the fact that its behaviour (policies) can affect largely the pace of an economy towards its steady state. Its engages in the provision of goods and services - government expenditure which can include direct investment, and/or transfering funds to private sector and other public sector enterprises for investment purposes. Its borrowing activity generates interest payments which, in conjunction with its expenditures, both capital and current, are financed by collecting taxes from householders and companies. If a gap happens, it is financed by borrowing from the monetary authorities or foreign international financial markets, and private banking and non-banking institutions. As we can see its borrowing (lending) activities dictates the pace of its stance regarding business cycles. For instance, an increase (decrease) in the rate of government expenditure would lead to a rise (fall) in the level of capital intensity. (See Chapter IV above for a detailed discussion of the channels through which government actions pill over the economy).

It is not the purpose of this section to survey and review the theories about public sector involvement in the economy in both roles as a producer and/or an expenditure agent, since such things would go beyond the plan of this work.

In what follows the size and the character of government participation of the economy is given by the composition and structure of government expenditure and government revenues (taxation). The size of government participation can be broadly measured as the proportion of total government expenditure of gross domestic product.

5.12.1 Determinants of government expenditure[217]

Total government expenditure can be decomposed into the following aggregates;

$$\text{TOTGOVEXP} = \text{GOVEXP} + \text{GOVINV} + \text{GOVDEBTPAY} \qquad (5.262)$$

government investment and government debt payments. On the other hand government revenues, which is the other side of the budget constraint constitutes the most important counterpart. It will be decomposed in a way that it components are related to the performance of the whole economy.

In our model we have determined some relationships which arise from the typical government revenue structure of an oil economy, although we keep the tradition in defining revenues according to the direct or indirect character of tax revenues. The lack of an organised tax system follows its historical dependence of oil tax. For such reason we are treating taxes as lump sums, even though tax rates to personal and corporative excluding oil tax vary from a base rate of 8% to highest 40%. For instance note that in average during the sample period of our investigation the numbers of individuals inside tax brackets do not constitute more than 12% of active population, in spite of being the base rate set up at very low lever, 8%. Let us define government revenues as being endogenous determined and decomposed accordingly the following set of identities.

$$GOVREV = TAXREV + NONTAXREV \qquad (5.263)$$

Such classification, although corresponding to an accounting identity indicates the volume of government revenues which are non-taxed. This component concerns to a characteristic of an oil economy where oil exploitation generates royalties and obligations with a little economic content. Furthermore define

$$TAXREV = DIRTAX + INDTAX \qquad (5.264)$$

where tax revenues and made of direct and indirect tax revenues. The important role of the oil as a major source of government revenue can be derived from the above relationship, namely

$$DIRTAX = OILINCOMETAX - NONOILINCOMETAX \qquad (5.265)$$

where OILINCOMETAX is taxes paid by oil companies without regarding being private of public sector. The second tax category non-oil-tax revenues correspond to income taxation on both personal and corporative sector sectors aggregated, since lack of data prevented us from considering both tax categories in more detail.

On the other hand INDTAX, corresponds to indirect taxation which was further disaggregated into import tax, or more generally, tariffs, and other indirect tax, so:

$$\text{INDTAX} = \text{TARIFFS} + \text{OTHER INDIRECT TAX} \qquad (5.266)$$

This block of equations gives the main characteristics of the tax revenues of an economy where a larger part o the government revenues come from the oil industry.Both direct tax categories, oil and non-oil direct taxes are endogenuous, for reasons that are apparent.

5.12.2 Oil tax revenues. Empirical results.

We should expect that revenues from taxes on oil companies (OILTAXDI) moves in line with the value of oil exports. However, we do not expect that this relationship is tight to some long-run proportionality. Oil tax revenues, set on a percentage of oil companies revenues, have changed over the period according to government needs for revenues. Its relationship to oil exports is a non-linear lone. Oil prices are likely to affect oil revenues particularly when there have been strong movements in prices.

Although we should recognize two differents periods regarding the tax policy exercised on the oil industry, namely pre and after the nationalization of the industry, in practice and from the point of view of government revenues there has not been structural changes apart of the increasing participation of government into the proceedings of theindustry by increasing taxes. The fiscal dependence on oil tax revenues has been an important characteristic of the Venezuelan economy during the last half of the century. Even though the oil component on government tax revenues has been decreasing in the last five years following the depressed oil market.

Our empirical work in the context of this fiscal dependence and it is aimed to investigate the behaviour and intervention of the government in activating aggregate demand.Note that we are dealing with an economy in which government intervention is not only featured by its tax policies but as well by posseing a large share on the domestic output.

The econometric methodology is similar to the one used elsewhere in this study. The specification search arrived to the following parsimonious estimated equation:

$$\Delta \log(OILTAX)t = -0.1930 + 0.7145\Delta \log(OILPRICE)t + 0.6294\Delta \log(OILEXP) -0.1599\log(OILTAX/OILEXP)t-1 - 0.5024D \quad (5.267)$$

The fiscal dependence on oil revenues is related to the changes in oil exports and prices.The proportionallity assumption which assumes a long run elasticity of one can be seen from the error correction term above.Such long run relationship between oil taxes and oil exports can be rationalized by increasing taxe and decreasing oil exports volume.In other words its indicates a progressive tax structure applied to the industry during the sample period. See Table 16 for a summary of the estimates and diagnostics.

5.12.3 Personal and corporative (non-toil) income taxes.

These tax revenues correspond to domestically generated income, other than non oil income. We expect that these tax revenues are related to gross domestic product or, alternative, to non-oil gross domestic product.

The dynamics of this specification could indicate some lags in the collection of these taxes. The relationship between income and direct taxes is one of long run proportionality, which is consistent with the theory of increasing government revenues (expenditures) with the increase of national income. The short run marginal tax rate, i.e. the coefficient on income indicates the 'size' of the direct income tax. If the marginal rate is usually accompanied by a low average rate as measured by the direct income (non-oil) taxes on gross domestic product indicates the low (high) level of taxation in the economy.

The long run elasticity equal or greater than one indicates a progressive tax rate structure where the burden of direct, non-oil, taxation falls on a very small proportion of personal and company sector. Indeed this implies that in proportion more tax is levied as income rises. The estimated equation bellow confirms these hypothesis. We have estimated two versions,onein differences and levels with the proportionallity assumption - unit long run income elasticity - and the other a first order partial adjustment, which implies a lag in the collection process. The former, an error correction model is described in the following equation:

$$\Delta\log(OTHTAXDI)t = -2.3157 + 0.3965\Delta\log(gdp)t$$
$$-0.6844\log(OTHTAXDI/GDPN)t-1 - 0.1619D \quad (5.268)$$

This model was selected on the dominance variance criterion.

The short run marginal tax rate is 0.3965, while the long run (average tax rate) is one. This tax rate is low even by the standars of other developing countries reflecting a domonance of oil tax revenues on government income. Let us mention that our hypothesis of unit long run elasticity corresponds to the historical low share of non oil income tax relative to domestic output. It average for the sample period is 2.69% ,reflecting the narrow base of direc taxation an Venezuela.

In addition the unit long run elasticity implies a tax rate which lacks of progressivity. This is an important finding since it indicates that a large majority of population does not pay income tax ,so the burden of direct taxation falls on a very narrow number of tax payers who are bound to pay proportionallity more tax as their income rise. Such result has important implications if the negative trend in the share of oil income tax continues. Multilateral organizations usually suggest that tax system should be reformed as a precondition to obtain new credits; it is advocated that governement expenditures should be cut down and indirect plus directa taxation should be increased. It is clear that a country such as Venezuela has la limited scope for an increase in taxation. Any drastic movement in this direction can reinforce the regressivness of tha taxation system.

5.12.4 Import taxes - tariffs. Empirical results.

Before we present the econometric results of our 'tariffs' equation let us discuss some theoretical propositions regarding the relationship between the economic development and the fiscal dependence of import (trade) taxes.[218] Greenaway (1984) suggested that less developed economies suffer from a rigid dependence on traded taxes in order to raise government revenue. In the long-run, however, as development comes, traded taxes are progressively replaced by other sources of domestic taxes. By implication, we assume that this new source is the extension in both its rate and its level of the income tax. Hitiris and Weekes (1987) and Greenaway (1987) discuss the issue of fiscal dependence and the level of economic development in levying import or trade taxes. In essence they agree that the openness and the degree of development conflict with the fiscal dependence on trade taxes, since less developed economies depend on the traded taxes too, to raise government revenues. There is in this regard some commentsin what concerns trade or import taxes and/or tariffs.

The imposition of trades taxes in less developed economies, may not arise in principle as a need for government revenues, since other sources of revenue may be easier than the administrative burden which requires the levy of import taxes. In the context of Latin-American countries and under the dominant theory of economic development immediately after the word, import taxes or tariffs were emphasised in its role to play in the industrialisation process.

The development policy recipes were two-fold; first, by growing inwards policy makers emphasized the role of protection of new born industry by levying import taxes on competition.[219] It is clear that the revenue motive migth have not existed then. By levying strong import tariffs on imported substitutes, domestic producers are protected. This type of indirect taxation has the same consequences as exchange rate devaluation[220], whose proceeds pour into the treasury. The Venezuelan economy shows a rich history of taxing imports following the above reasoning since large oil revenues in some cases coincided with the imposition of tariffs. Tariffs were enforced when the import substitution policy was officially embraced by government. After the first oil shock when international reserves increased considerably, most traded taxes were eliminated to permit imports to 'sterilise' the money stock produced by the oil windfalls. Soon after when the balance of payments were in trouble, tariffs were brought in again to serve for its twofold purpose; first, to protect the falling of international reserves behaving as a proxy for exchange rate devaluation and secondly to 'protect' domestic industry.

The same process repeated in 1984 and in 1988 in the middle of balance of payments crisis. Although We do not rule out fiscal purposes.

However the evidence in some countries is in other directions. The empirical results in Greenaway (op cit) and in Hitiris and Weekes (op cit) is more related to certain degree of economic development. Our empirical investigation is motivated the long run proportionality between import taxes and imports, which supports our thesis of tariffs being a proxy for devaluation of exchange rate or revaluation of exchange rate when eliminated. Although it is not purpose there to test the discussed hypothesis of fiscal dependence for levying import taxes, by disaggregating import tariffs between imports of consumption goods and non-consumption goods we could be able to confirm our hypothesis that tariffs and import taxes are used for rather other motives than for fiscal dependence. Note that it can be proof that consumer goods have higher duties while raw materials and capital goods are subject to lower taxes. The Venezuelan case confirms this. Furthermore, by disaggregating consumer goods between luxurious and non-luxurious we should find larger duties to luxurious goods.

Our specification, in line with the above reasoning implies that tariffs, traded taxes, duties and others are instruments for balance of payments correction.[221] We hypothesise that traded taxes (TARIFFS) vary directly with general imports. The fact that for the sample period there are imports that never were levied does not change our main assumption. Accordingly tariffs are endogeineized to emphasize the idea of some long run relationship with respect to the value of imports. In the next chapter we switch off the tariffs equation and carry a policy svenario where tariffs are given.Import tariffs.

The results bellow confirms the hypothesis outlined above.After several trials the specification search arrived to the following parsimoniuos equation:

$$\Delta\log(\text{tariffs})t = -1.0373 + 0.5237\Delta\log(\text{imports})t$$
$$-0.3595\log(\text{tariffs}/\text{imports})t\text{-}1 - 0.5310D \quad (5.269)$$

The short run marginal tax rate is 0.52 and the implied long run proportionallity is confirmed. This "average tax" rate represents the long run relationship between import tariffs and imports of good and services.

These results are however inconclusive since the tariffs structure is subject to a large complexity in less developing countries because imports of differents clases have different income intensities and price elasticities. For instance the simple classification of imports into consumption,raw materials,intermediate inputs and capital goods imply a tariff structure which is correlated with the income intensitites. The large is the income intensity the larger should be the levied import tax. On the other hand if imports are further disaggregated accordingly with the tariff system, income and price elaticities may be more strongly related. For example and accordingly to the exchange rate elasticity (with respecty to international reserves) it is likely that by diversifying import taxes we are indeed establishing a multi-tier exchange rate system. This has been the recent history of the import tax system implanted in Venezuela for the last three decades.

5.13 Summary remarks

This chapter has been concerned with the conceptual framework within the the structural parameters of the econometric model have been estimated. A rather ac-hoc but convenient procedure was adopted in order to present our empirical results of the differents sectors or blocks in which the model is organized, so that each sector could be interpreted as an individual market. Although such break down is rather arbitrary it facilitates its presentation. Thus,the model is organized along the following blocks:

i - external sector (including both current and capital account,
ii - real sector (goods,labour and prices),
iii - financial sector,
iv - government sector.

The specification, estimation and testing of model's equations is organized acordingly to above structure.

Ocassionally we have presented alternative specification for differents macroeconomic relationship in order to enphasize on the econometric methodology and on the model selection procedure adopted,thus,we have reported a large number of diagnostics,test and differents evaluation criteria commun today in the model building tradition i the United Kingdom. The model as a whole has 64 equations of which 26 are behavioural equations. Due to the nature of this study each segment of the model envolves individual conclusions, even that there have been found important results when relating equations belonging to differents blocks. See for instance the combined results from both prices and money models.

The first part of this chapter to a large extent develops the conceptual framework and the decision making process underlying the model structure. This lead us to discuss theoretically the differents tranmission mechanisms to emphasize the model structure. Thus we have briefly presented an analytical description of the model perfomance accordingly to what we expect the model as a whole behave when performing the simulation and the policy analysis.

CHAPTER VI
The Venezuelan Balance of Payments, The Model Validation, Model Properties and Policy analysis

6.1 THE MODEL VALIDATION
6.1.1 Introduction

The purpose of this chapter is to present the model characteristics and develop in some detail the analytical and theoretical solution of the model.

The model size does not allow us to handle it all to treat analytically the properties and the workings of the model. We intend to develop a general analytical tract which in some way would relate to a simplified representation - reduction of the model in a partial framework. Thus, section 1 covers the analytical 'solution'. In section 2 we examine the properties and characteristics of the model where the model has been solved as a dynamic, deterministic and unconstrained system using numerical methods. In Section 3 the model properties are evaluated by means of policy analysis. Section 4 assesses fiscal and monetary policies and other policy scenarios. In section 5 we present the framework for policy analysis and finally in Section 6 we present the policy simulations.

6.1.2 The Static Equilibrium

By static equilibrium we consider a situation where all stock variables are constant, so are flow variables. In such a situation there will be equilibrium in the financial markets, goods markets and on the balance of payments, the balance on government account do not need to equilibrate. The goods market as mentioned before is in equilibrium since inventories are invariable; the implication being an equilibrium between aggregate supply and demand. All these relationships can be derived from the model developed in the last chapter. Equilibrium in the goods market implies equilibrium in the balance of payments assuming that net factor payments are zero. The fundamental relationship between investment and banking is crucial to have an equilibria with balance of payments and on the goods market. If there is an excess of savings, current account will be in surplus; conversely if there is excess of investment foreign borrowing reflects capital inflows, i.e.

$$(\text{INVNT} - \text{SAVINGS}) + (X - M + \text{NFP}) = \emptyset \qquad (6.1)$$

The openness of the economy, condition the net transfer of capital, so it is important to identify the costs for accumulating foreign assets and/or liabilities. As the gross national product is given by

$$\text{GNP} = \text{GDP} + \text{NFP} \qquad (6.2)$$

the equilibrium the current account balance, is expressed as:

$$X - M + \text{NFP} = \emptyset \quad \text{or alternatively} \qquad (6.3)$$
$$X - M = \text{NFP} \qquad (6.4)$$

which resembles the relationship between saving and net investment. In the financial markets the equilibrium is given by a zero change in wealth, so as to to have:

$\Delta W = \Delta M + \Delta Bg + \Delta eFA = \emptyset$ since the stock variables are constant. Zero growth in stock variables implies that the money market equilibria condition is consistent with balance of payment which is in fact a monetarist proposition. However in the real sector excess fundings could match goods sector equilibrium. Since excess saving implies larger demand for asset balance the monetarist proposition breaks down the excess demand for money due to positive saving affecting money markets and consequently the balance of payments. On the other hand, dynamics equilibrium means that stocks grow.

Let us assume that the economy moves towards its long run steady state equilibrium where stocks and flows grow at the same rate, that is, the rate of growth in GNP is expressed in terms of capital formation, i.e. steady growth in capital stock.

On the financial side, and particularly in the monetary sector, equilibrium pertains that money stock should change in response to changes in the demand for narrow money and on the asset demand for money. Accordingly the money stock grows which is given by the following definition

$$MS = m.MB \qquad (6.5)$$

can be obtained by differentiation the logarithm of the above expression, thus:

$$\Delta\log MS = \Delta\log m + \Delta\log MB \text{ or alternatively} \qquad (6.6)$$

$$\Delta MS = m_t \Delta MB_t c + MB_{t-1} .\Delta m_t \qquad (6.7)$$

confining ourselves to an endogenous process. Accordingly the sources of monetary expansions reduces to the relation between the money multiplier and the money base. Alternatively we could have specified the determination of money supply using the standard approach of explaining the counterparts of the change in the money supply, i.e.

$$DMS = PSBR + DOMCREP - Bg - NDL + FF \qquad (6.8)$$

where the right hand side variables are public sector borrowing requirement, bulk lending to private sector, holding of government bonds, non-deposit liabilities and foreign finance respectively. However, such approaches require the determination of the right hand side variables which in turn would increase the size of the model without gaining much more information than the money base approach.[222]

Partition the balance of payments into its major components we observe the the surplus (deficit) in the current account represent an addition (subtraction) to (from) foreign assets of the whole economy. The latter makes it necessary to investigate whether these surpluses (deficits) are consistent with the infinite foreign asset hoardings. In a little more detail this relationship can be mapped as being:

$$IR = IR_{t-1} + CU + CA + \text{errors and omissions} \qquad (6.9)$$

Prices and wages affect the real asset variables since an increase in the price level decreases the real value of the money stock. In any case the desired real money balances, both transactionary and asset demands are endogenously determined. On the ideal assumption of equal aggregate of demand and supply, prices change could reflect a structural disequilibrium in the real sector affecting the process of growth. Since the economy in which we operate is open and since imports and exports are sensitive to price differentials, an increase in the price level, by narrowing the differential between foreign and domestic prices will decrease the monetary base through current account deficits. In monetarist terms this process alleviates the inflationary pressure in the goods market. Although our model is not strictly specified in those extreme assumptions, it is apparent that such results are implicitly tested in the numerical solution. All those relationships in our model are endogenously defined.

The intensity of such a process will depend on the price sensitivity of imports (exports) and on the income elasticities. Note that the disequilibria in the goods sector could reflect supply side bottleneck of the demand for inventories decline, where inventories are dominated by imports, as is the case of small open economies with rigid structural supply restrictions. Both real and financial sectors in the model are well integrated. Stock and flows effect are defined in the most simple way, however they constitute one of the weak aspects of the model, which must be improved in further editing of the model. Data problems precluded as the structure the full stock and flow interactions as in Davies (1986).

Wealth effects link real and financial sector through the consumption functions, which constitutes the largest component of national income. There are important wealth effects in the investment function of private sector through the presence of the liquidity ratio variable which has been shown to have important effects on the private sector investment. (See Walliss at al (op cit)). Unfortunately the financial sector has not been disaggregated enough, due to the natural limitations of this dissertation. In that respects we miss a link, direct one, between the money creation process and bank credit and investment, even though the money multiplier section implicitly specifies banks' behaviour. This further step will be considered in following issues of our model. However there are important 'real balances' effects from the financial to real sector which eventually affects the balance of payments. Note that there are important feedbacks in the model as the monetary base which is exogenous is affected by the balance of payments.

Our main target has been to develop a model in which the balance of payments is examined through the behavioural containts of the main macroeconomic relationships in a small open economy and which at the same time could be further developed by incorporating important disaggregations from both demand and supply side. However there is a fairly compact sub-sector where prices and wages interact in the determination of the labour market. No attempt was made to incorporate the supply side as limitations in the availability of data precluded us from doing so. The main feature of the model after encompassing the overall macroeconomic relationships inherent in the model's structure, is the possibility to trace the effects of various policy scenarios and stabilisation policies aimed at correcting balance of payments disequilibrium. These policy shocks are fed into the model through the 'exogenous' variables. The model allows us to trace a policy shock through the 'whole' economy and to measure the terminal effects on the balance of payments variables, as well as on other important variables.

A set of policies will be considered even though we are going to constraint to the most standard ones, as our main aim at this stage is to examine the model properties and tractability of historical data. It is apparent from the model's structure that both real sector, including labour market, and financial sector could exert pressure in the same direction of the 'external' disturbance (shock). This is the case of foreign shock caused by both private and public sector foreign borrowing (lending). Wealth effects are seen as the main channel through which foreign and external disturbances spill over the whole model.

An important aspect is the role of capital flows in the model. The capital is endogenous defined by an identity which was partitioned in its public and private sector components. The objective in this partition is to represent a more realistic structure in which public sector accumulates foreign liabilities and private sector accumulates foreign asset. Such behaviour is typical for less developed countries with a sizeable foreign debt. In particular this breakdown is consistent with the breakdown of total investment into private and public sector investments. However we have concentrated on private sector short term capital movements since the volume of other private flows, such as portfolio investment and other long term flows did not allow us to get plausible empirical models. Difficulties with the data oblige us to estimate a series of stocks of foreign assets by considering some figures as benchmark to derive the whole series. See appendix about data problems.

A similar approach was utilised to construct a plausible series for public sector foreign indebtedness, since the accumulation of foreign liability is modelled as a public sector demand for foreign resources. The capital account enters in the financial or monetary sector of the model. Wealth effects are fully explained since the structure of the sector belongs to the portfolio balance type. External and internal shocks spill over this sector and eventually terminating in the real sector. So we can trace the effects of policy in both financial and real sector into the balance of payments as an overall balance and finally on the stock of international reserves. Even though the disaggregation is not at optimal level due to data limitations we are able to analyse external and domestic shocks effects simultaneously and recursively.

These simultaneous, recursive and feedback effects can be easily traced, for example, if we assume a reduction of oil exports, which are exogenous to the model for obvious reasons. Thus, ceteras paribus, a fall in oil exports will affect expenditure (GNP) negatively. Consumption by $\delta V/\delta GDP$; investment by $\delta I/\delta GDP$, causing a decline in the rate of growth by ? $(\delta I/\delta GDP)\ (\delta GDP/\delta I)/100$ as output will fall due to the fall in expenditures. Imports are likely to fall by $(\delta M/\delta X)\ (\delta OUTPUT/\delta AD)$ or by $(\delta M/\delta X)$.

It follows that a fall in exports, ceteras paribus, will tend to increase the balance of trade deficit in the short-run. However the effect on expenditure both in short and long term will restore balance of trade 'equilibrium' since imports decrease. The size of elasticities and of the marginal propensity for consumption, investment and imports are crucial to assess the sensitivity and dynamics of the adjustment process.

In the financial money market the impact is two fold in the supply and on the demand of money. The instantaneous impact is an equivalent erosion on the stock of money. Feedbacks in the real section are channelled through the wealth effects, emphasising the declining effect of the fall in expenditure (GDP). The demand for money is affected simultaneously by the weak effects and by the fall in expenditures in a process in which the money market equilibrium tends in the long run. The overall fall in the economy will affect even further the balance of payments (trade and current account) by affecting non oil exports. Eventually the equilibrium is achieved at lower levels of gross domestic product, output and growth.

Equilibrium is achieved in the money market since savings are probably still positive. Note that expenditures and money sector impulses work towards an economic descens. Investments are accumulated causing a softening in prices, which will expand real money balance. The immediate effect of a revival in the rate of growth is a deterioration in the balance of payment (current account) since exports, dominated by oil exports do not react to domestic stimulus. This situation reflects the structural imbalances in an oil economy where domestic expansion, if it is not accompanied by an expansion in exports, is likely to drive the economy to a recurrent and pernicious balance of payments deficit. More details of this structural imbalance can be observed if the current account or balance of trade is broken into its oil and non oil components.

Above I wanted to refer to the main effects of a foreign shock caused by a drop in the value of oil exports. In a similar fashion we can infer on the effects of other foreign shocks as foreign interest rate, foreign prices and domestic shocks.

An important temporary conclusion is that the apparent flexibility in domestic prices, although expansionary from a point of view of real balances effect, will not produce an equilibria in the balance of payments unless an external shock (increase in oil exports) occurs. The dependence on foreign capital inflows is shown by this recurrent imbalance. Capital inflows and their associated monetary expansion can be offset by the induced import expansion. Thus the transient character of capital inflows will depend on the ability of the economy to impulse its capital formation according to the structure of imports and its respective import intensities. Some of these effects cannot be traced at this stage since some supply - demand side links are missing. Those links would restore, from the model point of view the interaction between the supply and demand side. The effects of imports in capital goods and intermediate inputs and raw materials on the output.[233]

So, imports which are determined by demand factors and actual production are assumed to equal demand for domestically produced goods and services. Potential domestic supply, i.e. capacity production should be determined by a production function, in which the rate of capacity utilisation influences prices and hence the price mechanisms contribute to equilibrium. Furthermore, a supply factor in the exports on non oil equations and the influence of the rate of capacity utilisation on imports would contribute to the mutual interactions between demand and supply sides. This desired framework is absent from our model due to reasons mentioned elsewhere in this thesis. However, I have estimated an imports equation including domestic manufacture as an explanatory variable for import of capital goods, intermediate imports and raw materials, but since I have not built up the supply side links I am using conventional demand equations in the import section, dropping the domestic manufacture. In future issues of the model, when the supply links are incorporated, the above import function will be brought in.

A final aspect, before we present the simulation results is the possibility of encompassing standard monetarist propositions and monetarist models in the context of our structural model. As can be seen we have developed a model along the keynesian income determination extended to incorporate the financial sector and wealth effects. However, this does not preclude us from introducing some monetarist proposition and tracing its effects. Another way of looking at this model is by emphasising its monetarist framework but extended to introduce a complete real sector, asset balances, price and wage formation, fiscal variables. But what is its most important feature is the explicit recognition of the government budget constraint. So, we will be able to trace both keynesian and monetarist policies in a general model.[224] The policies likely to be tested are as follows:

i) Credit expansion and its zero impact on income in the long run and on the BOP.
ii) Credit expansion causes an equivalent contraction in foreign assets (international reserves)

According to monetarists, the effects of credit on income and on balance of payments could be organised as follows:

$$GNP = GNP_0 + fMS \qquad (6.10)$$

$$MS = IR + DC \qquad (6.11)$$

$$IR = MO + mGNP \quad \text{and} \qquad (6.12)$$

where $X - M = 0$ in the long run $\delta IR/\delta DC < 0$ and $\delta Y/\delta DC = 0$, whereas the balance of payments is in equilibrium, since $AIR = X - M = 0$.

Similarly, stabilisation programmes, in fashion the last few years, and which are characterised by restriction in money markets, devaluations and balance in government accounts can be traced in its terminal effects on the balance of payments and on income. However the target in this section is to evaluate the dynamic properties of the model through the evaluation of some standard policy receipts.

6.2 DYNAMIC SIMULATION, AND CRITERIA FOR MODEL VALIDATION. MODEL PROPERTIES

In order to show the effect of macroeconomic policy any dynamic econometric model must track the historical data. The objectives behind this simulation exercise are twofold; firstly, it is necessary to be sure that there does exist a solution to the endogenous variable in the model, which at the same time, is a prerequisite for a model to be able to perform policy and structural analysis. Second, to validate the predictive tracking of the model and thereby to detect some of the conflicting areas. The process and method which enables us to analyse and examine the model properties is called dynamic simulation.. Such numerical solution method will allow us to test the statistical properties of the model and its ability in satisfactorily reproducing the historical data. Thus the provision of satisfactory validation criteria is condition sine quo non to carry the policy evaluation exercises and policy analysis. The evaluation criteria should take care of the following caveats of historical simulations.

The econometric modelling methodology to estimate particular equations was to design an overall general model theory consistent where restrictions from the general specification were essentially done following a testing procedure until we get a good parsimonious representation of the data generation process. Thus there are empirical reasons behind the final specification particularly when assessing the model dynamics. Variables excluded have shown poor design whereas variables omitted should have been justified either by demonstrating that the specification improved considerably by further disaggregation of data endogenous variable and/or by arguing that omitted variables have significant explanatory power on the actual equation (Smith and Stewart (1986)). For instance no monetary variable is included in the domestic price equation since, for the reasons mentioned above, it showed no significant affect on prices.

Simulation methods do not guarantee that historical tracking is dependent on the equation specification. So we ought to consider that residuals from the historical simulations could be serially correlated. OLS estimates in such circumstances (see Smith and Stewart op cit page 16) imply a "summation constraint on simulation residuals on the sample period". It is important to care for this since our estimation period is generally from 1958 to 1987, whereas the simulation period, historical tracking is for the period 1965 to 1984 and for the policy scenarios from 1979 to 1984. Following these comments, Let us acknowledge that choosing the "best" model according to these criteria may be an unrewarding task. In this particular case I report here what I consider the 'best' model according to the econometric methodology followed when estimating different equations. Such 'best' model must fit the historical values as well as presenting the best theoretical representation in terms of macroeconomic relations inherent in a stock and flow model where real and financial sector interact.

The model will be solved as a dynamic, deterministic and unconstrained system where the value of endogenous variables will be self generating and the estimated behaviour relationships re incorporated in their stockastic component at its expected zero value.

The method and evaluation criteria is based on an ex-post forecasts generated from a simulation within the estimation period. In accordance the simulated values will be validated in terms of its objective and its subjective criterion. The former by looking for estimates with the desired statistical properties of unbiasedness, consistency and efficiency from a regression of actual historical values against the predicted simulated values, as below:

$$\log Y_t^A = \delta + \beta \log Y_t^P + u_t \text{ where} \qquad (6.13)$$

Y_t are actual, historical values and $Y_t{}^P$ are the predicted values, and u_t the errors of forecast. Unbiasedness is achieved for $\delta = 0$; consistency for $\beta = 1$ and efficiency for $\delta = 0$ and $\beta = 1$, provided no serial correlation occurs . However, note that serial correlation in this case is not a criteria for rejection,[225] since errors 'accumulate' over the simulation period because lagged endogenous variables are treated as stochastic. In addition, adjustments to disequilibrium is spread over the simulation period. However we expect that forecast errors have the desirable property of randomness. The R^2 from this – regression is independent of the R^2 from the estimation stage because lagged endogenous which are treated as fixed are now stochastic since they are generated within the model. As mentioned before this is the reason why errors accumulate over the simulation period. Another aspect is that during simulation the error terms are not strictly additive due to compounding upon growth. Finally, forecast errors in any behavioural equation are sensitive to errors across equations as well. The second related aspect is at the subjective level. This criterion considers the predictive power of the model accordingly to the direction and assessment of turning points.

Another way of presenting the evaluation criteria we also measure the deviation between actual and predicted values in percentage at the end of the simulation run with respect to selected endogenous variables, which turn into evaluating the long run performance depending on the length of the sample period on which the simulation is carried out.

Finally a nonparametric check of model tracking performance involves some kind of judgement about how well the model behaves with respect to the historical values. Such criteria used as a convenient summary measure to assess the quality of the forecast and which is mostly used is the mean-square error ((MSE) defined as:

$$MSE = \frac{1}{t} \sum_{t=1}^{T} (y_t^a - y_t^s)^2 \text{ where notation as before} \qquad (6.14)$$

which is equivalent to variance plus the square of the bias. A model generating the lowest MSE is considered to track well the historical value.[226] The difficulties in using MSE of MSEP (mean-square-error-proportional) which is given by

$$MSEP = \frac{1}{2} \sum_{t=1}^{T} [(Y_t^a - y_t^s/y_t^a)] \qquad (6.15)$$

are overcome by using the root-mean-square-error measure (a derivation of MSE) since it does not differentiate between negative and positive errors, at the same time that penalise larger more strongly than other measures, thus:

$$\text{RMSE} = \sqrt{\frac{1}{T}\sum_{t=1}^{T} (y_t^a - y_t^s)} \text{ or in its proportional derivation as:} \quad (6.16)$$

$$\text{RMSE} = \sqrt{\frac{1}{T}\sum_{t=1}^{T} [(y_t^a - y_t^s)/y_t]} \quad (6.17)$$

From the above it follow that some trade-off between these objective and subjective measures has to be achieved. So, turning points and RMSE could in tandem indicate how well a model performs in tracking historical values.

6.2.1 Model Validation

In this section we present the results of a dynamic simulation exercise with VENMODEL for the sample period. As mentioned above by dynamic simulation we mean setting all the predetermined variables including logged dependent variables equal to their corresponding actual values and then solving the system simultaneously for all endogenous variables period after period. The simulation exercise is carried out for two periods, namely 1965-1984, and 1975-1984, to obtain a base forecast, or base run. Table 4.2 presents the root mean squared percentage error and the mean absolute percentage error for each endogenous variable. Similarly we provide graphic representation of actual and predicted values for selected endogenous variables in Appendix 4.[227] Simulation results are contained at the end of the chapter. The base run or central run for the period 1979-1984 is estimated for creating the central values used in our policy exercises. Since we will concentrate on 'short-run' policies.

6.3 Policy Simulation and Policy Analysis.

In the last section we have presented the model's performance in tracking historical data. A further step into the model validation process is through the policy simulation exercises in which some 'exogenous' variables are disturbed and its effects on endogenous variable is analysed and model properties evaluated.

Before we engage in carrying out these policy exercises and multiplier analysis we must produce some insights into the process of policy simulation and econometric policy evaluation. Simulations of a macroeconomic model means that the model is solved numerically. The reason being that simulation is a purely numerical technique and as such is sensitive to model designs so that it is always implicitly supposed that the estimated coefficients are invariable. Indeed there exists errors associated with point estimate since sample variability imposes some errors in the estimation of coefficients. So slight changes in the coefficients could have large effects on the simulation properties of models. In addition non-linearities in the model design will enhance the possibility of variant long-run dynamic multipliers which means that the size of multiplier is dependent on the values of the variables in the model. Such dependence makes the results of policies run to depend on the initial conditions of the simulation run, see for instance Laury et al (1978).

The second important aspect of the econometric policy evaluation is the issue of expectations and parameter consistency. Although we are not dealing with forecasting in this work, it is worthwhile discussing in some detail the important criticisms of simulation methods for assessing policy analysis. In his critical econometric policy evaluation, Lucas (1976) drew attention to serious problems in policy analysis using macromodels since economic agents are rational. Accordingly, estimated parameters which are the indicators of forecasting are not policy invariant if policy changes, so it becomes a misleading operation to use the macro model for assessing alternative policies. Lucas' critique appears to be an important aspect to be considered when performing policy analysis, since if parameters which models consider constant change as a consequence of a policy action, the estimated effects of the change could be misleading.

The key point in this critique on the inappropriate use of macromodels for policy analysis is the way in which expectations are formed. However, Von Natmer (1983) demonstrated that the process of expectation formation does not play a crucial role and the problem reduces to the ability of modellers to incorporate into the model agents response to policy changes. He suggests computing a reduced form from the structural model and using the information from this reduced form to exercise policy simulation. In principle the argument of variant coefficients to policy simulation is correct[228]. Referring to a practical use, for example, the Venezuela case could provide a case in point. Traditionally Venezuelan monetary authorities have been conservative. For a long period, particularly in our sample period there was no money financing of budget deficits. Interest rate has always been pegged with little variation, but trending. If the policy change due to external disturbances and monetary policy starts accommodating national expectations it indicates an increase in monetary policy since domestic economic agents would export capital with a monetary policy reaction of increased domestic interest rate to eliminate a balance of payments crisis.

As we can see, the crucial point of expectations formations seriously undermines the ability of macromodel builders from validating econometric models through policy simulations. However, there is an open question about what expectations means and how they are formed. Pesaran (1986) argues that there is a little scope for 'rational' expectations formation as the truth since there are important 'uncertainties surrounding the decision making of economics agents which arise from their ignorance of other agents' behaviours. (Pesaran (1987) page 27).

The alternative suggested by some authors[229], is to use direct measures of expectations such as survey data. So, once structural model's equations have been estimated using direct observable expectations, policy analysis can be exercised as usual. However macroeconomic modellers have taken Lucas' critique seriously and have started embedding national expectations in macromodels. Expectations have been explicitly modelled. See a series of papers by Hall and Henry (1985 a, b), Hall and Herbert, Holly and Farrop (1983), Holly and Beenstock (1980) and Hall and Henry (1988), Wallis et al (1986)(1987).

The conclusion of rational or forward consistent expectations in macroeconometric models requires the setting up of some terminal conditions. Thus a consistent solution is generated by making the expected values similar to the actual outcome of the base run in the future.

Terminal conditions are required at the last point in the future, i.e. outside the solution period. The trouble arises here since a unique solution for the model must result, i.e. a unique stable path which should be consistent with the elected terminal conditions. Once an equilibrium solution is achieved, policy analysis and validation can be done as usual. For a detailed account of simulating with rational expectation, see Wallis et al (1986) and Hall and Henry (1986). In our particular case we did not assume rational expectations as they are supposed to be formed adaptively, so it is likely that we will be sensitive to the Lucas critique. We have approached the model design under the conventional backward-looking' way by not differentiating between anticipated or unanticipated responses or events.

6.3.1 THE ASSESSMENT OF FISCAL AND MONETARY POLICIES AND OTHER POLICY SCENARIOS. POLICY INTEGRATION

The most important goal of this section is to analyse and discuss the model properties through the responsiveness of the Venezuelan economy to various policy stimuli and reaction. These policy stimulus are traditionally encompassed by the government intervention which defines the policy stance for both fiscal and monetary instruments. A word of caution should be made at the outset since the policies which exercises aim to discuss the dynamic properties of the model and its respective validation. Thus, these set of policies do not obey any particular stabilisation programme or similar even though such exercises can potentially be made. However all care should be taken to produce a coherent body of policy exercises which are consistent to discuss the model properties. We start our discussion by making some remarks about the consistent integration of both fiscal and monetary policies. Note that the model is so general that some other policies not belonging to a particular fiscal or monetary stance, such as devaluations (appreciation), commercial policies, income policies can be undertaken. The relationship between monetary and fiscal policy is strongly related to the government's policy stance which is outlined by the authorities in its medium and long term objectives. The policy stance is related to policy targets, accordingly expansionary or contractionary fiscal policy embody the links between the fiscal stance and the nature of monetary policy.

Fiscal policies become increasingly important for model validation. Dynamic simulations facilitate to consider in detail the effect of fiscal policies by taking into account the financing method on which the treasury seeks to finance its expansionary (contractionary) fiscal stance. If the policy is of money financing an accommodating monetary policy is exercised, in which monetary authorities will set an optimal level for interest rate according to the fiscal stance.

By targeting interest rate, the LM schedule is fixed. The objective or the goal of such policy is to hold a stimulative pressure for economic growth. Such policy goal is indeed more complicated since our system has, in addition, an external sector represented by the balance of payments schedule, which eventually depends on the definition and determination of exchange rate. Economic growth interact with the balance of payments (current account). Its effect on the foreign exchange market is determined by the trade elasticities and by its feedback response.

The implication of terminal effects on the balance of payments will have feedback response on the fiscal stance, since the effects of fiscal and monetary policies may change dramatically depending on the exchange rate adjustment. If the exchange rate is a policy instrument, disequilibria in the foreign exchange market could determine the policy stance, or at least fiscal and monetary policy integration even further as indicated by a situation of imperfect capital mobility.[230]

Assume for instance a fiscal expansion with imperfect capital mobility and fixed exchange rate. If the fiscal expansion - budget deficit - isis money financed,exchange rate, ceteras paribus, will depreciate.

This situation indicates feedback responses which add to the expansionary fiscal stance. If the budget deficit is debt financed the rise in interest rate is likely to appreciate the nominal exchange rate. In the former case, the accommodating monetary policy which assumes that certain levels for interest rates, stimulates the demand for money. This situation presents two monetary policy instruments working in tandem. Firstly, a fixed level of interest rate when it is exogenous determined and an increase in bank reserves which simultaneously expands domestic credit. Note that the interaction is fully simultaneously and further complications arise since an expansionistic fiscal policy followed by an accommodating monetary policy could be crowded out by restrictive open market operations. The intermediate result is cancelled out, whereas the net result depends on the responsiveness of economic agents and the size of coefficients in the money demand. Economic growth can be affected if investment expenditure is not as responsive to interest rate as to the availability of credit, such as in economic situations favoured by financial repression. The terminal effects on the balance of payments, as mentioned before, have to encompass the responsiveness of economic agents to expansion (contraction) of fiscal policy and the sensitivity of trade elasticities.

The above picture can be further complicated if income policies, exchange rate and repressed inflation policies are set simultaneously. In the case of repressed inflation caused by price control or income policies, the link between prices and money should be established, usually empirically, and if this is so, monetary policy can be invoked in order to target the demand for money, given the 'causality' between prices and money.[231]

On the other side, if we have a situation of increasing government debt, debt sales in open markets to banking and non-banking sectors could dampen previous monetary accommodation. If even further the credit policy is restrictive a standard proposition is that the domestic credit expansion depends on the size of balance of payments deficit (surpluses). Interest rate would rise and capital will flow in. The net result is an improvement of balance of payment caused by a restrictive domestic policy which is a standard monetarist proposition which crucially depends on the exogeneity of domestic credit. However, it is clear that the model we are presenting could be used to test this proposition in a balance of payments correction policy, since domestic policy is not endogenised.

Let us present in more detail the likely interrelations of fiscal and monetary policies which could be followed by means of policy simulations.

The integration between the fiscal and monetary policies can be depicted by examining the interaction between the financial needs of expansionary fiscal policy, budget deficit, money targets, domestic credit and balance of payments position. The mechanism government relies on to finance its fiscal expansion reproduces the finance effects of the fiscal policy together with the prevailing monetary conditions. Note, that this does not mean that money is completely controllable but it is the case of subordinated monetary policy in spite of the autonomous character of some monetary policies feedback. Ideally the integration of fiscal and monetary policy would require that policy analysis be exercised by encompassing all feedbacks.

Another aspect which should be considered when setting out the policy exercises is time consistency, since there is an interval of time between the shock and the feedback effects.

Accordingly, with those remarks let us first examine the case of money financing a fiscal expansion. Assume the model establishes the necessary links recursively and/or simultaneously A money financing policy could produce upward effects on prices and on the nominal exchange rate. Given the fact that we work in a regime of fixed exchange rate those effects are channelled to the real exchange rate. Note that both assumptions are model dependent. Our model does not produce monetary effects on prices and on the exchange rate,[232] since the rate of exchange is fixed we are not able to process the money financing effects and the likely depreciation effects of a flexible endogenous determined exchange rate. Note as well that under these conditions a bond financing case could induce an exchange rate appreciation through the interest rate effects. Again we are somehow restricted here since similar to the exchange rate regime, interest rate(s) are pegged by monetary authorities.[233] Banks do not compete for wholesale money. This institutional factor allows us to carry policy simulations by targeting money supply through the discretionary policy instruments in the hands of monetary authorities, such as discount rate and required bank reserves (reserve ratio).

We will refer to these instruments when examining stand alone monetary policy 'independent' of government fiscal expansion. In this section we will be interested in testing some quasi-monetarist propositions to affect the supply side of the money market.

The model incorporates alternative monetary aggregates. According to some institutional factors we expect that the broadest monetary aggregate - money plus quasi money - is less sensitive to interest rate changes due to the substitutability character of these money aggregates. On the contrary narrow money - not interest bearing - is expected to be sensitive to interest rate changes. Monetary policy of switching interest rate must not be so strong in order not to affect money. The position here is to target money, however, we did not target money as our main goal was to examine the model properties even though nothing stop as to examine the model properties by introducing a target for a plausible monetary aggregate.

On the side of fiscal policy, changes in government expenditure due to a fiscal policy stimuli will have immediate effect on the level of demand. In examining these effects, its immediate effect is recorded by the impact multiplier. Those policy exercises show a large impact for a money financing case, since additional contemporary effects are accounted for, for instance, the net effects of wealth effects on consumption and investment expenditures will enhance the effects of this fiscal policy. Unfortunately it is not possible to discriminate the autonomous and the induced effects embodied in the multipliers. Our purpose is to work out the effects of such fiscal policy with money financing on some key variables and on the balance of payments. Of most importance are the effects of such policies on imports and its induced effect on the balance of payments in general. Unfortunately historical facts preclude us from measuring the effects on the supply of exportables.

Venezuela is an oil country where oil exports make more than ninety percent of total exports. Accordingly we fix exports for our policy simulations. Alternatively, we have defined oil exports residually subject to the growth of domestic oil consumption and to the optimal policy of depletion of oil fields embodied in a production function for oil production, given oil prices exogenous. The limitations encountered in doing standard policy simulations to examine its effects on the trade balance opens other ways of testing and validating model properties. As oil exports (government revenues) accrue to treasury, a drop in exogenous oil prices is likely to unbalance government budget and produce budget deficit. We assume here that consequently cuts in government expenditures are not palatable for political reasons, so a budget deficit requires some financing means., The above policy simulation examines the model properties by composing an external shock with likely domestic repercussions of a fiscal policy aimed at holding the economy in steady state. Multipliers are examined in both key domestic macroeconomic relationships and its induced and direct effects on balance of payments.

In both cases, with or without an external shock (drop (rise) in oil prices) it is expected that with expansionary and 'compensating' fiscal policy total domestic output is expected to grow due to higher government expenditure. Although we do not obtain effects on prices due to money financing I expect that money finance of budget deficits to have twofold effects as wealth effects will work recursively and simultaneously on output, and consequently into balance of payments.[234]

The external shock of a drop in oil prices which potentially cause deficit in the balance of payments - balance of trade deficit is likely to be enhanced since the compensating effect of fiscal policy is expected to have larger effects on income than the negative effect of a drop in oil prices. Accordingly balance of trade worsens in line with the marginal propensity to import, which in our case is large. Unfortunately the model lacks several supply side links. Thus the feedback effects of imports, of capital goods on capital formation and eventually on output are missed. It is expected that in future issues of the model those links will be specified.

Note that due to institutional factors we could not solve the model with an alternative endogenous interest rate.[235] This deficit stops us from fully testing the induced effects of a money financing case on interest rate and eventually to measure an additional induced effect on the aggregate demand and balance of payments. Contrary to some presumptions we do have a private sector investment sensitive to interest rate changes, which nicely offer us the possibility of examining a further induced effect on aggregate demand through indirect wealth effects.

Let us now examine the extreme case of bond financing. Bond financing of government deficit supposes that monetary authorities are targeting money. Similarly in the case of money financing in which interest rate and government debt is left fixed, we assumed money is fixed for this policy simulation. Note that we target money according to the model solution. We do not switch off the money demand equation nor the money creation process. Money is accordingly left to be affected by the same monetary reactions of central bank according to commercial banks' portfolio behaviour, since we do not have either short nor long run interest rate. However we perform this policy simulation by adjusting the sale of government securities. Institutional factors on allocating government securities in Venezuela makes banking and non-banking sector 'compete' for government securities. The disequilibrium interest rate, low artificial ceilings, is conditioned by government when selling government bonds to private sector. Thus, bonds are sold (exchanged) to bank reserves (deposits) on central bank without affecting bank liquidity. The remainder of bonds are allocated in the market without affecting interest rate.[236] However, we carry out this policy simulation solving the model for interest rate. Interestingly, but as expected, the base run of this simulation with inverted money demand equations did show significant deviation from actual values. As expected, bond financing produces similar results to money financing. Note that this is absolutely model dependent, however our goal is to study the model properties and we did not detail this policy simulation further.

The same policy environment which envisaged money financing acts when the expansionary fiscal policy is financed by debt issuing. For the reasons outline above we will not examine the crowding out issue in this paper. However, crowding out results due to a bond financing police. Note however that such issues can be partially analysed by following a methodology suggested by Wallis eta al (1985) where the crowding out measure is obtained by the authors as follows:[237]

$$Cr = \frac{Mr - Mm}{Mr} * 100 \qquad (6.18)$$

where Mr and Mm are the multipliers for money and bond financing respectively. If CR > 0 there is a large effect on output in the fixed interest rate case. The higher Cr is the lower is the expansionary effect of government expenditure in the money target case. If Mm = 0, that is, no money financing effect, crowing out is 100%. In spite of these restrictions and limitations we examine closely the model properties in the bond financing policy simulation. In an ideal world with a fully endogenous term structure for interest rate the bond financing policy by increasing interest rate would induce capital inflows and appreciation in nominal exchange rate, which in a small open economy may depress prices and hamper aggregate demand with positive effects on the balance of payments. The positive effect on balance of payments is caused by a drop in imports.

A final case in policy simulation is the so called balance budget finance. No budget deficit is recorded, however, there is an important case for expansionary fiscal policy without requiring deficit financing. Assume that oil prices increase, i.e. an external shock which enhances government revenues.[238] Thus government could expand its expenditure requesting by law utilisation of revenues not budgeted. An interesting case arises here, since the size of trade elasticities indicates through the derived multipliers if the external shock is compensated by the domestic shock on expenditures and its repercussions on imports. Thus, a balance of payments, trade balance deficit (surplus) as a net result of both shocks is dependent of the trade elasticities.

Another aspect which is necessary to examine when analysing the model properties with policy simulation is the interaction between fiscal and monetary and other instruments of balance of payments correction as devaluation

The immediate effect of an expansionary fiscal policy is to increase the level of output. The multiplier effect is captured when other endogenous variables are affected by larger output. A stock and flow process is involved conducted by capital formation, stockbuilding and financial asset accumulation, apart from the expenditure effects. Increased final demand could press inflation upwards. Assume that we are able to trace the inflationary effects from an expansionary fiscal policy. These effects recorded in the multipliers are model dependent. In our case inflation is fuelled from the supply side,[239] it is cost determined and we did specify money wages from an augmented Phillips Curve view. Expenditures are affected by the inflationary effects. Such effects depend largely on the specification of consumer expenditures. Our model allows for acceleration of inflation effects on consumers' expenditures, similar to Davidson et al (1978).

The exchange rate is likely to be affected by a money financed expansionary fiscal policy, since it is likely that interest rate is held fixed or even dropped as a consequence of accommodating monetary policy. Although exchange rate is fixed in our model is could be an interesting exercise to simulate the model with a fiscal expansion as above using different exchange rates. This exercise would indicate the model properties in recording feedback effects from a declining exchange rate. Note that wages will not remain unchanged, since depreciation of the exchange rate will fuel domestic prices. Competitiveness in non-oil exports will be reached only to the extend that prices fuel wages inertially, following a backward looking indexation.

More complicated effects will be recorded since depreciation affects import prices given in domestic currency and correspondingly imports. Note that here too the trade elasticities play a crucial role. Lagged effects will uncover the J-curve process which follows a devaluation process. Unfortunately we may miss this effect as we are using annual data. The same is valid when examining the multipliers looking for contractionary effects as domestic output follow a depreciation in the exchange rate.[240]

Alternatively we can assume that price movements require that exchange rate switches; we could shock the model with likely real exchange rate which results from the first run. This exercise is easy to perform since nominal exchange rate is exogenous. The framework for this exercise is given by the effects of depreciation in the exchange rate cause on domestic prices and by the feedback of domestic prices on the real exchange rate, assuming that we have deflated the nominal exchange rate by a measure of domestic price. Similar to the interaction between prices and exchange rate after an expansionary fiscal policy are the direct and indirect effects of such policies on the interest rate both nominal and real. The effects will vary according to the financing method. In the case of a money financed budget deficit, interest rate is fixed, however prices could rise affecting the underlying interaction between the increased liquidity and the real interest rate. When the deficit is bond financed, interest rate should rise affecting final demand.

In both situations of prices and exchange rate, and of prices and interest rate the multiplier on expenditure and on balance of payments can be calculated. It is expected that balance of payment improves following a devaluation, however, if the policy is recessive, the net result could be even larger. The sensitivity of this effect will be measured by the size of the devaluation. A similar process could be recorded in the balance of payments following an increase (decrease) of interest rate.

An important interaction in contemporary macromodels is found between prices, exchange rate and interest rate. In developed economies those interactions are market orientated, so model builders are able to integrate them and perform all sorts of policy evaluations. Unfortunately in less developed economies institutional and historical factors affect the work of model builders since one of the most important macroeconomic relationships can not be embedded. So, we rely in the analysis on a somewhat artificial environment in which important behaviour feedback just do not exist. However, in spite of these 'irregularities' we are able to perform a policy analysis and estimate multipliers under the extreme cases of bond and money financing, in addition to stand alone monetary policies, exchange rate policies, foreign shocks and commercial policies.

6.3.2 A FRAMEWORK FOR POLICY ANALYSIS

The evaluation of the policy scenarios is carried out in its standard fashion. It is assumed, as it has been mentioned, that the models parameters remain invariant to policy shocks.

In the last section we have set up the policy options and the assumptions about the policy environment and the institutional and historic factors. Following the exposition in the last section our goal in this section is to present the government policy stance and the instruments used for the policy shocks. Note that the policy environment is in general pursued by the method used to finance the fiscal expansionary policy. This does not mean that the same environment is valid for other policies such as exchange rate changes and stand alone monetary policy, i.e. lax credit policy and/or a conservative credit policy. When defining policy stance it becomes apparent that the model offers us a complete set of predetermined variables or policy instruments, on which government relies to affect both aggregate demand and supply. The question is what is the 'best' combination of policy instruments in order to reach the objectives of macroeconomic policy. This means that we have to choose according to the policy environment and the fiscal stance.[241] Another aspect which is important when defining the policy stance, or better the fiscal policy stance is the question of timing, i.e. short and/or long run policies. Since by definition short run policies are different from long run because the speed of adjustment differs according to the fiscal stimulus and the method of deficit financing (Neild (1981).

On the monetary policy side it is expected that monetary stance is consistent with the fiscal stance. Goodhart (1981) asserts that for any given path of a monetary aggregate when it is set as target "there may be a vague consistent path for interest rate and vice versa" (Goodhart (1981) page 250). The deterministic character of policy simulations implies that it does not make a difference if the monetary policy is expressed in terms of targets on specific aggregates on in terms of changes in the monetary instrument, usually interest. Particular care should be taken when using interest rate as a monetary instrument in a fixed exchange rate regime since if the monetary policy is accommodating and interest rate is held fixed, inflationary pressures could emerge affecting expenditures and balance of trade according to trade elasticities. This situation is likely to be enhanced in the Venezuelan economy since the current account and balance of trade is generally weak when the economy is expanding, even though we did not find significant effects of money on prices.

In summary we can conclude that the stance of monetary policy is not independent of fiscal policies. The policy analysis to be carried out should accomplish the following setting:

1. The monetary policy stance is characterised by the use of interest rate as a much independent variable in addition to direct control over bank lending by increasing (diminishing) the required reserve of banking sector.
2. In accordance with 1, exchange rate is assumed to be fixed. This enables us to exercise exchange rate depreciation on a policy of external balance correction.
3. Fiscal policies are the dominant policy stance and in some degree subordinates the character of monetary policy and even exchange rate depreciation. If the fiscal policy is expansionary the resulting deficit is defined as being financed in the following ways:
   i) Money finance case. Where a monetary accommodation is assumed. According to 1, interest rate is targeted (fixed).
   ii) Bond financing case. Exogenous debt sales are exercised by solving the model for "endogenous" interest rate. This method of deficit financing will emphasise the interaction between fiscal policy and the liquidity conditions.
4. Exchange rate policies. Depreciation in exchange rate is embedded in the model to measure the responsiveness of the balance of payments to a non-monetary correction policy. Our empirical frame will show how devaluation influences the current and real domestic product through exports, imports, expenditures and stock adjustments on the demand side of the economy as well as through the cost of labour and foreign prices from the supply side. Stock adjustments in the financial section introduces important implications of foreign and domestic credit for external and domestic balance during the period of adjustment following an exchange rate depreciation. One of the important aspects which we will be looking for is to assess empirically the proposition of stagnation effects since exports, demand for importables and domestic expenditures are not very responsive to a change in the exchange rate. The net result would be a disruptive side effect of devaluation on inflation, employment and capital accumulation, as well as real wages and income distributions. The case is relevant today since it conforms one of the most important policies suggested by many debt rescheduling packages aimed at preserving some level of international reserves which eventually could enhance the country' payment position. Accordingly we will investigate short and medium term effects.

The above menu of policies can be exercised under the following external environment of a rise and a drop in exogenous oil prices. Note that as an oil exporter country historically, although decreasing a large part of government tax revenues is related to the value of oil exports. So, if oil prices rise government revenues are likely to rise, although no reason exists that expenditures will rise accordingly. In this respect we have two roads. Firstly, an increase in oil prices which increases government revenue is frozen in the Treasury[242] and, secondly, all proceeds from oil revenues are monetised through government expenditure. We will carry both exercises. The most important aspect here is that following a drop in oil prices government revenues are affected but this does not necessarily yield a budget deficit, so we will assume that a balance budget principle is in force.

Alternatively, we could suppose that the dependence of government revenues (tax) of oil exports makes government deficit endogenous. In this case we could target the deficit to be a proportion of national output which leads us to the standard case of bond or money

Note that there are many possible financing combinations following an external shock.

Fiscal policy stance for our policy simulations set its policy instrument - government expenditure as a percentage deviation from its historical value which gives size the the shock. This will attenuate the policy simulating dependence on the base forecast values, particularly in highly nonlinear models as this one.[243] Increases in government expenditure (GOVEXP) will be considered in real terms.

Alternatively we could break down government expenditure into government current and capital expenditure. This is indeed the most appropriate procedure, but unfortunately, due to lack of data for capital stock in both private and public sector, this precludes us from analysing more closely the direct effects of government investment on national output. In our simulation we work with an aggregate figure for government expenditures.

On the revenue side non-oil revenues, both direct and indirect are endogenous in the system. Tariffs, duties and excises (aggregate in one category) are endogenous following the assumption of fiscal dependence in imposing tariffs. However, the argument of treating tariffs as a proxy for exchange rate depreciation (appreciation) can be utilised in the model by switching off the equation. Policy simulations could embody some assumptions about tariffs. However we had followed both arguments of fiscal dependence and tariffs as proxy for exchange rate devaluation.

On the other hand, the monetary policy instruments implicitly defined in our model are as follows:

i) time deposit interest rate
ii) loan interest rate
iii) discount (central bank) interest rate
iv) bank reserve ratio or required reserves

The integration of both sets of instruments ensures a limited stock adjustment process leading to a stock and flow integration, since the lack of data precluded us from fully specifying the stock and flow relationships.

An equilibrium position is assumed in the money market; its specification recognises the impossibility of fully controlling money supply. So, monetary authorities rely on interest rate and on the instrument affecting the banks' supply of loans to target the money supply. In the stand alone monetary policy simulations we investigate central bank's attempt to control money supply be restricting credit and money growth simultaneously. This set of policies assumes a non-expansionary fiscal policy and a balance budget is run.

A final aspect to be mentioned in the issue of crowding out. The standard simulation of crowding out effects cannot be investigated in the Venezuelan economy since bond financing fiscal deficits have not been a consistent way of financing budget deficit, even though there were some bond financing, on interest rate which is fixed by monetary authorities which did not evolve in line with th accumulation of domestic debt. As an important macroeconomic result linked to the growth of government debt and private sector expenditure behaviour we will report 'crowding out' from our bond financed policy simulation. Although the rationale for this might not be as standard as in models in developed economies.

Let us refer a final thought to the purpose of undertaking dynamic simulation with our model of the Venezuelan economy primarily to establish the validity of our assertions with respect to fiscal policy, monetary policy, exchange rate and external assumptions, as well as to investigate the functioning and properties of the models. Although the objective of this paper is to investigate the effects of various policy scenarios on the balance of payments and in particular on its components, it emerges that the policy simulations can be set up more generally and validate the model through a large combination of policies in the different sectors in which the model is structured. The base run was run inside the sample period from 1964 to 1984 in which we tested the tracking performance of the model. In the policy analysis and model validation I report simulation results with respect to relevant endogenous variables for a period of five years, namely, from 1979 to 1984 in which a short to medium term policy assessment was carried out. As mentioned before the main focus would be on the balance of payments and on most relevant expenditure categories. Although there will be results on components of current account, external assumptions will affect the demand for foreign funds by public sector and foreign assets by private sector.

The procedure for the simulations provide a set of initial values for the endogenous variables and exogenous variables since the simulation exercises pertain to periods going beyond the initial period of estimation. The policy simulation runs accordingly to what is hypothesised in Chapter IV of this dissertation in that monetary policy is not neutral with respect to income and balance of payments' components ad that fiscal policy and other non-monetary policies are successful instruments to control and correct balance of payments permanently.

6.3.3 The Policy Simulations. Results

Firstly, we present a discussion of the simulation results and the tracking performance of the model in a general context. It follows a detailed analysis and discussion of model's performance with respect to some targets variables.

It can be seen from the simulation results that the model tracks reasonably well the historical data. There are however some inconsistencies in the prdiction of foreign asset holdings. Even though the results show a considerable deviation notice that foreign assets in a stock variable which was constructed indirectly since no official data collection exists. Thus errors in measurement affected the estimates of that equation. The recorded large standard errors affected the simulation results. Note that when regressing actual values on fitted values there is an overprediction of foreign asset holding, the coefficient of 2.32 asserts this irregularity.

Apart from this inconsistency the model behaves reasonably well in historical data. See Table 4.2 for a summary of the historical simulation. Notice that the differences between actual and 'predicted' values emerge from the fact that measures as R^2 and other properties of the behavioural equations are not preserved in the simulation, since lagged endogenous variables which are considered fixed in the estimation stage are being generated inside the model at the solution stage. This implies that errors accumulate over the simulation period. This aspect is particularly important because if an equation is estimated in first difference (as it is the case here) in each period, the previous period value is considered fixed no stochastic. Furthermore, disturbances are not strictly additive during the simulation. In addition recall that forecast errors in the behavioural equations are very sensitive and are affected by errors across all model's equation. A final comment follows from the fact that both estimation and simulation periods are not the same following the irregularities of the available data base.

In general the model predicts quite well the direction and the turning points. A primary aspect of the historical simulation is the generation of the 'actual' values to which we validate our assertions with respect to fiscal monetary and other policies; as well as to make more evident the model performance and properties.

The policy simulations are of the standard type on which we quantify the effects of policy changes on selected expenditures and balance of payments variables and on the economy as a whole. The historical simulation extends over a period of twenty (20) years inside the sample period. In doing so we have not considered to carry a simulation well over the sample period as a test for stability of the model. The policy simulations of short to medium term type extend over a period of six (6) years; where results are reported at the end of each period (1979-1984) and the main focus are balance of payments and various expenditures categories. One of the main hypotheses brought about during the presentation of this study is the implication of monetary policy and its effectiveness to affect the balance of payment and the economic growth. Similarly we discussed the effectiveness of fiscal policy and other nonbalance of payments with respect to balance of payments disequilibria and economic growth. Such discussion has been carried out in a pure theoretical context. In this particular study the policy analysis we exercised implies some sort of policy integration between fiscal and monetary policy,[244] even though we deal with 'pure' policies as well; as it is the case of pure monetary policy.

Let us firstly discuss the effect of the fiscal policy stance. Fiscal policy is viewed here as a sustained shift in the demand for government expenditure. We therefore examine the impact of a change in government consumption. Recall that in VENMODEL we have explicitly specified the government budget constituent, thus, an increase in government expenditure must be matched by an increase in either money or debt, that is, by a variation in the money debt relationship. The implied deficit makes fiscal policy loose its independence, since the deficit must be fiannced in some way. In this framework we understand the policy integration concept.

This policy simulation assesses the effects of an increase in government consumption - money/bond financed - on aggregate demand and on the balance of payments. It allows us as well to examine the fiscal policy interaction with the balance of payments and expenditures since the budget deficit generated by the fiscal shock is not neutral with respect to the balance of payments position. In general it is true that a budget deficit in an open economy can be a decreasing function of the balance of payments, for that matter, current account. Computed dynamic multipliers with respect to income categories and balance of payments variables allow us to trace the effects of increased income on other expenditure categories in general and on balance of payments in particular. Note that our model allows for wealth effects. In the case of budget deficit financed polict, wealth effects are recorded on the current account and on the balance of payments.

It is important to mention as well that if, for instance, an increase in government expenditure - deficit financed - leaves the relevant variables in the balance of payments and on the real sector unchanged in the long-run, the value of the multipliers will approach to zero. However, if there is a shift in those variables the multipliers are constant. The most likely case is that for changes in government expenditure - deficit financed - the multipliers increase over time, converging in the very far future when the economy reaches its steady state. Multipliers shown in Table 4.3-4.4 and graphics representation of this policy shock give a visual insight into the model's properties and behaviour. These results show that money financed budget deficit produce an expansion in the economy activity. The increased economic activity reduces the current account surplus. Notice that such multiplier effects is enhanced by the corresponding wealth effects of a deficit financing policy. When the fiscal policy is accompanied by a bond financing policy, the expansionary effects are dampened by the restrictive effect of the increased interest rate. However, notice that towards the end of the period the system has converged to its steady state.

In particular we want to examine the model's dynamic behaviour by undertaking the following experiments:

i. A fiscal policy of an increase in government expenditure by 10% financed by domestic credit via changes in high powered money
ii. A fiscal policy of an increase in government expenditure by 10% financed by issuing new debt.
iii. A 25% devaluation in the exchange rate.
iv. A 'pure' restrictive monetary policy by an increase of 2 points in interest rates.
v. A reduction of 20% in the volume of domestic credit. Restrictive monetary policy.
vi. An expansionary monetary policy by switching off required reserves.
vii. A restrictive monetary policy by increasing by 10% the volume of

required reserves.

viii. An external shock made of an increase in oil prices.

The discussion and analysis of the first two policy shocks is referred in the literature as the crowding out issue. In a Keynesian context - as this one - it is expected that changes in government expenditure implies changes in total expenditures. The recognition of the government budget constraint implies that such increase in government expenditure must be equal to the available financial flows, so that the budget deficit alters the stock of debt and consequently the stock of private wealth. Such statements imply that the effects of fiscal policy carry over the monetary consequences which are caused by the different financing methods.

The results of that policy experiment, see Table 4.3 show that an increase in government expenditure has a first-round or direct impact, where the effect on income is resulting from the expansion in total expenditures. On the other hand, wealth (induced) effects are represented by changes in consumption expenditures, induced - among others - by the changes in financial wealth which is associated with the financing method used in this policy exercise. Finally we record an additional effect - following a bond financing policy - represented by the first-round and by the induced effect of income and prices on imports and exports. These results show that when money is the method used to finance increased government expenditures, the effect on income and on the balance of payments is always positive. See Figure 4.1.

When the policy shock is bond financed, even though its effect is positive, it is some how weaker than when money is used to finance the deficit. Such difference in the intensity of the financing effect can be explained by the fact that debt financed policies affect interest rates. A temporary result is in this respect that neither policy shows a crowding out effect even though private investment is a decreasing function of interest rate. A possible explanation is that we have artificially exercised the bond financing shock since interest rate is exogenous due to a precarious development of capital markets in Venezuela. Notice that the model behaves retinal when solved for interest rates. See Table 4.4 for a summary of the dynamic multipliers.

Another important property of the model is the working of price level (inflation). As the price level is not affected by movements in the money stock it follows the movements of income. On the balance of payments we notice that in both financing cases the current account is always in deficit. This result is mainly caused by the high import intensities recorded in this small and very open economy. The money financing case produces the largest current account deficits since income effects plus wealth effects make the changes in income to be larger inducing a large rise in imports demand. That result emphasizes the potential of fiscal policy as a macroeconomic policy instrument because the expansionary effects of fiscal policy leads to a current account deficit depending on the size of import elasticities.
Figure 4.2 shows the effects of bond financing.

Pure monetary policies were exercised with the model by a sustained shift in interest rates and on the supply of credit. Such policies are considered in the framework of the basic stock and flow structure of the model which is characteristic of most monetary models. The policy simulation assumes a reduction of a sustained 20% in the level of domestic credit (high powered money). As in the fiscal policy case our main concern here is to investigate whether income remains neutral and balance of payments position improves. It can be seen from Table 4.5 that credit contraction does not have a negative effect during the simulation period as a whole; however it reduces drastically in the last period giving signals of stagnation. Similar effects are observed in the balance of payments components, since balance of payments improves slightly. No offset effect is shown in the position of international reserves.
See Figure 4.3

The second type of monetary policy carried out is of a restricted type where interest rates, both base and banking rate, have been changed. This particular combination of policies, along with the fiscal ones aimed to regulate aggregate demand and correct balance of payments disequilibria would seem to be a plausible set of policy prescriptions available to authorities to adopt. First of all, the fiscal and monetary policy stance is a result of the integrated nature of economic policy when the government budget constraint is fully recognised. However in this particular case, as in the domestic credit shock, 'pure' monetary policy is exercised firstly to 'test' its effectiveness in the medium to long term as well as to evaluate the model's behaviour. This policy shock has had a negative impact in the level of aggregate demand as it can be observed in Table .6. However those effects tend to fade away as the simulation period elapses. The negative effect on the level of aggregate demand causes a simultaneous improvement in the balance of payments. Wealth effects can be observed in the consumption function as interest rates affect consumption of durables. See Figure 4.4

The improvement in the balance of payments diminish over the simulation period once the import intensities 'restore' its effects on imports of both consumption and capital goods. On the other hand prices are hardly affected, following the particular pattern in this model where prices are not affected directly by a change in the stock of money but by a change in the level of economic activity.

An alternative approach for carrying out a restrictive and/or expansionary monetary policy is exercised by changing the levels of the desired stock of bank reserves. Tables 4.7 and 4.8 show the results of these policy exercises. Before we discuss our empirical results, allow us to recall the debate between the monetarist propositions of McKinnon-Shaw's type models and (neo) structuralist models. Both models emphasize - even though differently the role of the required level of bank reserves (required reserve ratio) measured as a proportion of bank's deposits. See Figures 4.5 and 4.6.

Their models incorporate required reserves as a mechanism to offset the monetary expansion being definite, since its reduction the available volume of liquidity (credit). Those effects can have in some circumstances perverse results (Fry (1988, op.cit.)). Indeed Courakis (1984,1986) showed that higher volume of bank deposits can be generated in circumstances where the demand for banking credit is largely inelastic relative to the demand of its counterpart. If this is so, the deposit rate tends to increase due to an increase in the level of required reserves. On the other hand, Fry (1980) and Mathieson (1984) suggest the elimination of required bank reserves in order to compensate the crowding out of private investment when required reserves are outside money. Neo-structuralist models emphasize the role of required reserves since it is a key factor to compare the efficiency of financial intermediation through the banking system unfavourable with the efficiency of financial intermediation through the curb or unregulated financial markets.

Our main object in this section is to experiment with a monetary policy where the policy variable is the stock of bank reserves. We have carried out two complementary policies, first an increase in the desired level of bank reserves and secondly, on its total elimination such as suggested by McKinnon-Shaw's type models. An increase in the level of bank reserves affect slightly the level of aggregate demand in the same pattern on the above exercise of credit restriction. Economic activity slows down for an early convergency to its static steady state path. The balance of payments is similarly affected along effects on aggregate demand.

Table 4.8 shows the results of the elimination of required banks reserves. As expected this policy shock affects positively the level of aggregate demand, which in turn following the characteristic of the import elasticities, reduces the current account deficit and level the balance of payments. Note, however, that the expansionary effects are not strong enough and in the last period of the simulation there are signs of stagnation followed by a potential current account deficit. Growth does not follow the path of the current account in the long run. Once again we can observe the underlying weakness of the current account due to the dynamism of the import elasticities. See Figure 4.6

The remaining two policy exercises assume exogenous changes in the current balance; an exchange rate devaluation and an increase in the price of oil. Table 4.9 and 4.10 report the results of those two exercises. The results show that an increase in the price of ol clearly produces an expansionary impact on the level of economic activity, and an improvement of the current account. Notice that such strong surplus in the current account is due to the dominance of oil exports in the Venezuelan total exports. Refer to Chapter II for a discussion of the Venezuelan balance of trade. In the case of exchange rate devaluation Table 4.9 reports the contractionary effect on the level of economic activity. Such contractionary effect is transmitted through the high level of inflation which follows the devaluation of the exchange rate, and higher import prices. However these effects take away and disappear after the first three periods of the policy exercise. Notice that the high import elasticities 'offset' in some way the contractionary effect of the devaluation, since the contraction in imports, in both consumption and capital goods is not strong enough following a devaluation of 25%. Current account improves as a consequence of the contractionary effect of the devaluation because import prices rise above the level of which the depreciation in the exchange rate affects the other side of the current account. See Figure 4.7 and 4.8.

In the simulation approach to policy questions exercised in this section, value of endogenous variables are medianisch determined for alternative assumptions about the policy variables. This approach indicates to policy makers the implications of the different policy options out of which they can choose desired alternatives.

CHAPTER VII
CONCLUSIONS

The fundamental objective of this dissertation has been to undertake an empirical study of the Venezuelan balance of payments by building an econometric model through which the analysis of a predetermined number of policy options, that could lead to to a better understanding as well as to a factual quantification of the main macroeconomic effects on the behaviour of the balance of payments as a whole. Towards this objective we commenced with a brief account of the Venezuelan balance of payments. The main purpose of that section was to review the behaviour over the sample period of the most important variables in the balance of payments both current and capital account. This discussion of the main features of Venezuela's balance of payments was designed to organise our understanding of the generation of historical data, as well as to advance a comprehensive account of the main characteristics of the Venezuelan external balance including a review and discussion of the policies applied during the sample period. Following such discussion we have attempted to identify the aspects of the balance of payments which need further examination.

The scope of that section pertaining to the descriptive analysis of the balance of payments has encompassed the determination of exports, imports both value and volume, as well as the corresponding prices. Towards a better understanding and comprehension of the main determinants of the balance of payments we have carried out a detailed discussion of the alternative approaches to the balance of payments; i.e. elasticity, absorption and monetary approaches. This survey on the literature in both its theoretical and empirical works helped us identify the determinants and the effects of the various policy options on the components of the external balances as well as the macroeconomic relationships between both internal and external sectors.

Most of the literature on balance of payments theory and policy, whether Keynesian or monetarist has remained essentially static, since it deals with non-growing economy. Also it is costumarely to ignore the implications of the government budget constraint and the stock and flows effects derived by the dynamic implications of such "recognition".

In his important surveys Currie (1976)(1978) drew the lines of the macroeconomic analysis and the macroeconomic relationship between both internal and external balances. Our purpose was to extend those theoretical propositions into the context of a growing economy and by developing an empirical work where the main emphasis was the analysis of the determinants of balance of payments, including the policy effects.

The framework we follow in this thesis is to firstly survey the literature by presenting an outline of the Mundell-Fleming model which was embedded in Chapter IV where there is a discussion of the implications of the recognition of the government budget constraint. Thus an analytical tool is developed to confront the effects of the main policy effects debated by monetarists and nonmonetarists. The framework was to formulate a model that incorporates, simultaneously, money, capital accumulation, balance of payments and government budget constraint. Even though we did not constrain apriory to any particular gospel we could integrate the balance of payments theory and policy with a stock and flow result of the portfolio balance model. The target was to examine the role of money and debt in the economic growth in the context of an open, small economy, with a fixed exchange rate regime and capital mobility.

This analytical model was utilised to discuss the long run effects of fiscal and monetary policies, and non-monetary policies for balance of payments correction such as devaluation on balance of payments, and international reserves. It was shown that such policies depend first, on whether government budget and balance of payments deficit or surplus are both equal to zero or whether a deficit (surplus) in one is offset by a deficit (surplus) in the other, and second, on the way a fiscal policy expansion is financed, that is the way money is created (drawn) and fiscal policy is financed. It was shown also that other policies of balance of payments correction such as devaluation have permanent effects on the balance of payments.

The main contribution of this study is the construction of a fairly integrated econometric model of the Venezuelan economy which, as a tool for policy analysis, was able to demonstrate, empirically, the main theoretical propositions regarding the determinant of the balance of payments components and the likely effects of the policy stance with respect to fiscal, monetary policy and other non-monetary policies such as devaluation and import taxes.

The econometric model developed, and estimated in Chapter V, well overpassed our objective to emphasise only on balance of payments, since we have eventually built a model that encompasses the most important macroeconomic relationships, and in which standard macroeconomic effects are fairly integrated in both real and financial sectors of the Venezuelan economy. The 'natural"'limitations in the size of the model is given by the availability of data. This particular constraint stops us from presenting a more detailed stock-flow model that the one estimated in Chapter V, as well as restricting us to few supply side affects.[245] Along these lines, we were restricted in estimate supply side effects, caused by the effects of imports of intermediate capital and raw material goods in the production sector of the economy. For instance, if imports are derived as residual between demand and supply, total imports may be allocated into its different standard components according to the sectorial import functions.

In similar fashion we could have developed the financial sector by considering the balance sheets of such sector. As mentioned before, data limitations did not allow us to do so. On the other hand, the objective of this thesis could have been attainable by presenting a model size with the most possible simultaneous relationships (41) in a fairly small size model (62 equations).

We wanted to mention some aspects which were present at the model building process and which posed important restrictions in our attempt of encompassing the most important macroeconomics in a date economy. One practical lesson drawn on economic modelling in less developed countries is to some extent restricted to institutional and historical particulars; however this does not preclude investigators to go deeply into such economies in order to pick up important structural macrorelationships and present them in a fairly integrated model. In this particular case these limitations are to be taken into account for further research.

Let us return to the model we have estimated in Chapter V. In spite of the limitations mentioned above the main contribution of this investigation is both theoretical and empirical. In the analysis of the balance of payments of Venezuela, a theoretically sound and logically consistent empirical model has been lacking for a long time. As reviewed in the introductory chapter no empirical econometric model to analyse the working of the economy and to access policies exists in Venezuela. This work is, to the best of my knowledge, the first attempt to present a coherent tool for the understanding and analysing the policy options available to authorities. The goal was to obtain an empirical model of the economy of contemporary Venezuela, able to track the economy's recent developments and potentially usable for short-run and medium term policy analysis. Even though we did not engage in forecasting activities, the performance of the model inside the sample period indicates that forecasting can be pursued as well.

The model designed to trace short-run and medium term policies used aggregated annual data. Unfortunately no quarterly data exists for most of the real sector, even though the quarterly data for the financial sector exists. We could have relied on some kind of pseudo data method to construct quarterly data, however we know that data artificially constructed does not represent the real outcome of the economy. Thus we decided to go back in the past in order to extend our sample period up to thirty (30) observations in most estimated equations. However, even though data conditions remain a major constraint in the modelling of this economy.

The model building strategy was based on the fact that most standard and other theoretical propositions can be empirically represented in the context of a less developed economy, even though direct "tests" of monetary and elasticity propositions could and are exercised. However we did not constrain ourselves into the "testing" of these propositions since we have developed a broader approach in which one could (not) encompass alternative results. However, some nested and non-nested policy suggestions can be "tested" since the model presents the integration of macroeconomic variables in a more general setting. Those practical aspects - present - in the building strategy reinforced the theoretical framework of the model as a whole. Note that from that point of view we could partition the economy (model) into severl "blocks" each representing a particular "block" of the Venezuelan economy. There is a real sector represented by the aggregate demand functions. This sector encompasses the "external" sector or balance of payments, labour market. There is a "bridge"s block represented by the capital account and a financial block represented by the financial functions of that market.

In general, we could say that this investigation combined successfully Keynesian, monetary and portfolio balance approaches to the analysis of balance of payments, even though the size and the structure of the model reflect the traditional Keynesian modelling approach, it is quite useful to give a detailed picture of how different channels of reserve flows, i.e. exports, imports and capital flows, result in the balance of payments of Venezuela. Even though it can be argued that the introduction of a monetary "block" represents the generalisation of the monetary approach to the balance of payments on the basis that this complete more general equilibrium approaches, it is important to quote the the building strategy which started on the real sector theoretically justified the introduction of the "monetary block". Thus, we could argue that the theoretical consistency of the system might obey a particular approach. The causation, recursiveness and simultaneous relationships are inherent in the theoretical context in which the structural parameters of the model's equations are estimated. One important result is that the quantity theory is implied in the model and even though it is not necessarily expressed in any direction of particular causation. The model, as mentioned, is highly simultaneous, which on the other hand represents an interesting constraint when estimating the structural parameters.

According to the above discussion the major finding of this study can be aggregated into two classes. First, any findings on the particular individual equations regarding the macroeconomic effects singled out into that particular function. In this case, most of the equations of model' sections are, for the first time, estimated and does not have alternative or rival models to which our findings and results could be encompassed or nested.[246] The second class of findings are subject to the solution of the model's and the empirical test of some standard policy suggestion. This mechanical approach implied in the model simulations indicates how well we capture the "work" of the whole economy and how the implied dynamics of the system is embodied in the solution of the structural equations as a macromodel. Similarly, by "shocking" the system with the available policy options we have "tested" some standard propositions but some are constrained to the span of time in which we carried out the mechanical dynamical simulations.

Having completed the investigation our plan in this final chapter is to focus upon some of the features and findings of the extended Keynesian model developed by us by presenting the most important analytical implications of this study and the empirical findings of interest according to the above ad hoc classification.

1. The extended Keynesian model's features whose structure and analytical foundations have been discussed at length in Chapter IV, and whose empirical estimates, using Venezuelan data, has been discussed in Chapter V, departs significantly from standard Keynesian models' framework as well as macromodels of less developing economies in general. Our major finding is that the integration between "financial" and "real" sectors (blocks) is the transmission mechanism regarded direct and induced wealth effect. In what follows we outline some of the most important characteristics which have been vital in the generation of our results in Chapter VI, where the latter is defined as being affected by their own interest rate which approximates this function to savings.

2. The domestic price level (and changes) is not exogenously determined by foreign prices, even though it is highly responsive to import prices. The other argument, i.e. wage effects, is interpreted by following an indexation rule.

An important finding is the rejection of the monetarist hypothesis implied in the causality from money to prices. Accordingly inflation did not seem to be caused by excess money demand (supply), since no systematic effect was found between the rate of money growth and inflation. The lack of such link has enormous implications for the analysis of the model properties following the policy options available to authorities, particularly the effects of a money financing fiscal expansion. Important institutional and historical factors explain the lack of a link between money => prices. Alternatively inflation appeared to be intertial type and imported, which, not surprisingly, emerges from our Phillips curve specification. Let us mention that such a Phillips curve typed model is a direct result of the specification search.

Regarding institutional and historical factors, note that during the sample period there is a widespread use of price controls, subsidies and accumulated current account surplus which allowed exchange rate to remain unchanged for the whole sample period. The background of this is the pernicious supply side constraints or bottleneck which induces a low elasticity of domestic produced goods to excess demand. If money is pumped into the economy, imports are there to "sterilise" the money supply. The net result over time is the repressed characteristic of inflation. Prices adjustment under this situation are followed by wide spread price control subsidies and the like.

3. At this stage the domestic component of high powered money is exogenous, so we have no argument to reject or to accept the extreme monetarist proposition of exogenous domestic credit. Even though we would have the possibility of carrying out an exercise implying a domestic credit assumption. Indeed we did so. The policy of a fiscal expansion was financed by money. The important finding is that money is not neutral. It affects the balance of payments (current account) through its direct and induced wealth effects.

4. Since variation in inventories (stockbuilding) absorbs the differences between aggregate supply (domestic output plus imports) and aggregate demand (expenditures) the missing supply side "link" bias has been an important constraint in the determinations of the feedback effects from demand and supply and vice versa. These links have to be specified in future research because there exists the presumption that the most important constraints to economic development lie in the inability of the supply side to satisfy the demand.[246] Accordingly, and after "solving" those limitations, the level of output can be determined in terms of capital stock and inventories among others.

5. Gross fixed capital formation within the private sector is sensitive to changes in income, liequidity ratio. It is a decreading function of

interest rate conflicting the repressed financial hypothesis. Usually the financial represssion model exports that investment is an increasing function of interest rate.[248] However, we recognise that the no acceptance of the null financial repression, the characteristic of Venezuelan economy, is similar to the one described by the financial repression model. However the availability of financial resources does not vary in accordance with its price. Active credit assistance to commercial banks and other financial institutions by part of monetary authorities has no correlation with the variability of interest rate, since it is pegged by monetary authorities. Even though on year basis interest rate shows some variability. The results we have obtained are inconclusive in this regard. The extreme assumption of financial repression is rejected.

Another aspect which we have missed in this section is to embed the transmission of direct wealth effects into the investment of private sector. The variable liquidity ratio would express more clearly the direct wealth effects if we could have modelled the financial sector from flow of funds approach. Data limitations did not allow us to define in a more complete way the flow-of -funds and the transmission mechanisms embodied on it and accordingly trace the feedback effects from one sector to the other.

6. Somehow related to 5. above is that the effects of capital outflows (foreign assets-building by private sector) are implicitly recognised in the investment function of the private sector. The liquidity ratio effect is weak indicating that funds do not flow according to demand. This picture reflects the state of Venezuelan economy during the last 10 years of the sample period where investment expenditures of private sector decrease in real terms dramatically, whereas it was steadily accumulating foreign assets. It is left for further research to rebuild those links between capital mobility and the relationship between savings, investment, rates and real capital accumulation.[249] As a result of of inefficient financial system the private sector role in capital formation (savings) was small during the sample period (see 10 below).

7. Wealth effects are significant in consumers expenditures. This constitutes the most important link between financial and real sector.

Those wealth effects enhance the effectiveness of monetary policy in its effect on income and on the balance of payments.

8. Money supply enters endogenous in the model since an important aspect of the financial sector embedded in the model is the possibility of stand alone monetary policies. In such a context we were interested in the instruments which control the supply of money even though it is endogenous in the system.

9. The level of imports and exports (non oil) are responsive to relative prices. However the sensitivity in the aggregate imports is wealth. (10% level of significance).

10. Freedom of capital flows existed in Venezuela for most of the sample period. This allows the integration of Venezuela with international market. However the low development of domestic financial sector highly influenced private sector to hold a large share of foreign assets in their portfolio. This capital rose more rapidly due to robust growth of foreign interest rate. These effects dampened the expected domestic interest rate effects even in periods in which the differential is positive. The major finding is the confirmation of the portfolio model which can be drawn for above result. The implication of the above is important since it is common to refer to the issue of capital flight arguing expected depreciation of the exchange rate. Even though we could confirm partially such assumptions, the accumulation of foreign assets by private sector is a continuous process starting well before the difficulties in the balance of payments appeared in 1983. Our result, even though it is still inconclusive suggests that there are fundamental and institutional reasons for having a large share of foreign assets in private sector portfolios.

11. The other side of the coin is the accumulation of foreign debt by public sector. We were not able to confirm our hypothesis embedded in the two-cap model of domestic excess demand. The low and even the negative rate of economic during the last seven years of the sample period indicates that the rate of growth of capital accumulation did not keep pace with the rate of growth in external indebted of the first perturbation the balance of payment made crisis since the economy did not accumulate enough to accomplish with the debt payment. Thus it is not a

difficult exercise to predict the balance of payments crisis in 1983 when the accumulation of external debt (including the revaluations) did not correspond with the most important economic growth indicators. On the contrary what is shown is that the external indebtedness of public sector correspond to the process of no-investment of private sector.

12. Transaction money demand showed a long-run income coefficient of 2.08 encompassing other long-run elasticities for less developed economies. Thus, the dominance of a cash economy is a reflection of an inefficient financial system. These results are robust with those of private sector investment, foreign asset accumulation, final consumption. In the policy simulations we can confirm these effect since the model tracks the economy quite well.

All those major findings and features of the model when combined with the fact that money supply is endogenous determined by the size of the multiplier do suggest that we have somehow a framework integrating the monetary, absorption and elasticity approach. More precisely, we have a model which is a generalised version of a short-run balance of payments analysis developed by Frenkel, Gylfasson and Helliwell.[250] That model tried to synthesise the monetary and Keynesian approaches to the balance of payments, by developing a general model that incorporates the behavioural relationships of the two approaches. Our empirical model could be considered according to a generalised version of Frenkel et al model. The variables such as consumption, investment exports, imports and output provide the foundation on which the analysis in terms of the absorption approach can be undertaken. On the other hand the fact that both exports and imports (two categories) are responsive to relative prices and that the domestic price level is responsive to wages and foreign prices provide the preconditions for an analysis in terms of the elasticity approach. However, when taking the model as a whole, the multiplier can provide richer information about the working of the model or sections of it, i.e. the balance of payments, since there will be a complex net of inducted and direct effects , difficult to interpret following any of the mentioned gospels.

The model such as estimated and solved in Chapter V and VI suggest the following general implications:

1. We have strengthened an integral view of the balance of payments and showed through dynamic simulations that both monetary, elasticity and absorption approaches have a vital role to play in the analysis of balance of payments. The simulation analysis which we exercised stated that the balance of payments or current account will be in disequilibrium if the rate of capital formation exceeds that of saving. This is a typical two-gap model result. Along these lines of analysis it could be proved that the responsiveness of imports (both consumption and capital goods categories) to relative price deteriorate[251] the balance of payments. On the other hand a money financed fiscal policy expansion affects the balance of payments, thus money is not neutral.

2. For an improvement in the balance of payments - in this oil economy - the capacity to produce exportables should increase considerably or alternatively the demand for importables should decrease. The latter can be produced by a decrease in output which will deteriorate the production of exportables. For an economy such as Venezuela where oil exports are 9/10 of total exports the constraint in the balance of payments is large if oil exports remain unchanged. A clear policy suggestion emerges from our study and that is that non-oil exports should expand rapidly otherwise recurrent deficits in the balance of payments will occur consecutively. The deterioration in the balance of payments has unstable features unless income (output) grow at the same pace that exports do in order to guarantee a constant marginal propensity to import. This analytical proposition can be traced in the model we have developed.

3. Fiscal policy is a powerful instrument to affect the balance of payments. Taxation and a subsidies on imports and exports can be used as surrogate for exchange rate devaluation. Budget deficits (surpluses) directly increase (decrease) the level of absorption (wealth effects) particularly increase (contract) the money stock depending on the way fiscal deficit (surpluses) is financed. This aspect emphasised the issue that fiscal policy represented by a budget deficit (surplus) is not a pure fiscal policy since it is not feasible without financing from the monetary policy sector).

On the other hand the fiscal policy repercussions can accelerate (crowding out) the rate of investment in the private sector as well as public sector. Eventually this will enhance the economy growth and improve the balance of payments provided that exports are responsive to the economic growth. The situation turns out to be perverse in Venezuela since 90% of exports (oil) are drive by exogenous factors. Such a scenario is likely to deteriorate the Venezuelan balance of payments is the assumption of ceteras Paribus dominant in the oil export In the model we have developed we have successfully singled out those contradictory macroeconomic relations. The simulation experiments of Chapter VI to some extent shows those results. The other end of that policy, i.e. when there is a budget surplus wealth effects ensure that current account improves. A tax policy (increase) will have a similar effect.

4. A growth is external indebtedness unaccompanied with an increase in exports in order to cover interest payments will not only deteriorate the balance of payments but will also affect income.

5. The standard monetary proposition that in the steady state monetary policy (increase in domestic credit) is neutral is rejected. Note regarding this result that interest rate has significant effects on investment and on money demand, eventually an increase in domestic credit (liquidity ratio affects income). The monetary simulation that we have carried out, increase in interest rate, elimination of requires reserves have the standard results. The increase in interest rate improves the balance of payments. The elimination of the required reserves cause opposite results.

6. The policy of exchange rate depreciation has lasting effects on the balance of payments. There is considerable sensitivity of imports and non-oil exports to the price level. the model we have presented largely exceeds our objective of buildings a macromodel for analysis of balance of payments. That model will encompass other macroeconomic relationships introducing a more complete approach that the one we had in mind when starting this research. In accordance with those thoughts an important question emerges. What potential use can be achieved by macromodels like this one in practice?

There are several possible practical uses of macroeconometric models, even though no macromodel is used in Venezuela by Central Bank or by the

Treasury to assess available policies options. We believe that model like this can be used in the preparation of government budget since the budget follows a discussion of past year's performance of the economy.
Usually government officials are involved in the analysis of project of the various budget items. Those projections however, done item by item, have no information about the causal relationship embedded in the macroeconomic relationship. A model similar to the one we presented in Chapters V and VI encompasses these interrelationships and cross effects among the economic variables involved. The model, to be a useful tool for policy analysis should adequately capture these relationships. In Venezuela the rationalisation of fiscal and monetary policy is based on two separate and relatively elemental lines of thinking.

Official fiscal policy always assumes that government spending has a secular effect on economic growth. So government deficits are conceived as expansionary and compensating for the structural excess demand of private sector. On the other hand, monetary policy has been largely based on direct control of the liquidity by affecting bank reserves (discount window policies). Interest rate has not been actively used for monetary policies. Arguing that interest rate increases are inflationary. Seldom artificial ceilings have been set in order to guarantee cheap credit. In the preparation of such elementary monetary policy, Central Bank does not have a policy analysis tool in which the policy stance would be assessed; or even to supplement its policy tool-box with an empirical macromodel. In both situations macromodels can be helpful tools since the available policy options to policy makers can be comparatively assessed.

7.2 AREAS AND SUGGESTIONS FOR FURTHER RESEARCH.

We have extended the Keynesian and monetary model framework by incorporating prices and expenditures. Nonetheless there are some important aspects which have been left out or have been dealt with inadequately in this investigation. In parts data problems limited us to assess the empirical links of the supply side of the Venezuelan economy. In spite of the data base limitations; in some areas there will not be important impediment to overcome the inadequacies. In this regard it is necessary to dissaggregate output when introducing the supply side. This production sector should be dissaggregated into the major economic sectors, i.e. agriculture, mining, manufacturing and services. Imports can be further dissaggregated by allowing raw materials and intermediate imports and capital goods to enter in the respective area of affection in the supply side. Capacity utilisation should be estimated by considering sectorial surveys and time service data. Capital flows and foreign assets of private sector should be linked with the real sector of the economy savings and capital accumulation, since it has been shown that the building up of foreign asset domestic private savings are affected and accordingly capital accumulation.

On the side of the monetary sector, the likely further research is to organise the banking and other financial institution balance sheets, by modelling using a portfolio approach both banking and nonbanking sectors.

Another area for further research is the dissaggregation of investment expenditures between housing and several categories for non-housing investment.

Finally there will be a need for updating since we have estimated the structural parameters using data for the period 1955 to 1984.

Footnotes

Chapter 1

1. Currie (1976) established the basis for the integration of both constraints and it macroeconomuic implications.See Currie(1978) as well.

2. The exchange rate remained about 4.3 units by US dollar during the period 1963-1983.

3. Note that the model is quite general at this stage.

4. See Frankel et al (1980).

Chapter 2

5. For a comprehensive terms of trade indicator for measuring the performance of balance of trade we have disaggregated into two indices. First a terms of trade index considering non oil exports and secondly a terms of trade index considering oil prices. Both indices would give a more comprehensive picture than an aggregated terms of trade index.

6. Approximately, we could calculate the "purchase power of exports" last year assuming no change in prices. The following (current period) using the following expression

$$X_{t-1} - Px \left[\frac{TT_t - TT_{t-1}}{TT_{t-1}}\right] \cdot Pm_t$$

where X, Px, Pm, TT are exports, export prices, import price and terms of trade.

7. See for instance Little (1982 and Greenaway, D and Hyung Nan (1987).

8. The coefficient of variation is 3.24% for 1955-1984

9. Measured by the nominal exchange rate deflated by a measure of domestic price.

10. Treasure reserves do not form part of monetary base, as well as other special government accounts at Central Bank which as they add to a negative quality, subtract form the international reserves.

11. Before nationalisation oil income tax increased considerably as it was demanded by increasing government expenditure.

Chapter 3

12. The emphasis is only on the current account since capital flows do not respond to market forces (See Larsen and Meltzler).

13. The derivation relies heavily in Thirwall (1980)

14. By means of fiscal policy action, see Dornbusch (1987) p262-5

15. The model is a simplified version of Ganning (1980)

16. Note that the theoretical background for such an equation is not too strong due to the explicit m.p. to save out of the export sector.

17. Elsewhere in the thesis I come back to the model upon deriving the demand for foreign borrowing.

18. This part rests heavily in Hahn (1977) and Kruger (1983).

19. The analysis draws entirely from DeGrawe (1983).

20. In the strict sense, the money multiplier is endogenous and may depend amongst other factors on the preference ratios of domestic residents. We have made m = 1 to keep the analysis manageable. variables.

21. See chapters IV-V for further results in specifying the capital account.

23. This requires that the law of one price holds in the long run and perfect assets substitution.

24. If full employment holds.

25. She did not estimate a reserve flow equation since an equation for domestic credit is estimated. Capital flows are exogenous.

26. By wealth, portfolio balance, aggregate supply, government deficits, capital flows, they present a simple short-run model which suffices to develop their synthesis. However it is clear that the model can be extended by incorporating the 'missing' variables to present a model suitable for long-run analysis. See Frankel, Gylfasson and Helliwell (1980 p 591).

Chapter 4

27. The model follows Dornbusch (1980).

28. See Mundell (1964, 1963) and Fleming (1962).

29. For a detailed account of wealth effects see Currie (1980)(1979).

30. Import prices are given in domestic currency.

31. See Cuthbertson (1977) p 176.

32. See Chapter III of this paper.

33. See Gondolfo (1988)

34. See Stevenson and others (1987) p 219. Wealth could call with a current account deficit, due to interest rate (wealth effects) and expenditure effects.

35. See Gondolfo (1987) p 215.

36. See De Growe (1883) for a detailed presentation of the optimal mix criticism and Artis (1983) p 93-94.

37. This point draws heavily on Gondolfo (1950).

38. See McKinnon and Oates (1961), M von Neuman (1970), Brown and Willet (1980).

39. See Branson (1975) in Ando edit, Currie (1981) Arti & Miller (1981).

40. See Currie (1981) for instance.

41. The model keeps its Keynesian framework (e.g. Tobin (1982).

42. De Grouve (1983) present a similar portfolio model but restricted to capital flows.

43. See Backus, D. & Purvis, D. (1980) and B.B.S.T. (1980).

44. The obliged reference is Tobin (1969, 1980).

45. The following analysis is based the partial equilibrium framework examined by De Growe (1983) op cit in his theory of portfolio model, chapter 10.

46. See Stevenson and others (1987) op cit p. 256.

47. See Currie (1981)

48. Currie (198) p.84.

49. See Currie (op cit) for a detailed account.

50. See Currie (1976) op cit

51. This reflects Currie's criticism of Turnovsky's (1976) definition of government expenditure, see Currie (1981) for an extended exposition.

52. An attempt is made to extend Currie's analysis for a growing economy, but in a more general setting. See Currie (1976) op cit.

53. Although the model is more general here, it follows generally Stern (1981).

54. If an equilibrium FA =), stock of foreign assets, is adjusted the balance of payments equation breaks down to be only the current account, since no capital flows exist. This is an important result as a current account equal to zero is required to have the system in equilibrium. As is mentioned above this will have great implications when plugging the government budget constraint.

55. Wealth effects in this schedule are a downward shift.

56. Our asset demand specifications used here are similar to those employed by Bakus and Pervis (1980), Bakus, Braynard and Tobin (1980). Braynard , Bakus D. & Pervis (1980) ;B.B.S.T. (1980).

57. See appendix in which the solution procedure is explained.

58. See Stein & Infante (1980) for a more specific model than this, but with the same implicit propositions.

59. See Infante & Stein (1980) op cit in which similar results are obtained, by using a more simplified model.

60. No permanent effect is found in the stock of IR, which could be true since this case is of non-growing economies.

61. The above equation could be rewritten in this way. We start from the definition of DC=Ø DEBT, and DC=Ø DEBT+DEBTØ or alternatively Ø DEBT+DEBT+IR=0, since IR=BOP, we could have Ø DEBT DEBTØ +BOP=0, OR AS DEBT=GOVDEF the equation is rewritten;Ø DEBT + GOVDEF Ø = -BOP, so both BOP and GOVDEF are different from zero≠ 0. new equation BOP+ØDEBT+DEBT Ø =0.

62. See Infant and Stein (1980) op cit where a similar result is found.

63. See Currie (1976, 1980) op cit.

64. See Currie (op cit p.311).

65. As before we have to incorporate into the system the equation representing the constraint that real money balances have to be constant in the long-run, BOP + (ØDEBT + GOVDEF Ø) = 0.

Chap 5.

66. We will discuss the data issue in the appendix.

67. See Turnovsky (1977) and Artis (1983) where can be found the theoretical basis for open macroeconomics.For developing economies see Fry (1988) and Parkin & Zis (1976).

68. See Frankel & others (1980).

69. In the sense of incorporation relative prices, see Hansen (1974)

70. See Gandolfo (1980,1983) for an extended discussion about model sizes.

71. See Gandolfo (1980) for an extended specification of a stock-flow model, disequilibrium model.

72. See Davis (1987, 1988) or a complete exposition of stock flow effects in a UK macroeconomic model.

73. See Davies (1988) for a full exposition of capital accumulation under portfolio adjustment.

74. We have specified BOP above in national currency by bringing about the exchange rate by completeness. However we are using US dollars for the external sector.

75. See Chapter III for a full exposition of these conditions.

76. See Khan and Goldstein (1981) for a survey on the literature both theoretical and empirical and which both models are totally developed.

77. See Kreining & Officir (1978) op cit.

78. See Leamer & Stern (1970).

79. For a complete discussion of this issue see Leamer and Stern (1970) op cit, Orcutt (1955) and Khan and Goldstein (1985) op cit.

80. See A Winters (1981) for a complete exposition of this discussion.

81. Even though indirectly effects can be transmitted by the appreciation of the real exchange rate as it is emphasized in the literature related to the Dutch Disease issue.

82. These policies of import substitution have switched imports to imports of intermediate inputs and capital goods.

83. See Khan and Goldstein (1985) for a full exposition about the lack of reliable export price indices and the use of alternative measures.

84. See Data Appendix for an explanation of the method used to build the non-oil export series, and non-oil export prices.

85. See Appendix for the Econometric Methodology used in this study.

86. See Harvey (1981).

87. The derivation of imports functions such as defined here could depend on which import we are taking about. For simplicity or theoretical statement above is related to import of consumption and intermediate and capital goods. See Goldstein & Khan (op cit) and Kohly (1982). imports and on the relative price elasticity.

88. See annex for a complete exposition of the methodology used through this dissertation.

89. See Leamer & Stearn (1970).

90. See Hibbert & Wren-Lewis (1978) for instance.

91. See Khan (1974), Melo & Volgt (1983), for instance.

92. See for instance, Khan (1974,1976,1987), Melo & Volgt (1983), Khan & Loss (1974) Boylan & Cuddy 1986), Khan (1974), Boyland, Cuddy & O'Murcheartaigh (1980).

93. See Hendry, Pagan and Sargan (1985) for instance, and Hendry and Richards (1983).

94. See Harvey (1981), and Hendry Pagan and Surgan (1985) op.cit.

95. Most of these authors refer to the foreign exchange constraint effect on imports.

96. Where quarterly data were obtained form annual data.

97. The results with the differenced equation do not consider the long-run elasticity which may indicate rather mis-specification. The size of the DW appears to demonstrate this, as it is inconclusive.

98. See our comments above with respect to these static specifications.

99. Footnote missing.

100. See our reference at the beginning of this section.

101. See Marakhur & Montiel (1987) IMP Staff Studies.

102. See Marakhar & Montiel (1987) op cit.

103. Demand for imported goods depends on the price of such goods relative to their domestically produced counterparts. If real exchange rate appreciates, there will be a decrease in the relative price of imported goods with respect to domestically produced goods. This seems to be the feature of Venezuelan imports for most of the period.

104. See Beanstock, M. (1981).

105. See Branson (1981) for a full exposition about the differences between short and long term capital flows.

106. See Beanstock (1981) op.cit. page 28 for a complete discussion of this issue.

107. See Cuthbertson, Henry, Mayes, Savage (1981) where the reduced form approach is criticized.

108. See for instance, Currie (1981).

109. See for instance McGregor (op cit) and Tacoyama (1980).

110. See Currie (op cit) and Tacayame (op cit)

111. See Tacayame (op cit) for a full exposition. The econometric methodology is explained by McGregor (op cit)

112. The model is a resemblance of other portfolio balance models, see inter alia Koury & Porter (1974), Herring & Horston (1977) Marston (1985), Dornbusch (1975).

113. Let us note that there is a relation between private sector foreign assets accumulations and public sector foreign debt. See inter alia Dornbusch (1984), Cuddington (1984)(1985), Khan (1985), Kharas (1986).

114. See for instance Currie (1980) op cit.

115. Data for non-banking private sector bank deposits off-shore is collected by IMF from 1981.

116. Refer to Data Appendix.

117. See Engle and Granger (1985).

118. See Avramoric D (1964) and Nikbakht E (1983) for a rationalisation of both measures, capital and incremental capital output ratio.

119. See Table for Diagnostic and selection criteria.

120. See for instance Beenstock et al (1983).

121. For OECD countries is has always been mentioned that the elasticity is unit. However Beenstock et al (op cit) found that the elasticity is even larger.

122. See Keynes General Theory, and Sargent (1978) and Hall (1978).

135. Following Dornbusch and Fisher (1983)

136. See Thomas (1985) for similar result.

137. These results are drawn from Thomas (1985) op.cit.

138. We follow Dornbusch and Fisher (1981).

139. See Thomas (1985) op.cit. p. 253.

140. Which is a good proxy if the economy is in full employment and markets are competitive (see Fisher (1983). op.cit.

141. See Bean (1982) for a derivation of the investment function

142. The long run (proportionality) is given here by log I_t - log B + Y_2.

143. See Fisher (op cit) for an extended discussion of this aspect factors.

144. See Tobin's model of money and economic growth, Tobin (1965).

145. See Taylor (1983), Von Wijmbergen (1983), 1985), Chang and Jung (1984) inter alia for extended discussion regarding policies within a structurist framework.

146. In a later paper, McKinnon (1984) reinforced his original proposition by introducting strong control over government expenditure in order to avoid the perverse effects of increasing budget deficits and the financial liberalisation.

147. With respect to the relaxation of interest rate ceilings and its effects on private sector investments, Currie and Anyadike (1980) comment that investment could not necessarily be estimated by the new stream of savings, since if deposit and active rate move in tandem under financial repression conditions, and increase in the deposit rate and in the active rate could reduce owns investors internal

funds more than the increased savings (credit). Thus the net effect of a depressed interest rate could reduce price investments, due to the burden of higher loan rates. The relevant aspect here is how the liberalisation of interest rates affects the undistributed profits.

148. The complementary between money and physical capital (McKinnon (1973) p. 60), and which is expressed as a demand for money function $M/P = f(Y, I/H, ir)$, ir is real interest rate and where $f_1 > 0$; $f_2 > 0$ and $f_3 > 0$ and $I = g\ (ir, Y)$ where $g_1 > 0$ and $g_2 > 0$.

149. See Blejer and Khan (1987) where the model is developed in full.

150. Recall the two-gap theory of excess domestic demand.

151. See for instance Davies (1986) op.cit.

152. See Hendry (1981).

153. However, it can be argued that the natural rate of unemployment is relatively higher in LDC than in developed countries.

154. See Phillips (1958), Lipsey (1978) and Tobin (1972) and Santomero and Seater (1978) for an extensive survey.

155. Note that the value for $\emptyset$ to be $0_{T}\emptyset<L$ gives the shape of the Phillips Curve. So the national rate hypothesis can be considered to be an extreme assumption.

156. See Beggs D (1982) for an extensive and formally elaborated introduction into this literature.

157. The 'standard' literature in this aspect examines the short-run relationship between inflation and growth. These models have been developed from the Lucas and Ropping's Phillips Curve. See Hanson (1980), Barro(1978).

158. See Subrata Getak (1986) for a criticism of such stabilisation programmes.

159. See Van Wijnberger (1982), Taylor (1980)(1983) inter alia.

160. See Breser Pereira and Nikomo (1984) for a review of structuralist or inertial inflation.

161. See Tobin (1972).

162. See Ize and Salas (1985).

163. The main argument in Blejers' model is that, even in the short-run there can be large deviations from the extreme assumption of purchasing parity as in Johnson. Accordingly monetary disequilibria will affect the balance of payments and relative prices. (Blejer M (1977).

164. It is obvious what modifications could be introduced to Blejer's monetary model. However as we can see from the structure of our model, by introducing the relevant modifications the model is not any more a monetary one.

165. See Ize and Solas (1985) for a complete derivation of price inflation equation , which is a reduced form derived from a production function.

166. The 'special case' prove variability theory of inflation usually incorporates goods price in the equation as a structural determinant.

167. See D Hoffman (1986).

168. See Bresser Preira (1984), Bressor and Nikono (1988) for an extended discussion of "inertial" inflation.

169. We have tried to differentiate in the text, the notion of structural and structuralist, which is analogous to the monetary and monetarist definition.

170. See for instance Subrata Gatak & Ayisa C (1987).

171. The lack of data precluded him from investigating the inflation according to such theoretical models.

172. See Hojman D (op cit) and the references therein.

173. I do not report them, since the causality tests are inconclusive.

174. See Freidman M (1975, 1977).

175. See Begg D. et al 1984.

176. See Leijon Finfrud (1968) for instance.

177. (?)

178. See Davies (1985) for a complete explanation of the mark-up wage issue.

179. See Modgliani and Paulo Schioppa (1978) and Spinelly (1980) for an analysis of Italian labour market, in which wage bargaining agreements plays an important role in the determination of wages.

180. See Hall et al (1983) "Wages and Prices" in A Bretton (eds) H.E.B. London and Nickells .S (1982)

181. See Hall et al (1983) for a survey of bargaining models in the context of an industrialised country, the UK and the references therein.

182. Hojman's (op cit) minimum wages effects are achieved by inverting the augmented Phillips curve and solving for real wage.However,itsminimum wage hypothesis does not take into account more general postulates of 'hybrid' models where real wages can be estimated even in the presence of market disequilibrium .

183. The indexation rule (or wage contingence) based on past inflation reflects the inefficientuse of available information define the agents behaviour (government, price to employers and workers as backward looking.

184. Note that Frankel (op cit) asserts that the theoretical reasons behind this 'Phillips Curve' model is just an analogy to the actual Phillips curve model. He in fact developed an alternative theory which, not surprisingly, yields the same empirical characterisation.

185. Even though we ought to mention that analogous as the structuralist analysis of inflation, the structuralist models are different versions of Okum Sap and others 'structural' variables. See Lopez (1983) for instance

186. See Corbo V (1974)

187. See Nugent J (1982) for a anti Phillips Curve approach to less developed economies, on the grounds that results could be even the opposite of Phillips' Curve ones.

188. See Sargent (1980) for instance. The disequilibrium term may indicate was well the initial inflation given to the indexation rule or scheme.

189. See Isard P (1977) and Hoggarth P (1983) for instance.

190. Layard and Nickell (op cit), and Nickell (op cit) argue that there is a strong empirical support for the presence of real wage effects.

191. See Wallis et al (1984) for a review of empirical models in the UK.

192. See Taylor (op cit) for a detailed demonstration of the invalidity of the neo-classical labour function.

193. See Rosen and Quandt (1978, 1985, 1987) for detailed presentation of disequilibrium model.

194. See Heady (1986) for an alternative approach with regard to labour market in less developed countries.

195. We have followed Layard and Nickels (1985) in the derivation of the employment function.

196. See for instance Pessarides (1987) for a demonstration of the ambiguity effect of technological progress.

197. See Appendix for a review of the econometric methodology used elsewhere in this thesis.

198. See, for instance, Cuthbertson K (1986).

199. See Cuthbertson (op cit) for a complete analysis of such kinds of models.

200. See appendix for the definition of the monetary and financial aggregates.

201. For an extended analysis of the transmission mechanism of monetary policy see for instance Goodhart (1982).

202. See Chapter III, IV, V and the investment function in this chapter where the literature is reviewed.

203. See our portfolio balance model in Chapter IV

204. See Cuthbertson (op cit) for instance.

205. See Fry (1988) op cit for an impressive survey in this literature.

206. See our discussion of the repressed economics model in the section devoted to the investment function, and in Chapter III.

207. Most of those studies estimate a static form of the demand for money partial adjustment. We know that this assumption could invalidate and restrict the dynamics of other exogenous variables.

208. These results are somehow confirms the rejection of the monetarist presumption of money affecting prices,using Venezuelan data.

209. However we did not find prices (inflation) have any effect in the demand for money, so weakening the assumption of precautionary motives, which in conditions of less developed economies is measured by including inflation (Cordozo 1983).

210. See Butler et al (1979) for a model of money stock control using an expanded multiplier approach.

211. The high powered money or monetary base consists of those assets which constrain the process of bank credit creation.

212. By totally differentiating the above equation we are able to decompose the variation of the multiplier.

$$\frac{dm2}{dm} = \frac{(t+1)(r-1)}{(C+t+1)(c+r(t+1))} * dc - \frac{c-rc}{(c+t+1)(c+r(t+1))} * dt - \frac{t+1}{(c+r(t+1))}$$

where the above equation relates proportional change in the multiplier to variation on the currency, time deposits and reserve ratios.

213. Bank reserves can be further decomposed into required reserves set by monetary authorities, and free reserves, subject to the bank's own decision.

214. Government institutions are requested to hold their deposits mainly in commercial banks, both private and public sector owned.

215. Usually these public sector banks engage in granting loans for investment at subsidises interest rates but rarely for every day business activity.

216. See for instance Branson(1978).

217. Government expenditure in our model is composed of central government expenditure (budget). Government corporations and public sector corporations are assumed to behave as private enterprises. Nevertheless government expenditures include transfer to some of these public sector corporations. What concerns us here are the budget effects.

218. The discussion of this topic has increased in the last years. See inter alia Greenaway (1980) (1981)(1984)(1987),Hitiris T and Weeks (1987) and the refferences therein.

219. The underlying process is well known: import substitution.

220. Conversely when import taxes are eliminated, are argument is to compensate the effects of supply side bottleneck and its disturbed inertial inflation effects. Thus the imporsition of tariffs has the effect of revaluation of the exchange rate, which in very open economies has anti-inflationary effects.

221. See Currie D (1976) for instance.

Chapter 6

222. See Cuthbertson (op cit) and Beenstock M (op cit) Pages 1-2 Indeed there are no illogical inconsistencies between both approaches.

223. The mentioned links can be shown for instance in the following table, which refers to the supply and demand on the market for goods and services. Thus:

Supply		Demand
-domestic production	-consumer goods	private & public consumption
	-investment goods	private & public investment
-imports	-raw materials	exports of oil and non oil

224. Recall our discussion of Chapter IV in the section where the theoretical framework of the model is developed.

225. See for instance Granger and Newbold (1987), Chapter 8.

226. However this measure does not seem to be unbiased in exhausting 'good' model performance. Granger and Newbold (1987) asserts that the expected value of MSE is minimised as the value of T^2 is maximised provided variations are fixed. However, the length of the sample relies in using MSE and derivations of it.

227. Graphics representations are presented for selected variables for the periods, 1965-1987.

228. The crucial point here is that it is assumed that agents form its expectations rationally.

229. See for instance, Pesaran (op cit), Henry and Wren-Lewis (1984).

230. See for instance Wallis et al (op cit) page 10.

231. In spite of the theoretical proposition in favour of causality direction from money to prices; it is likely that such theoretical propositions must be evidenced empirically. See Chapter V for a review of this literature.

232. See Chapter V above .

233. However this did not preclude us from exercising a bond financing policy by inverting money demand.

234. However the model offers an alternative way of deriving money financing effects on prices. If we assume that power purchasing parity we could endogenise import price equation and solve the model for exchange rate. In addition interest rate would drop in line with a money financing policy. There will be an induced effect on domestic prices as exchange rate depreciates. For the purpose of this thesis those links are severed.

235. Even though we have carried out a policy experiment, bond financing by solving the demand for money for interest rate.

236. Due to the fact that bond sales are totally exogenous we are in a situation in which government policies involve physical crowding out since banking and non-banking institutions are compulsory to the new debt issue.

237. See Wallis et al (1985) page 37.

238. Institutional factors allow higher oil prices to increase government revenues. Government tax oil exports. Its revenues are linked to the value of oil exports. They constitute the larger tax revenues of central government.

239. Recall our discussion in Chapters IV and V on the issue.

240. The debate about the shape of effects of a devaluation is still inconclusive. Some authors have argued that the likely improvement in competitiveness, devaluation could even produce stagnations under certain monetary and fiscal policy stance. This issue has been recently discussed in particular following the IMF policies to increase the level of reserves of debtor countries, eventually to improve its payment position. The evidence showed that countries with large devaluation experimented strong recession.

241. See Wallis et al (1955) (1987) (1988) where can be found detailed and alternative definition of macroeconomic policies from a modelling point of view.

242. In particular, we emphasise that there is not an automatic mechanism through which government expends all proceeds implied in higher oil prices. Similarly if those proceedings are not monetized they are kept in a special account in the Central Bank out of the monetary base.

243. This issue of policy simulation dependence has been treated extensively in Hesselman and Davies (1983).

244. See our discussion in Chapter IV.

Footnotes Ch.7

245. See Davies (1986) op cit and Helliwell (1986) for alternative solutions developing supply side blocks.

246. The econometric methodology developed by Hendry and associates implies that an important aspect of the model building process is to encompass alternative results or findings. Unfortunately, since there is no economic building tradition in Venezuela, we could not compare our findings.

247. See our review of structuralist assumptions in Chapter V.

248. See our discussion above and the review of the literature on repressed financial models and the complementary hypothesis in McKinnon (1964) op cit.

249. See Thirlwell A P of Nureldin H (1981), Feldstein M (1983), Dooley, Frenkel and Mathison (1986) inter alia.

250. See Chapter III above for a discussion of that model.

251. This can be measured by a depreciation in the ex-rate.

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APPENDIX 1
The Econometric Modelling Methodology

Economic modelling is considered as an attempt to define the data properties in simple parametric relationships which remain reasonably constant over time.

In the estimation of individual equations a crucial aspect is the econometric methodology through which parameters are estimated. The focus is on the estimation of constant parameter representation, since empirical models are defacto reductions of the data generation process. They are a derived process.

The general outcome of an econometric study should be interpreted as designing a testable representation of the data generation process in which the trade off between theory and data is produced in the empirical model. This approach is crucial for the definition of the dynamics in the model since it is known that the theoretical model usually does not predict the dynamics of economic process (the lag structure) as defined on priory grounds above by testing down specification will generate the invalid (valid) restrictions. The process starts by estimating a statistical model on which the empirical model (theoretical parameters) can be derived. By testing for misspecification we can obtain a parsimonious model where it can been solved from the systematic and non-systematic components (residual autocorrelation). The statistical model which contains the parameters of interest on which the theoretical parameters can be derived as functions of the former and should be tested for collinearity, exogeneity and validity of restrictions, normality, homocedasticity, functional form. Specifications testing follow since the statistical parameters have very little economic interpretation,[252] because "when tested for any misspecification and none of the underlying assumptions are rejected can only be interpreted as providing a convenient summarisation of the sample information" (Spano 1987, p.579).

When defining the empirical (econometric) model, economic theory tells us the estimable form of the theoretical model by considering the data used to estimate the probabilistic model. Specification search will generate such desired empirical model theory consistent. The reparameterised model should have the same statistical properties ofthe statistical model; e.g. independence, normality, functional form, homocesticity

In addition to these there is an important issue to which the estimated empirical model should accomplish since econometric models are usually used for policy analysis and prediction. Thus the model should be tested for parameter constance and predictive ability. This task is usually carried out by estimating recursively in order to capture the behaviour of estimated (theoretical) parameters along the sample period, even though the information can be summarised by specific tests. Similarly, testing the forecasting ability is summarised by respective diagnosis.

The economic procedure outlined above ensures that theory and data interact to produce a parsimonious theoretic model in which data plays an important role. Such econometric methodology has become a powerful approach to estimating the model in less developed economies where data, sometimes of doubtful quality in some cases, would not encompass established theoretical constructs in central (developed) countries. (See the empirical estimates of the model's equation and the theoretical aspects reviewed in Chapter V).

The methodology outlined above has been developed by Hendry and associates (see DHSY (1978), Hendry and Mizon (1978, 1980), Hendry (1983)(1987)).

In summary, obtaining and evaluating the econometric model can be systematised by the concepts below. Searching dynamic specification of the general linear model usually starts from the following dynamic relationship:

$$\log Y_t = a(L) \log Y_t + k_0 \log X_t + k_1(L) \log X_t + u_t$$

where X_t and Y_t are exogenous and endogenuous variables at time t, respectively, and k(L) and a(L) are log polynomials of degree m and n, i.e.

$$k(L) = \sum_{i=1}^{m} k_i L^i$$

$$a(L) = \sum_{i=1}^{n} a_i L^i$$

L being the lag operator and u_t is the disturbance white noise.

As a by-product of above models the error correction model[253] always implies the reparameterisation of the above expression, which involves the "imposition" of restrictions. The error correction representation (models) can be motivated as a way of formalising an optimising behaviour of economic agents in the presence of costs of adjustment (Nickell (1985)). Assuming that proportionality between X and Y exists the above (ADL) model can be interpreted as representing an error correction mechanism thus:

$$\Delta \log y_t = \alpha_0 + a\ \alpha_1\ \Delta \log x_t + \alpha 2_0 \log (y/x)_{t-1} + e_t$$

where $\log(y/\alpha)_{t-1}$ express proportionality assumption implicit in the agents' optimising behaviour.

That expression implies (economically) that in the short-run, i.e. for given trend values, a deviation of y_t from its trend affects x_t deviation from its trend. However, in the long run, this error correction model imposes a restriction on the ratio between the two level values; reflected by the long run solution (Y = KX). The usefulness of the error correction representation is that usually economic theory(non-stochastic equilibrium) implies proportionality between the variables (e.g. consumption and income, investment and capital, money and income, wages and prices, and so on), where the short-run impact is given by $a_0\ \Delta \log X_t$. The error correction term or long run representation given by $\log (y/x)_{t-1}$ reflects the effect on $\Delta \log y_t$ of having y_{t-1} deviating from it trend value with $\log x_{t-1}$.This representation of long run behaviour (always a theoretical abstraction) by means of an error correction mechanism arises from considering the time series properties of data (Engle and Granger (1987), Hendry (1986)), since they show trends. The underlying statistical and economic aspect is formalised by Granger (1981) since economic variables (usually trending) are integrated in order r (I(n)) if their r-th differences are stationary. Error correction models are in practice, special cases. Note that we did not carry out the necessary contigration testing. However significant error correction models imply and indicate tests for cointegration between variables (see Hendry D and Ericksson N (1987)).

The general to specific specification which, as seen above, involves as a special case the formalisation of error correction models generate the parsimonious (reparameterised) model in which the empirical model is represented. The evaluation and selection criteria must be satisfied by that empirical model. Those criteria widely accepted constitute the necessary conditions to accept empirical models as being plausible representation of economic life. In what follows there is a systemisation of these evaluation criteria.

These criteria are random residuals (white noise and innovation residuals), exogeneity, parameter constancies, theory consistencies, data admissibility, validity of restrictions, homocedasticity, normality, predictive ability, economic interpretation of parameters, function form and encompassing.[254]

1. White noise residuals is a necessary condition for data coherence, since they reflect absence of systematic lack-of-fit. Residuals should be random. An appropriate test for the null of no autocorrelation in the residuals is the Lagrange Multiplier (LM) test, calculated by the ancillary regression of the residuals on all the regressors of the original model and the lagged residual.

In its χ^2 form, the statistic is distributed as $\chi^2(r)$, $Z_1 = TR^2$ and in an F form, $F_1 = \frac{T-k-r}{r} \cdot \frac{R^2}{1-R^2}$ distributed as $F(r_1)_{T-k-r}$ where R^2 is obtained from the ancillary regression mentioned above

A white noise process could be predictable from other information, particularly from the past values of the variables in the empirical model. A complementary criterion is innovation. This criterion implies that residuals are not predictable in any sense. Testing for innovation can be done by using Engle's (1982) test for autoregressive conditional hetrocedastricity (ARCH), RESET Ramsey's (1969) test and LM for r-th order residual autocorrelation of Harvey (1981).

Harvey's test for residual correlation of r-th order is the LM form distributed as $\chi^2(r)$. In its F form it is written as :

$Z_2 = \frac{t-k-r}{r} \frac{(\chi^2(r))}{T^{-1}}$ distributed assumptionally as F_2, k-k-r)Harvey 1981).

The autoregressive conditional hetrocedastricity (ARCH) due to Engel (1982) is calculated by computing an LM statistic for the test of ki=0 in the ancillary regression

$$(Z_3 = TR^2)\text{: } E(e_t^2/e_{t-1}) = e_t^2 = a + \sum_{i=1}^{p} k_i\, e_{t-i}^2 + U_t \text{ where } R^2 \text{ is}$$

obtained from the regression of $\hat{e}_t$ on constant and $\hat{e}_{t-1}$ and is assumptionally distributed as $\chi^2(1)$ if $K_1 = 0$ (Pesaran 1985). The RESET (Z_4) test for functional form, Ramsey (1969) is similar to those above (given in LM and F forms, but based on the square of fitted values.

Innovation criteria can be also tested by the same statistics used to test the validity of restrictions, that is an F test of joint significance of additional parameters in the unrestricted model which is excluded in the restricted model, that is:

$$Z_5\ F = \frac{RSSR - RSSU)/n)}{RSSU/T-k}$$

where n is the number of additional parameters and k the number of variables in the unrestricted model.

Z_5 is distributed as F(n,Fk) under the null of that n additional parameters have zero coefficients. Harvey (1981) derived this test from the Wald and Likelihood principles when restrictions are linear.

Furthermore, hetrocedasticity can be tested by White (1981) and it is a simple test of the homocedesticity assumption. In LM form it is a test of k = 0 in the model

$$E(e_t^2) = k_t^2 = k^2 + k\ (x_t^1 a)^2$$

which is tested on the ancillary regression $e_t = k + a\hat{y}_t$

The normality of the errors, necessary condition for the validity of estimates is done by Jargue-Bera (1980) test in both LM and F test (Z_6).

All above tests are reported both in LM and F forms have the same distribution asymptotically; LM is distributed as an x^2 and the F form which is sometimes referred to as an "LMF" or "modified LM" is more generally preferable for small samples than the LM versions (Kiviet (1986)).

Since the model is required for forecasting or policy analysis we should test for predictive ability and for parameter constancy.

As mentioned earlier parameter constancy is required for valid interference; because the model must be interpretable if any change occurs. For this purpose we would estimate recursively through the sequence of estimated coefficients over time and via the associated Chow statistic (Chow (1960), Pesaran (1985). This test aims to test the null that $a_1 = a_2$ conditional on having equal variances (Z_7).

The Chow statistic in F form is distributed as an $F(K_1\ T_1 + T_2 - 2k)$ and its LM version is computed as $\chi^2(r) = kFss - x^2(k)$ (Pesaran 1985) In other words

$$Z_7 = \frac{\left[\sum_{t=1}^{T} N_t - \sum_{t=1}^{T_1} N_t\right] T_2}{\sum_{t=1}^{T_1} V_t^2 / T_{1-K}}$$

where T1 and T2 are the number of observations in the estimation period and in the "forecast" period (T = T1 + T2) and V_t are the prediction errors.

The predictive ability of the empirical model should be tested by means of the same Chow test (See Pesaran (1985)). It is computed in its F form as follows:

$$F = \frac{(e_0'e_0 - e_1'e_1)}{e_1'e_1/R_{1-K}} \text{ distributed as } F(T_2, T_{1-K})$$

where e_0 is the OLS residual from the regression of Y_0 on X_0. That is, the first and second sample period together, and e_1 is the OLS residual of the regression of Y1 on X1. That is, the first sample period.

The LM version is computed as

$$X^2 = T_2\ F_{PF}\ .\ \text{distributed } X^2(T2)$$

Other criteria such as valid conditioning, weak and strong exogeneity are not reported in this thesis. However they can easily be derived as they are implied by the parameter constancy criterion.

Finally the model should be evaluated for theory consistency and test for admissibility criteria. The former requires that an empirical model should reproduce the theory from which the statistical (static) model has been derived. The latter implies that the model should be able to predict which does not violate definition constraint. (Hendry and Ericksson (1985) p.10).

APPENDIX 2: BEHAVIOURAL EQUATIONS, IDENTITIES AND BRIDGE EQUATIONS

1- OIL PRODUCTION (MILLION BARRELS)

$$\begin{aligned}\text{Log(OILPROD)}_t = & \underset{(-3.6777)}{-7.6643} + \underset{(7.8167)}{1.9610}\log(\text{GDPOECD})_t - \underset{(-6.1797)}{0.2056}\log(\text{OILPRICE})_t \\ & + \underset{(2.1464)}{0.0409}\log(\text{NRESERV})_t - \underset{(-8.5543)}{0.0878}\text{TIME}\end{aligned}$$

$\bar{R}^2$		.9533
S.E. regression		0.0529
F(5,20)		123.36
Mean dep.var		6.9184
D-W		1.7186
Serial correlation	LM Test	$\chi^2(1) = 0.4141$; $F(1,19) = 0.3200$
Functional form	LM Test	$\chi^2(1) = 3.1105$; $F(1,19) = 6.1463$
Normality test	LM Test	$\chi^2(1) = 1.0481$
Heteroscedasticity	LM Test	$\chi^2(1) = 0.2781$; $F(1,23) = 0.2587$
ARCH test	LM Test	$\chi^2(1) = 1.4567$
Predictive failure test	F statistic	$F(7,14) = 2.7456$
Chow-stability Test	F statistic	$F(4,17) = 2.3389$

Estimation Period 1960-1984

2- AGGREGATED IMPORTS

$$\begin{aligned}\text{Log(IMPORTS)}_t = & \underset{(-4.4918)}{-8.5390} + \underset{(4.6519)}{1.1345}\log(\text{GDPREAL})_t - \underset{(-0.0134)}{0.00588}\log(\text{RELPRICE})_t \\ & + \underset{(0.6710)}{0.6710}\log(\text{IMPORTS})_{t-1} - \underset{(-7.57)}{0.0416}\text{TREND} - \underset{(-5.10)}{0.2417}\text{D} - \underset{(2.50)}{0.3049}\text{D}\end{aligned}$$

$\bar{R}^2$		0.9703
S.E. regression		0.0903
Mean dep.var		9.4639
Serial correlation	LM Test	$\chi^2(1) = 1.8533$; $F(1,19) = 1.40$
Functional form	LM Test	$\chi^2(1) = 0.0913$; $F(1,19) = 0.0647$
Normality test	LM Test	$\chi^2(1) = 0.5559$
Heteroscedasticity	LM Test	$\chi^2(1) = 0.1515$; $F(1,25) = 0.1410$
ARCH test	LM Test	$\chi^2(1) = 1.4134$

3- IMPORTS OF CAPITAL GOODS AND RAW MATERIALS

MODEL B

$$\Delta\log(\text{IMPKRER})_t = \underset{(-3.9029)}{-0.4717} + \underset{(-4.2315)}{2.8967}\Delta\log(\text{RELPRICE})_t + \underset{(2.8256)}{0.8638}\Delta\log(\text{DOMMAN})_t$$

$$- \underset{(3.6327)}{0.3400}\log(\text{IMPKRER/DOMMAN})_{t-1}$$

$$+ \underset{(4.2783)}{0.6047}\Delta\log(\text{IMPKRER})_{t-1} - \underset{(-3.6678)}{0.2994}D$$

$\bar{R}^2$		0.7087
S.E. regression		0.0710
F(5,20)		13.1652
Mean dep.var		0.0585
Serial correlation	LM Test	$\chi^2(1) = 0.1432$; $F(1,19) = 1.1052$
Functional form	LM Test	$\chi^2(1) = 0.9187$; $F(1,19) = 0.6959$
Normality test	LM Test	$\chi^2(1) = 0.0873$
Heteroscedasticity	LM Test	$\chi^2(1) = 0.5331$; $F(1,24) = 0.5027$
ARCH test	LM Test	$\chi^2(1) = 0.2916$
Predictive Failure test	F statistic	$F(7,14) = 3.1927$
Chpw-stability test	F statistic	$F(6,15) = 3.0116$

Estimation Period 1958-1984

4- CONSUMPTION OF DURABLES (REAL)

$$\text{Log(CONDURR)}_t = \underset{(-6.8352)}{-7.1112} + \underset{(3.5984)}{0.3386}\log(\text{CONDURR})_{t-1} + \underset{(7.5127)}{1.2092}\log(\text{YDISPR})_t$$

$$- \underset{(-7.9295)}{0.0597}\text{INTEREST} - \underset{(-4.9728)}{0.1836}D$$

$\bar{R}^2$		0.9851
S.E. regression		0.0651
F(4,19)		332.66
Mean dep.var		7.8296
D-H		0.4025
Serial correlation	LM Test	$\chi^2(1) = 0.1631$; $F(1,18) = 0.2291$
Functional form	LM Test	$\chi^2(1) = 1.5132$; $F(1,18) = 1.086$
Normality test	LM Test	$\chi^2(1) = 1.6412$
Heteroscedasticity	LM Test	$\chi^2(1) = 0.0188$; $F(1,22) = 2.9641$
ARCH test	LM Test	$\chi^2(1) = 0.00079$
Predictive failure test	F statistic	$F(7,13) = 3.1062$
Chow-stability test	F statistic	$F(4,16) = 0.9466$

Estimation Period 1960-1984

5- CONSUMPTION NON-DURABLES (PRIVATE)(REAL)

$$\Delta og(CONNDURR)_t = \underset{(-2.2786)}{-0.0350} + \underset{(2.0948)}{0.1406}\Delta log(YDISPR))_t - \underset{(-2.2593)}{0.0177}\Delta log(GEPRWS)_t$$

$$- \underset{(-5.7695)}{0.2261}log(CONNDURR/YDISPR)_{t-1} - \underset{(-5.0181)}{0.1143}DUMMY68$$

$$+ \underset{(2.3191)}{0.0295}log(RWEALTH/YDISPR)_{t-1}$$

$\bar{R}^2$		0.7478
S.E. regression		0.0219
F(5,19)		15.23
Mean dep.var		9.4639
Serial correlation	LM Test	$\chi^2(1)$ = 0.00014437; F(1,18) = 0.0010
Functional form	LM Test	$\chi^2(1)$ = 0.0421; F(1,18) = 0.0303
Normality test	LM Test	$\chi^2(1)$ = 0.4112
Heteroscedasticity	LM Test	$\chi^2(1)$ = 3.0897; F(1,23) = 4.4987
ARCH test	LM Test	$\chi^2(1)$ = 2.0849
Predictive failure test	F statistic	F(7,14) = 0.4176
Chow-stability test	F statistic	F(5,16) = 0.5718)
EstimationPeriod 1960-1984		

6- PRIVATE SECTOR REAL FIXED INVESTMENT

$$Log(INVPRIR)_t = \underset{(-0.4628)}{-0.0647} + 0.5032log(INVPRIR)_{t-1} + \underset{(3.8633)}{0.6517}log(GDPREAL)_{t-1}$$

$$- \underset{(-10.3243)}{0.1499}INTEREST_t - \underset{(3.6489)}{0.3913}log(DOMCRER/GDPREAL)_t$$

$$- \underset{(-5.6849)}{0.3141}D - \underset{(-2.8555)}{0.1648}D$$

$\bar{R}^2$		0.9787
S.E. regression		0.0745
F(6,25)		199.81
Mean dep.var		8.9434
D-H		-0.2465
Serial correlation	LM Test	$\chi^2(1)$ = 0.2674; F(1,19) = 0.1901
Functional form	LM Test	$\chi^2(1)$ = 0.0200; F(1,19) = 0.0141
Normality test	LM Test	$\chi^2(1)$ = 0.1515
Heteroscedasticity	LM Test	$\chi^2(1)$ = 0.0757; F(1,25) = 0.0703
ARCH test	LM Test	$\chi^2(1)$ = 0.2168
Predictive failure test	F statistic	F(7,14) = 3.1223
Chow-stability test	F statistic	F(6,13) = 3.0978
Estimation Period 1958-1984		

7- IMPORTS CONSUMPTION GOODS AND OTHER MANUFACTURES (REAL)

$$\log(IMPCGSR)_t = \underset{(-7.0804)}{-2.4057} + \underset{(16.0867)}{0.8655}\log(IMPCGSR)_t + \underset{(5.6752)}{0.3451}\log(YDISPR)_t$$

$$- \underset{(-2.5653)}{2.2250}\Delta\log(RELPRICE)_t - \underset{(13.3577)}{1.3043D} - 0.3021D$$

$\bar{R}^2$		0.9772
S.E. regression		0.0847+
F(5,21)		179.7104
D-H		0.0629
Serial correlation	LM Test	$\chi^2(1) = 0.000007$; $F(1,20) = 0.00005$
Functional form	LM Test	$\chi^2(1) = 1.1303$; $F(1,20) = 0.8738$
Normality test	LM Test	$\chi^2(1) = 0.4221$
Heteroscedasticity	LM Test	$\chi^2(1) = 1.0480$; $F(1,25) = 1.0095$
ARCH test	LM Test	$\chi^2(1) = 0.9930$
Predictive failure test	F statistic	$F(7,16) = 1.7798$
Chow-stability test	F statistic	$F(4,19) = 1.6923$

Estimation Period 1958-1984

8- IMPORTS OF CAPITAL GOODS AND RAW MATERIALS (REAL)

MODEL A

$$\Delta\log(IMPKRGR)_t = \underset{(-3.7363)}{-0.7033} + \underset{(5.3071)}{0.7347}\Delta\log(IMPKRGR)_{t-1} - \underset{(-7.8850)}{3.5563}{}^*\Delta\log(RELPRICE)_t$$

$$+ \underset{(2.1826)}{0.4675}{}^*\Delta\log(GDPREAL)_t - \underset{(-3.8122)}{0.3010}{}^*\log(IMPKRGR/GDPREAL)_{t-1}$$

$$- \underset{(-4.5503)}{0.3937}{}^*D - \underset{(-1.5350)}{0.1368}{}^*D$$

$\bar{R}^2$		0.7098
S.E. regression		0.0712
F(6,19)		179.7104
Mean dep.var		0.0585
D-H		-1.0704
Serial correlation	LM Test	$\chi^2(1) = 2.6562$; $F(1,18) = 2.0482$
Functional form	LM Test	$\chi^2(1) = 1.3897$; $F(1,18) = 1.0164$
Normality test	LM Test	$\chi^2(1) = 0.02040$
Heteroscedasticity	LM Test	$\chi^2(1) = 0.8136$; $F(1,24) = 0.7753$
ARCH test	LM Test	$\chi^2(1) = 0.0339$
Predictive failure test	F statistic	$F(7,14) = 3.1221$
Chow-stability test	F statistic	$F(6,15) = 2.9897$

Estimation Period 1958-1984

9- STOCKBUILDING PRIVATE SECTOR. INVENTORIES (REAL)

$$\Delta\log(\text{IMPORTS})_t = \underset{(3.7675)}{0.4833} + \underset{(2.4314)}{0.6843}\Delta\log(\text{GDPREAL})_t$$

$$- \underset{(-2.6111)}{0.0683}\log(\text{STOCKSR/GDPREAL}))_{t-1} - \underset{(-5.8556)}{0.0537}\text{INTEREST}_{t-1}$$

$$- \underset{(-5.26)}{0.0537\text{D}} - \underset{(-2.9781)}{0.2946\text{D}} - \underset{(-4.7670)}{0.2382\text{D}}$$

$\bar{R}^2$		0.8511
S.E. regression		0.0964
F(6,21)		26.7153
Mean dep.var		0.0856
D-W		1.7855
Serial correlation	LM Test	$\chi^2(1) = 0.2631$; $F(1,20) = 0.1897$
Functional form	LM Test	$\chi^2(1) = 2.0075$; $F(1,20) = 1.5447$
Normality test	LM Test	$\chi^2(1) = 0.8242$
Heteroscedasticity	LM Test	$\chi^2(1) = 0.7116$; $F(1,26) = 0.6781$
ARCH test	LM Test	$\chi^2(1) = 0.1308$
Predictive failure Test	F statistic	$F(7,16) = 2.5630$
Chow-stability test	F statistic	$F(6,17) = 2.4976$
Estimation Period	1957-1984	

10- LABOUR DEMAND

$$\text{Log}(\text{EMPLOY})_t = \underset{(3.0108)}{1.2257} + \underset{(2.8072)}{0.1039}\log(\text{GDPREAL})_t - \underset{(-1.9567)}{0.0884}\log(\text{WAGEIND/CEPRWS})_t$$

$$+ \underset{(18.3030)}{0.8709}\log(\text{EMPLOY})_{t-1}$$

$\bar{R}^2$		0.9972
S.E. regression		0.0157
F(3,25)		3329.6
Mean dep.var		14.9813
D-H		1.5499
Serial correlation	LM Test	$\chi^2(1) = 1.4517$; $F(1,24) = 1.2647$
Functional form	LM Test	$\chi^2(1) = 0.9683$; $F(1,24) = 0.8290$
Normality test	LM Test	$\chi^2(1) = 2.0055$
Heteroscedasticity	LM Test	$\chi^2(1) = 4.6198$; $F(1,27) = 5.1163$
ARCH test	LM Test	$\chi^2(1) = 1.0857$
Predictive failure Test	F statistic	$F(7,17) = 2.2410$
Chow-stability test	F statistic	$F(3,21) = 3.0715$
Estimation Period	1956-1984	

11- LABOUR SUPPLY

$$\text{Log(LABFOR)} = \underset{(0.1628)}{0.0179} + \underset{(2.0588)}{0.2627}\text{log(POP)} - \underset{(5.3242)}{0.7203}\text{log(LABFOR(-2))}$$

$\bar{R}^2$		0.9987
S.E. regression		0.00996
Mean dep.var		15.0808
D-W		1.4280
Serial correlation	LM Test	$\chi^2(1) = 0.0836$; $F(1,24) = 0.0719$
Functional form	LM Test	$\chi^2(1) = 5.5197$; $F(1,24) = 5.8828$
Normality test	LM Test	$\chi^2(1) = 25.76$
Heteroscedasticity	LM Test	$\chi^2(1) = 0.0544$; $F(1,27) = 0.0506$
ARCH test	LM Test	$\chi^2(1) = 0.7898$
Predictive failure Test	F statistic	$F(7,19) = 2.0014$
Chow-stability test	F statistic	$F(2,24) = 1.9324$

12- PUBLIC SECTOR EXTERNAL BORROWING (EXTERNAL INDEBTEDNESS)

MODEL A

$$\text{Log(DEBTR)}_t = \underset{(3.3534)}{1.9890} + \underset{(2.3485)}{0.2930}\text{log(GDPREAL)}_t - \underset{(-2.8103)}{0.2642}\text{log(EXPORTS)}_t$$

$$- \underset{(-4.9961)}{0.2178}\text{logDUMMY8082)} + \underset{(9.8677)}{0.7738}\text{log(DEBTR)}_{t-1}$$

$$- \underset{(-2.7216)}{0.2618}\text{log(KAPITALR/GDPREAL)}_t$$

$\bar{R}^2$		0.9196
S.E. regression		0.0574
F(5,19)		55.930
Mean dep.var		10.4524
D-W		1.0401
Serial correlation	LM Test	$\chi^2(1) = 0.5896$; $F(1,18) = 0.4347$
Functional form	LM Test	$\chi^2(1) = 0.0654$; $F(1,18) = 0.0472$
Normality test	LM Test	$\chi^2(1) = 0.8549$
Heteroscedasticity	LM Test	$\chi^2(1) = 0.3291$; $F(1,23) = 0.3068$
ARCH test	LM Test	$\chi^2(1) = 0.8896$
Predictive failure Test	F statistic	$F(7,14) = 2.2190$
Chow-stability test	F statistic	$F(6,12) = 3.1798$

Estimation Period 1960-1984

13- PUBLIC SECTOR EXTERNAL BORROWING

$$\mathrm{Log(DEBTR)}_t = \underset{(3.40)}{2.6761} + \underset{(2.25)}{0.2973}\log(\mathrm{GDPREAL})_t - \underset{(-3.28)}{0.3843}\log(\mathrm{EXPORTS})_t$$

$$+ \underset{(8.82)}{0.7939}\log(\mathrm{DEBTR})_{t-1} - \underset{(-2.75)}{0.4218}\log(\mathrm{I}/\Delta\mathrm{GDPREAL})_t$$

$\bar{R}^2$		0.8511
S.E. regression		0.0782
F(4,20)		35.28
Serial correlation	LM Test	$\chi^2(1) = 0.1729$; $F(1,19) = 0.1323$
Functional form	LM Test	$\chi^2(1) = 0.0627$; $F(1,219) = 0.0477$
Normality test	LM Test	$\chi^2(1) = 1.7994$
Heteroscedasticity	LM Test	$\chi^2(1) = 0.1244$; $F(1,23) = 0.1151$

Estimation Period 1956-1984

14- PRIVATE SECTOR FOREIGN ASSETS HOLDINGS

$$\Delta\log(\mathrm{FABS})_t = \underset{(-10.2441)}{-0.7898} + \underset{(6.0893)}{1.0968}{}^*\log(\mathrm{WEALTH})_t - \underset{(7.8148)}{0.0931}{}^*\log(\mathrm{RINTFOR})_t$$

$$+ \underset{(3.8197)}{0.2118}{}^*\log(\mathrm{FABS})_{t-1} - \underset{(-13.1483)}{0.4345}{}^*\log(\mathrm{FABS/WEALTH})_{t-1}$$

$$+ \underset{(-7.0491)}{0.4504}{}^*\mathrm{DUMMY61} - \underset{(-4.6765)}{0.3142}{}^*\mathrm{DUMMY73} - \underset{(-6.8151)}{0.2902}{}^*\mathrm{DUMMY77\text{-}79}$$

$\bar{R}^2$		0.9423
S.E. regression		0.0883
F(7,17)		56.940
Mean dep.var		0.2863
D-H		-1.4722
Serial correlation	LM Test	$\chi^2(1) = 2.7478$; $F(1,16) = 1.9758$
Functional form	LM Test	$\chi^2(1) = 1.4317$; $F(1,16) = 0.9720$
Normality test	LM Test	$\chi^2(1) = 0.7045$
Heteroscedasticity	LM Test	$\chi^2(1) = 1.2705$; $F(1,23) = 1.2315$
ARCH test	LM Test	$\chi^2(1) = 0.9971$
Predictive failure Test	F statistic	$F(7,14) = 2.3479$
Chow-stability test	F statistic	$F(6,12) = 2.2180$

Estimation Period 1960-1984

15- TARIFFS

$$\Delta\log(TARIFFS)_t = \underset{(-3.8622)}{-1.0373} + \underset{(3.2216)}{0.5237}{}^*\Delta\log(IMPORTS)_t - \underset{(-4.4202)}{0.5310}{}^*DUMMY83$$

$$- \underset{(-3.9229)}{0.3595}{}^*\log(TARIFFS/IMPORTS)_{t-1}$$

$\bar{R}^2$		0.8139
S.E. regression		10.11
F(2,22)		0.988
Mean dep.var		0.0637
D-W		1.5373
Serial correlation	LM Test	$\chi^2(1) = 1.7847$; $F(1,20) = 1.5375$
Functional form	LM Test	$\chi^2(1) = 0.6550$; $F(1,20) = 0.5381$
Normality test	LM Test	$\chi^2(1) = 2.0401$
Heteroscedasticity	LM Test	$\chi^2(1) = 0.7227$; $F(1,23) = 0.6847$
ARCH test	LM Test	$\chi^2(1) = 0.3676$
Predictive failure Test	F statistic	$F(7,15) = 1.4592$
Chow-stability test	F statistic	$F(3,18) = 1.3569$

Estimation Period 196o-1984

16- OIL INCOME TAXES

$$\Delta\log(OILTAX)_t = \underset{(-3.9084)}{-0.1930} + \underset{(4.2934)}{0.7145}{}^*\Delta\log(OILPRICE)_t - \underset{(3.9231)}{0.6294}{}^*\Delta\log(OILEXP)_t$$

$$- \underset{(-4.0089)}{0.1599}{}^*\log(OILTAX/OILEXP)_{t-1} - \underset{(-5.3410)}{0.5024}{}^*DUMMY81$$

$\bar{R}^2$		0.9265
S.E. regression		0.0910
F(4,19)		73.4847
Mean dep.var		0.1546
D-W		1.8416
Serial correlation	LM Test	$\chi^2(1) = 0.0846$; $F(1,18) = 0.0636$
Functional form	LM Test	$\chi^2(1) = 0.0000336$; $F(1,18) = 0.00002$
Normality test	LM Test	$\chi^2(1) = 0.2978$
Heteroscedasticity	LM Test	$\chi^2(1) = 0.3873$; $F(1,22) = 0.3609$
ARCH test	LM Test	$\chi^2(1) = 1.3862$
Predictive failure Test	F statistic	$F(7,13) = 1.3490$
Chow-stability test	F statistic	$F(4,16) = 1.2978$

Estimation Period 1961-1984

17- OTHER DIRECT INCOME TAXES (OTHER THAN OIL)

$$\Delta\log(OTHTAXDIR)_t = \underset{(-4.37)}{-2.3157} + \underset{(2.36)}{0.39765}\Delta\log(GDP) - \underset{(-4.54)}{0.6844}\log(OTHTAXDIR/GDPN)_{t-1}$$

$$- \underset{(-2.10)}{0.1619}D$$

$\bar{R}^2$		0.60
S.E. regression		0.0741
Mean dep.var		0.1262
D-W		2.06
Serial correlation	LM Test	$\chi^2(1) = 0.0838$; $F(1,15) = 0.0631$
Functional form	LM Test	$\chi^2(1) = 5.5550$; $F(1,15) = 5.7685$
Normality test	LM Test	$\chi^2(1) = 1.9135$
Heteroscedasticity	LM Test	$\chi^2(1) = 0.5454$; $F(1,18) = 0.5046$
ARCH test	LM Test	$\chi^2(1) = 0.9811$
Predictive failure Test	F statistic	$F(7,12) = 1.99$
Chow-stability test	F statistic	$F(3,16) = 2.71$
Estimation Period 1960-1984		

18- REAL MONEY, NARROW MONEY: CURRENCY PLUS DEMAND DEPOSITS (M1)

$$\Delta\log(M1/P)_t = \underset{(-7.66)}{-3.7064} - \underset{(-6.36)}{4.71335}\log(1 + INTEREST/100)_t$$

$$+ \underset{(7.91)}{0.3317}\log(GDPREAL)_t + \underset{(1.96)}{0.28204}\Delta\log(GDPREAL)_{t-1}$$

$$+ \underset{(6.76)}{0.4320}\Delta\log(EXRATE)_t$$

$\bar{R}^2$		0.8213
S.E. regression		0.0428
F(5,21)		24.8968
Mean dep.var		0.0490
D-W		1.6975
Serial correlation	LM Test	$\chi^2(1) = 0.6042$; $F(1,20) = 0.4578$
Functional form	LM Test	$\chi^2(1) = 0.4715$; $F(1,20) = 7.6519$
Normality test	LM Test	$\chi^2(1) = 0.3972$
Heteroscedasticity	LM Test	$\chi^2(1) = 0.3966$; $F(1,25) = 0.3727$
Predictive failure Test	F statistic	$F(7,14) = 3.68$
Chow-stability test	F statistic	$F(6,15) = 3.35$
Estimation Period 1958-1984		

19- PRICES LEVEL (GENERAL WHOLE SALE PRICES) (1)

$$\Delta \log(GEPRWS) = \underset{(-1.6406)}{0.0075} + \underset{(4.4616)}{0.1792}^{*}\Delta \log(WAGES) - \underset{(-4.8210)}{0.0959}^{*}\log(GEPRWS/WAGES)_{t-1}$$

$$+ \underset{(10.9446)}{0.8034}^{*}\Delta \log(IMPPRWS)_{t} - \underset{(-3.9228)}{0.0379}^{*}DUMMY6465$$

$\bar{R}^2$		0.9417
S.E. regression		0.0128
F(4,24)		114.098
Mean dep.var		0.0564
D-W		1.3973
Serial correlation	LM Test	$\chi^2(1) = 2.5903$; $F(1,23) = 2.2559$
Functional form	LM Test	$\chi^2(1) = 9.4158$; $F(1,23) = 11.05$
Normality test	LM Test	$\chi^2(1) = 1.9704$
Heteroscedasticity	LM Test	$\chi^2(1) = 0.6221$; $F(1,27) = 0.5919$
ARCH test	LM Test	$\chi^2(1) = 0.3405$
Predictive failure Test	F statistic	$F(7,18) = 2.0123$
Chow-stability test	F statistic	$F(4,21) = 3.8661$
Estimation Period	1956-1984	

20- PRICES (2)

$$\Delta \log(GEPRWS)_{t} = \underset{(-0.8205)}{-0.0047} + \underset{(3.1951)}{0.1780}\Delta \log(WAGES)_{t} - \underset{(-4.69)}{0.1168}\log(GEPRWS/WAGES)_{t-1}$$

$$+ \underset{(7.73)}{0.68}\Delta \log(IMPPRWS)_{t} - \underset{(0.9422)}{0.0299}\Delta \log(M1)_{t}$$

$\bar{R}^2$		0.90
S.E. regression		0.0162
F(4,24)		69.88
Mean dep.var		0.0564
Serial correlation	LM Test	$\chi^2(1) = 0.694$; $F(1,23) = 0.0552$
Functional form	LM Test	$\chi^2(1) = 12.6564$; $F(1,23) = 12.65$
Normality test	LM Test	$\chi^2(1) = 0.1335$
Heteroscedasticity	LM Test	$\chi^2(1) = 0.6095$; $F(1,27) = 0.5796$
ARCH test	LM Test	$\chi^2(1) = 2.0976$
Predictive failure Test	F statistic	$F(7,18) = 2.8897$
Chow-stability test	F statistic	$F(4,21) = 4.6244$
Estimation Period	1956-1984	

21- IMPORT PRICES

$$\Delta\log(IMPPRWS)_t = \underset{(-3.6019)}{-3.9568} + \underset{(6.2460)}{0.0063}^*\Delta\log(USAPRICES)_t + \underset{(4.6916)}{0.0029}^*\Delta\log(EXCHRATE)_t$$

$$- \underset{(-3.6198)}{0.4821}^*\log(IMPPRWS)/(USAPRICES)^*EXCHANGE)_{t-1}$$

$\bar{R}^2$		0.7273
S.E. regression		0.0240
F(3,25)		25.881
Mean dep.var		0.0602
D-W		1.6514
Serial correlation	LM Test	$\chi^2(1) = 1.0330$; $F(1,24) = 0.8864$
Functional form	LM Test	$\chi^2(1) = 0.3814$; $F(1,124) = 0.3199$
Normality test	LM Test	$\chi^2(1) = 0.9458$
Heteroscedasticity	LM Test	$\chi^2(1) = 0.2742$; $F(1,27) = 0.2578$
ARCH test	LM Test	$\chi^2(1) = 0.6707$
Predictive failure Test	F statistic	$F(7,19) = 2.3490$
Chow-stability test	F statistic	$F(3,23) = 2.2740$
Estimation Period 1956-1984		

22- WAGES

$$\Delta\log(WAGEIND)_t = \underset{(3.2307)}{0.0984} + \underset{(4.2316)}{0.8542}^*\Delta\log(GEPRWS)_t - \underset{(2.2120)}{0.2926}^*\Delta\log(WAGEIND)_{t-1}$$

$$- \underset{(-3.4806)}{0.0101}^*UNEMPR_t - \underset{(-3.1658)}{0.2962}^*(WAGEIND/GEPRWS)_{t-1}$$

$\bar{R}^2$		0.7128
S.E. regression		0.0369
F(5,28)		13.410
Mean dep.var		0.0659
D-W		-0.3379
Serial correlation	LM Test	$\chi^2(1) = 0.5837$; $F(1,19) = 0.4363$
Functional form	LM Test	$\chi^2(1) = 6.6637$; $F(1,19) = 6.5478$
Normality test	LM Test	$\chi^2(1) = 1.3975$
Heteroscedasticity	LM Test	$\chi^2(1) = 2.2163$; $F(1,24) = 2.23$
ARCH test	LM Test	$\chi^2(1) = 0.1191$
Predictive failure Test	F statistic	$F(7,14) = 1.9879$
Chow-stability test	F statistic	$F(5,16) = 1.6745$
Estimation Period 1959-1984		

23- TIME DEPOSITS (REAL)

$$\log(TIMDEPR) = \underset{(-3.9121)}{-4.6154} + \underset{(3.9507)}{0.6642}{*}\log(GDPREAL) + \underset{(2.0245)}{0.0194}{*}INTEREST$$

$$- \underset{(-2.7184)}{0.0123}{*}INFLATION + \underset{(7.8687)}{0.7021}{*}\log(TIMDEPR(-1))$$

$$- \underset{(-2.1399)}{0.0991}{*}DUMMY82/83$$

$\bar{R}^2$		0.9949
S.E. regression		0.0629
F(5,18)		890.496
Mean dep.var		8.9727
D-W		0.2051
Serial correlation	LM Test	$\chi^2(1)$ = 0.00045; F(1,17) = 0.00031
Functional form	LM Test	$\chi^2(1)$ = 0.9656; F(1,17) = 0.7127
Normality test	LM Test	$\chi^2(1)$ = 0.8071
Heteroscedasticity	LM Test	$\chi^2(1)$ = 0.4605; F(1,22) = 0.43
ARCH test	LM Test	$\chi^2(1)$ = 0.0347
Predictive failure Test	F statistic	F(7,12) = 3.0298
Chow-stability test	F statistic	F(5,12) = 3.0121

Estimation Period 1961-1984

24- TIME DEPOSIT RATIO (TIME DEPOSITS/ DEMAND DEPOSITS)

$$\log(T) = \underset{(-3.61)}{-0.1869} + \underset{(9.09)}{0.7675}{*}\log(T)_{t-1} + \underset{(5.45)}{5.0813}{*}\log(1 + INTEREST/100)_t$$

$$- \underset{(-3.11)}{0.0149}{*}INFLATION_t - \underset{(-5.89)}{0.3841}{*}DUMMY83/84$$

$\bar{R}^2$		0.9420
S.E. regression		0.0843
F(4,24)		114.751
Mean dep.var		0.1070
D-W		0.6771
Serial correlation	LM Test	$\chi^2(1)$ = 0.7699; F(1,23) = 0.6272
Functional form	LM Test	$\chi^2(1)$ = 0.2816; F(1,23) = 0.2255
Normality test	LM Test	$\chi^2(1)$ = 0.1915
Heteroscedasticity	LM Test	$\chi^2(1)$ = 0.9139; F(1,27) = 0.8786
ARCH test	LM Test	$\chi^2(1)$ = 0.0357
Predictive failure Test	F statistic	F(7,19) = 1.4256
Chow-stability test	F statistic	F(4,21) = 1.4098

Estimation Period 1956-1984

25- CURRENCY RATIO (CURRENCY IN CIRCULATION/ DEMAND DEPOSITS)

$$\log(C) = \underset{(3.2855)}{5.0230} - \underset{(-3.3729)}{0.5236}{*}\log(GDPREAL)_t + \underset{(2.1455)}{0.3849}{*}\log(C)_{t-1}$$

$$+ \underset{(2.7579)}{2.4748}{*}\log(1 + INTEREST/100)_t - \underset{(-4.1447)}{0.2834}{*}DUMMY83/84$$

$\bar{R}^2$		0.9100
S.E. regression		0.0948
F(4,24)		71.76
Mean dep.var		-0.8432
D-W		2.1065
Serial correlation	LM Test	$\chi^2(1) = 0.5670$; $F(1,23) = 0.4548$
Functional form	LM Test	$\chi^2(1) = 2.6089$; $F(1,23) = 3.2640$
Normality test	LM Test	$\chi^2(1) = 6.3725$
Heteroscedasticity	LM Test	$\chi^2(1) = 0.3791$; $F(1,27) = 0.3577$
ARCH test	LM Test	$\chi^2(1) = 0.2512$
Predictive failure Test	F statistic	$F(7,13) = 1.6834$
Chow-stability test	F statistic	$F(4,16) = 1.5893$

Estimation Period 1956-1984

26- RESERVE RATIO (BANKS RESERVES/ BANK DEPOSITS)

$$\log(R)_t = \underset{(-2.2031)}{-0.4272} - \underset{(-4.0427)}{0.1297}{*}\log(REQRES)_t - \underset{(-2.9678)}{3.0868}{*}\log(DISCOUNT)_t$$

$$- \underset{(-2.2654)}{0.2236}{*}DUMMY75 - \underset{(-2.1543)}{0.1461}{*}DUMMY82/83$$

$\bar{R}^2$		0.8774
S.E. regression		0.0957
Mean dep.var		-1.6412
D-W		1.5553
Serial correlation	LM Test	$\chi^2(1) = 1.2823$; $F(1,22) = 1.0559$
Functional form	LM Test	$\chi^2(1) = 3.7130$; $F(1,22) = 3.36$
Normality test	LM Test	$\chi^2(1) = 13.783$
Heteroscedasticity	LM Test	$\chi^2(1) = 1.4306$; $F(1,26) = 1.4000$
ARCH test	LM Test	$\chi^2(1) = 0.9788$
Predictive failure Test	F statistic	$F(7,17) = 2.3489$
Chow-stability test	F statistic	$F(4,20) = 2.2973$

Estimation Period 1957-1984

27- NON-OIL EXPORTS (REAL)

$$\Delta\log(RNOOILX)_t = -1.7412 + 0.6815^*\Delta\log(GDPREAL)_t + 0.0541^*\Delta\log(RELATIVPRICE)_t$$
$$+ 0.4732^*\Delta\log(RNOOILX)_{t-1} - 0.5315^*\log(RNOOILX.NOILGDPR)_{t-1}$$
$$+ 0.6224^*D - 0.1802^*D$$

$\bar{R}^2$		0.9299
S.E. regression		0.0564
F(6,18)		35.0691
Mean dep.var		0.0285
D-W		-0.8062
Serial correlation	LM Test	$\chi^2(1) = 1.1983$; $F(1,17) = 0.0235$
Functional form	LM Test	$\chi^2(1) = 3.2428$; $F(1,17) = 4.7854$
Normality test	LM Test	$\chi^2(1) = 0.4473$
Heteroscedasticity	LM Test	$\chi^2(1) = 0.0968$; $F(1,23) = 0.4808$
ARCH test	LM Test	$\chi^2(1) = 1.8726$
Predictive failure Test	F statistic	$F(7,12) = 1.7889$
Chow-stability test	F statistic	$F(6,13) = 2.0102$

Estimation Period 1960-1984

28- DOMESTIC OIL CONSUMPTION (MILLION BARRELS)

$$\log(DOOILCON) = \underset{(-4.1615)}{-0.2259} + \underset{(7.1612)}{0.7653}^*\log(DOOILCON)_t - \underset{(3.121)}{0.16033}^*\log(GDPREAL)$$
$$+ \underset{(2.87)}{-0.0970}^*\log(RPDOM)$$

$\bar{R}^2$		0.976
S.E. regression		0.048
Mean dep.var		4.4375
D-W		0.47266
Serial correlation	LM Test	$\chi^2(1) = 0.7587$; $F(1,23) = 0.1615$
Functional form	LM Test	$\chi^2(1) = 2.3756$; $F(1,23) = 0.0794$
Normality test	LM Test	$\chi^2(1) = 0.9876$
Heteroscedasticity	LM Test	$\chi^2(1) = 0.5436$; $F(1,22) = 0.1690$
ARCH test	LM Test	$\chi^2(1) = 2.3543$
Predictive failure Test	F statistic	$F(7,17) = 3.2123$
Chow-stability test	F statistic	$F(3,21) = 2.9897$

Estimation Period 1958-1984

Identities and Bridge Equations

29 - INRUS = $IRUS_{t-1}$ + CUS + KAS + ERRORS

30 - INRBS = IRUS × EXCHANGE RATE

31 - CUS = EXPORTS/EXRATE - IMPORTS/EXRATE2 + NFP/EXRATE

32 - EXPORTS = OILEXP + NOOILX

33 - XPOREAL = (EXPORTS/GEPRWS)*100

34 - OILEXPBAR = OILPROD - DOOILCON

35 - NOOILX = (RNOOILX * GEPRWS)/100

36 - IMPORTS = IMPCGS + IMPKRG

37 - IMPCGS = (IMPCGSR * IMPPRWS)/100

38 - IMPKRG = (IMPKRGR * IMPPRWS)/100

39 - CONDUR = (CONDURR * GEPRWS)/100

40 - CONNDUR = (CONNDURR * GEPRWS)/100

41 - INUPRI = (INUPRIR * GEPRWS)/100

42 - INVENTV = $STOCKS_t$ - $STOCKS_{t-1}$

43 - STOCKSR = (STOCKS.GEPRWS) * 100

44 - INVENTVR = (INVENTV/GEPRWS) * 100

45 - GDPN = CONDUR + CONNDUR + GOVCON + INVPRI + INVPUB + INVENTV + EXPORTS - IMPORTS

46 - GDPREAL = CONDURR + CONNDURR + (GOVCON/GEPRWS) * 100 + INVPRIB + INVPUBR + INVENTVR + EXPOREAL - IMPCGSR - IMPKRGR

47 - INFLATION = log($GEPRWS_t$/$GEPRWS_{t-1}$) * 100

48 - UNEMPR = (LABFOR - EMPLOY)/LABFOR * 100

49 - DIRTAX = OILTADI + OTHTAXDIR

50 - INDTAX = TARIFFS + OTHTAXIND

51 - NOILGDPREAL = GDPREAL - XPOREAL

52 - KAS = PBCFS + PRCFS + PORCFS + OTHCFS$ + DIRINVS

53 - PBCFS = (1 + LIBOR/100) * $DEBT_{t-1}$ + INTPAYS

54 - DEBT = DEBTN/EXRATE

55 - COR = (KAPITALR/GDPREAL)

56 - KAPITALR = $KAPITALR_{t-1}$ + INVREAL - DEPRECR

57 - RWEALTH = (WEALTH/GEPRWS) * 100

58 - WEALTH = M1 + TIMDEP + MORBOND + GOVBONDS + FABS

59 - FAUS = FABS/EXRATE1

60 - TIMDEP = M2 - M1

62 - MULTI = (C+T+I)/(C+R*(T+1))

APPENDIX 3: THE DEMAND FOR FOREIGN BORROWING. AN ALTERNATIVE MODEL

This alternative model concentrates on the effects on the economy of both constraints, balance of payments and government budget constraint. It is assumed that the economy engages in continuous borrowing which in the long run results in large debt. Debt service in conditions of large debt income ratio requires the increase in taxation. Those effects should stimulate a better capital allocation which in the long run leads to a porcess of capital formulation. On the other side, private sector accumulate net foreign assets, money and capital. Public sector is a net debtor. Note that the background is one of an excess demand by both private and public sector. Thus,

$$G + iBg - T = D = \dot{B}_d + \dot{B}_f \qquad (1)$$

Assume that interest payments are financed by increasing foreign domestic or taxation, so,

$$G + i_d B_d + i_f B_f - T = \dot{H} + \dot{B}_d - \dot{B}_f \qquad (2)$$

$$\text{where } B_g = B_d + B_f$$

The real sector:

Consumption (C) is an increasing function of disposable income (Y^d):

$$C = f_1(Y^d) \qquad (3)$$

Investment is defined to be a function of output (Y) and profits (Π), are capital (K)

$$\dot{K} = I = f_2(Y,K,\Pi) \qquad (4)$$

The financial sector:

Money is demand defined as being a function of transactions, interest rate and wealth.

$$M_d = f_3(i_d,Y,W) \qquad (5)$$

Money is supplied in its two principal components; international reserves and domestic credit:

$$M_S = DC + eIR \qquad (6)$$

(assume for simplicity that the multiplier is constant). Since private sector accumulates money capital and foreign assets and liabilities the excess of domestic savings corresponds to excess demand. The public sector budget deficits represents its excess demand; thus

$$Y - C - I - (G-T) = X - M + CU \qquad (7)$$

This identity should hold. Any deficit (surplus) is financed by increasing either rises or debt, and the fiscal and monetary policy determine the steady state growth. The optimal mix will specify the financing policies.

The balance of payments (identity) given by the following expression

$$e\dot{I}R = DOP = CU + KA \qquad (8)$$

and expressions (5) to (7) gives this

$$Y - C - I - (G-T) = eIR - \dot{B}_f - e\dot{F}A \qquad (9)$$

which it can be written as:

$$IR = Y - C - I - (G-T) + B_f + FA \qquad (10)$$

where $e = 1$. Note that

$$KA = \dot{B}_f + \dot{F}A \qquad (11)$$

The requirements for foreign finance can be expressed in terms of the underlying parameters of the system above, where the behavioural section is conformed by savings consumption, investment and by the balance of payments and government budget constraints.

A set of assumptions is made.

i) interest rate is exogenous (capital mobility)

ii) exchange rate is fixed,

iii) there is an intrinsic stock-flow relation.

The expression (11) can be rewritten as follows:

$$\dot{IR} = BOP = (Y-C-I) - (G+i_d b_d+i_f B_f-T) + \dot{B}_f + \dot{FA} \qquad (12)$$

Substituting by (2) above we get:

$$\dot{IR} = BOP = (Y-C-I) - (\dot{H}+\dot{B}_d+\dot{B}_g) + \dot{B}_f + FA \qquad (13)$$

Note that $\dot{B}_g$ is borrowing by government and it is a proportion (φ) of total public sector borrowing, thus

$$\varphi\dot{B}_f = \dot{B}_g \quad \therefore \quad \varphi = \frac{\dot{B}_g}{B_f}$$

Then by substituting in (13) we get

$$\dot{IR} = BOP = (Y-C-I) - \tilde{H} - \dot{B}_d + (1-\varphi)\dot{B}_f + \dot{FA} \qquad (14)$$

which can be solved for $\dot{B}_f$, thus

$$\dot{B}_f = \frac{1}{1-\varphi} (BOP - (Y-C-I) + \dot{H} + \dot{B}_d - \dot{FA})$$

Government borrowing and government sector borrowing can be expressed as a result of the underlying parameters of behaviour functions above. Note that fiscal policy as well as monetary policy is embodied in such expressions.

APPENDIX 4: CONTROL SOLUTION AND EVALUATION CRITERIA. DYNAMIC MULTIPLIERS. TABLES AND FIGURES.

TABLE 4.1

CONTROL SOLUTION SIMULATION. EVALUATION CRITERIA

VARIABLE	R^2	RMSE	MAE	β	THEIL INEQUALITY COEFFICIENT	FRACTION OF ERROR DUE TO BIAS	FRACTION OF ERROR DUE TO DIFFERENT VARIATION	FRACTION OF ERROR DUE TO DIFFERENT COVARIATION
GDPREAL	0.98	4882	4253	0.97	0.035	0.661	0.008	0.33
EXPORTS	0.99	2523	1777	1.002	0.021	0.071	0.125	0.802
NOOILX	0.99	588	398	1.009	0.05	0.458	0.3136	0.2280
RNOOILX	0.9743	261	220	1.008	0.063	0.709	0.070	0.218
OILEXP	0.99	2470	1748	1.002	0.026	0.012	0.067	0.91
IMPORTS	0.99	5975	3788	1.015	0.063	0.301	0.391	0.307
IMPCGSR	0.99	497	392	1.001	0.023	0.024	0.046	0.928
IMPKRGR	0.90	1599	1239	0.890	0.078	0.065	0.242	0.691
CURRENT.ACC	0.90	1461	914	0.98	0.080	0.250	0.015	0.730
CONDURRI	0.95	434	360	0.999	0.065	0.613	0.003	0.383
CONNDUR	0.99	2127	1762	1.004	0.030	0.680	0.173	0.140
INVPRIR	0.96	1247	942	0.98	0.050	0.487	0.075	0.511
STOCKS	0.95	3615	2791	0.98	0.059	0.145	0.098	0.854
GEPRUS	0.99	7.1	5.9	0.99	0.017	0.192	0.122	0.684
IMPPRUS	0.99	24.1	17.9	1.023	0.066	0.551	0.410	0.030
INFLATION	0.66	3.1	2.4	0.90	0.090	0.017	0.014	0.98
WAGES	0.98	19.9	15.0	0.98	0.042	0.184	0.010	0.805
DEBT	0.96	1909	1500	1.004	0.062	0.542	0.046	0.411
STCF	0.50	826	485	0.76	0.360	0.076	0.002	0.921
FAUS	0.97	1356	621	1.09	0.080	0.084	0.535	0.380
CAPITALACC	0.52	1461	1052	0.63	0.380	0.065	0.026	0.91
M1	0.99	3232	2454	1.004	0.048	0.491	0.088	0.420
WEALTH	0.99	15921	6335	1.012	0.051	0.109	0.620	0.270
C	0.95	0.026	0.019	1.1	0.033	0.24	0.17	0.59
T	0.95	0.11	0.094	0.99	0.026	0.0002	0.00003	0.99
R	0.92	0.013	0.010	0.90	0.036	0.112	0.190	0.686
MULTI	0.99	0.124	0.108	0.97	0.017	0.326	0.114	0.559
M2	0.99	1522	1195	0.99	0.067	0.067	0.079	0.853
OILTAXDI	0.98	3181	2036	0.98	0.057	0.050	0.314	0.680
OTHTAXDIR	0.99	290	241	0.98	0.026	0.050	0.304	0.645
EMPLOY	0.99	117134	96965	0.96	0.015	0.506	0.188	0.34

TABLE 4.2

CONTROL SOLUTION SIMULATION. ACTUAL AND FITTED VALUES

OBS.	CONDS1	CONDUR	CONNDURR	CONNDRS1	CONNDS1	CONNDUR	IMPPRWS	IMPPRWS1	GEPRWS	GEPRWS1	WAGEIND	WAGES1
1965	1370.2	1627.0	20960.3	20567.0	19571.1	20059.0	91.5000	89.0080	95.7000	95.1577	92.0000	93.6153
1966	1447.5	1682.0	21700.0	20781.0	20800.6	21049.0	95.5000	93.3173	97.0000	100.0941	95.0000	97.1546
1967	1514.2	1689.0	22486.3	21259.1	22148.5	22104.0	98.1000	96.8851	98.3000	104.1833	98.0000	100.0429
1968	1662.7	2068.0	20827.0	19721.0	20966.8	20827.0	100.0000	98.8030	100.0000	106.3173	100.0000	100.5532
1969	1575.5	2264.0	22215.6	20528.4	22258.5	22571.0	102.1000	101.1186	101.6000	108.4278	107.0000	99.9284
1970	1752.2	2437.0	24083.4	22472.3	24414.2	24830.0	105.2000	104.8767	103.1000	108.6417	98.0000	85.9404
1971	2106.8	2440.0	24624.2	23419.9	25563.6	26274.0	110.4000	107.1157	106.7000	109.1535	105.0000	87.2462
1972	2614.0	2653.0	26367.8	24603.8	27400.7	29110.0	115.4000	109.5752	110.4000	111.3678	112.0000	95.2998
1973	3271.5	3162.0	27171.5	26480.5	30792.8	32008.0	122.4000	113.4370	117.8000	116.2848	121.0000	108.2382
1974	4599.5	4867.0	29080.0	29067.3	36990.9	39985.0	142.8000	121.6671	137.5000	127.2596	149.0000	130.3326
1975	5312.9	5759.0	32326.9	31413.2	46366.2	50527.0	161.1000	137.6628	156.3000	147.6009	182.0000	162.2514
1976	6851.8	7662.0	35387.5	34163.1	57661.4	59274.0	170.9000	152.4967	167.5000	168.7827	202.0000	197.5816
1977	8235.0	8883.0	38501.1	37142.6	69803.6	71227.0	183.5000	164.3456	185.0000	187.9342	230.0000	226.8434
1978	9976.5	10995.0	42306.6	40133.4	83096.7	83767.0	196.5000	175.6385	198.0000	207.0513	263.0000	250.7188
1979	10984.0	11487.0	45465.5	42691.5	97667.5	98842.0	211.4000	188.9899	217.4000	228.7749	294.0000	272.6894
1980	12471.2	12995.0	46727.8	45017.4	116206.4	122380.0	244.2000	208.0625	261.9000	258.1365	346.0000	303.4648
1981	11787.6	12782.0	49448.1	46255.8	136619.5	147751.0	273.1000	232.5242	298.8000	295.3561	383.0000	343.8148
1982	11139.9	13155.0	52315.6	46939.9	156412.7	169084.0	293.8000	256.6399	323.2000	333.2189	391.0000	382.8348
1983	7992.8	7700.0	50790.5	47498.3	171235.3	175735.0	310.9000	272.6322	346.0000	360.5080	390.0000	403.3016
1984	7175.1	8466.0	49446.9	46832.2	194697.3	200260.0	368.2000	312.2692	405.0000	415.7343	394.0000	439.0381

OBS.	INVPUBR	INVPBRS1	STOCKS	STOCKS1	INVENTV	INVENTVS1	INFLATION	INFLATS1	OILPROD	OILPROS1	CONDRS1	CONDURR
1965	1636.4	1645.7	4713.0	4529.3	928.0000	744.3456	3.0772	2.5088	1266.5	1271.8	1439.9	1700.1
1966	1963.9	1903.2	5171.0	5500.9	458.0000	971.6026	1.3493	5.0575	1230.0	1280.3	1446.1	1734.0
1967	2461.9	2322.8	5690.0	6596.2	519.0000	1095.3	1.3313	4.0041	1292.1	1218.8	1453.4	1718.2
1968	3488.0	3280.7	9409.0	10795.2	3719.0	4199.0	1.7146	2.0276	1314.0	1302.9	1563.9	2068.0
1969	3284.4	3077.6	11433.0	11383.3	2024.0	588.1201	1.5873	1.9656	1310.3	1304.4	1453.0	2228.3
1970	2605.2	2472.3	15639.0	13193.1	4206.0	1809.7	1.4656	.1971	1353.4	1277.1	1612.9	2363.7
1971	2907.2	2841.9	19423.0	14799.4	3784.0	1606.3	3.4322	.4700	1295.4	1254.0	1930.1	2286.8
1972	5426.6	5379.5	22783.0	16741.6	3360.0	1942.2	3.4089	2.0083	1175.3	1288.1	2347.2	2403.1
1973	5593.4	5666.3	25621.0	19574.2	2838.0	2832.6	6.4878	4.3204	1228.6	1238.6	2813.4	2684.2
1974	4958.5	5357.6	31543.0	27218.3	5922.0	7644.1	15.4636	9.0187	1086.2	1036.3	3614.3	3539.6
1975	6856.7	7260.8	37389.0	29666.5	5846.0	2448.2	12.8153	14.8283	856.2900	891.4788	3599.5	3684.6
1976	10505.7	10425.8	41124.0	36387.2	3735.0	6720.8	6.9206	13.4100	837.3100	893.1414	4059.5	4574.3
1977	12752.4	12553.3	45308.0	42708.6	4184.0	6321.4	9.9372	10.7480	816.8700	867.9289	4381.8	4801.6
1978	15384.8	14712.3	45884.0	49936.7	576.0000	7228.1	6.7911	9.6874	790.5900	895.5085	4818.4	5553.0
1979	12833.5	12195.4	45982.0	45986.8	98.0000	-3949.9	9.3472	9.9772	859.9400	825.3078	4801.2	5283.8
1980	11898.4	12071.9	44628.0	41716.2	-1354.0	-4270.7	18.6224	12.0750	791.3200	759.6994	4831.3	4961.8
1981	14000.0	14163.2	40254.0	41639.7	-4374.0	-76.4669	13.1812	13.4693	769.0550	723.5668	3991.0	4277.8
1982	14811.0	14365.6	45421.0	46606.4	5167.0	4966.7	7.8497	12.0618	690.9450	707.5848	3343.1	4070.2
1983	12061.6	11576.2	24224.0	28944.7	-21197.0	-17661.7	6.8167	7.8714	655.5400	676.1503	2217.1	2225.4
1984	6878.3	6700.7	25975.0	26147.8	1751.0	-2796.8	15.7448	14.2532	656.6350	664.0986	1725.9	2090.4

OBS.	STOCKAPS1	STOCKAPP	INVETVR	INVENTRS1	INVPRI	INVPRIS1	INVPRIR	INVPRIRS1	RNOOILX	RNOILXS1	NOOILX	NOILXS1
1965	96.1610	118.2813	969.6970	782.2236	5408.0	4692.6	5651.0	4931.4	899.6865	871.1775	861.0000	828.9921
1966	234.9650	64.0219	472.1649	970.6894	5526.0	4936.7	5696.9	4932.1	837.1134	740.2013	812.0000	740.8977
1967	224.7348	69.3021	527.9756	1051.3	5510.0	5317.1	5605.3	5103.6	904.3744	802.2380	889.0000	835.7980
1968	135.1122	98.4028	3719.0	3949.5	6872.0	5233.6	6872.0	4922.6	1210.0	994.0762	1210.0	1056.9
1969	214.2929	150.5440	1992.1	542.4072	8021.0	5659.9	7894.7	5219.9	1442.9	1113.3	1466.0	1207.2
1970	22.4562	168.7943	4079.5	1665.8	8851.0	7004.2	8584.9	6447.0	1611.1	1236.1	1661.0	1342.9
1971	62.1508	546.0757	3546.4	1471.6	10216.0	8531.4	9574.5	7815.9	1562.3	1404.4	1667.0	1533.0
1972	300.2263	673.5248	3043.5	1744.0	9851.0	8886.5	8923.0	7979.4	1624.1	1590.7	1793.0	1771.6
1973	739.1567	1527.1	2409.2	2435.9	12027.0	10546.9	10209.7	9069.9	1996.6	1762.0	2352.0	2049.0
1974	1847.4	4284.7	4306.9	6006.7	14166.0	11926.0	10302.5	9371.4	2494.5	2208.0	3430.0	2809.9
1975	4350.6	4312.8	3740.2	1658.6	19881.0	18861.1	12719.8	12778.5	2200.9	2051.4	3440.0	3027.9
1976	4257.4	2679.2	2229.9	3981.9	25173.0	25503.8	15028.7	15110.5	2177.3	1857.0	3647.0	3134.3
1977	4128.8	4296.5	2261.6	3363.6	36892.0	32710.7	19941.6	17405.4	2121.6	1842.2	3925.0	3462.2
1978	4344.4	3183.8	290.9091	3491.0	41375.0	41228.5	20896.5	19912.2	2228.8	2012.0	4413.0	4165.9
1979	5239.3	4495.7	45.0782	-1726.5	37653.0	40059.3	17319.7	17510.4	2423.2	2278.5	5268.0	5212.6
1980	5902.1	9412.1	-516.9912	-1654.4	32992.0	32101.1	12597.2	12435.7	2616.6	2551.4	6853.0	6586.2
1981	6014.9	6287.8	-1463.9	-25.8897	27951.0	27790.7	9354.4	9409.2	2584.0	2490.7	7721.0	7356.5
1982	5337.9	3287.1	1598.7	1490.5	22294.0	20722.9	6897.9	6219.0	2427.6	2195.2	7846.0	7315.0
1983	3816.8	3204.2	-6126.3	-4899.1	13613.0	13262.1	3934.4	3678.7	4421.7	3862.6	15299.0	13924.8
1984	4434.0	4130.7	432.3457	-672.7477	21737.0	23664.7	5367.2	5692.3	2481.5	1991.5	10050.0	8279.5

OBS.	IMPCGSR	IMPCGRS1	IMPCGS	IMPCGS1	IMPKRGR	IMPKRS1	IMPKS1	IMPKRG	XPOREAL	XPORS1	GDPREAL	GDPRS1
1965	5261.2	4826.0	4814.0	4295.5	3477.6	3628.9	3230.0	3182.0	12171.4	11572.8	39242.4	37404.4
1966	4539.3	4887.0	4335.0	4560.4	3316.2	4015.2	3746.9	3167.0	11630.9	10884.8	40616.7	37127.0
1967	4865.4	4934.9	4773.0	4781.2	3314.0	4227.5	4095.8	3251.0	12183.1	10049.5	42328.2	37290.3
1968	5016.0	5097.3	5016.0	5036.3	3912.0	4328.5	4276.7	3912.0	11559.0	10637.4	45162.0	39876.1
1969	5053.9	5039.3	5160.0	5095.6	4026.4	4076.2	4121.8	4111.0	11255.9	10248.4	45598.8	37396.6
1970	5052.3	4892.7	5315.0	5131.3	4307.0	3540.6	3713.3	4531.0	11858.4	10373.0	50651.4	42717.2
1971	5137.7	5185.7	5672.0	5554.7	4787.1	3357.3	3596.2	5285.0	13608.2	12774.9	53897.1	48822.4
1972	5532.1	5860.3	6384.0	6421.4	5225.3	3723.0	4079.5	6030.0	13091.5	14146.7	56195.5	54247.9
1973	6039.2	6913.2	7392.0	7842.2	5540.0	4854.7	5507.0	6781.0	18006.8	18195.2	62636.4	61140.2
1974	8059.5	8697.4	11509.0	10581.9	6703.1	7750.5	9429.8	9572.0	35480.0	35825.8	82193.8	82831.4
1975	9836.7	10355.3	15847.0	14255.4	8694.0	11353.4	15629.4	14006.0	25129.9	27084.9	76127.6	72888.3
1976	12051.5	12708.4	20596.0	19379.8	10873.6	14963.9	22819.5	18583.0	24511.6	25315.7	81124.4	77106.4
1977	16306.8	15375.0	29923.0	25268.2	13958.6	16850.6	27693.2	25614.0	23516.8	23861.4	83920.0	78699.0
1978	17988.8	18423.2	35348.1	32358.2	14531.3	16471.2	28929.7	28554.0	21190.4	22558.2	85136.6	82349.4
1979	15958.8	15819.1	33737.0	29896.5	12435.2	12698.6	23999.0	26288.0	29449.9	26499.6	94771.6	85587.3
1980	14996.5	14090.9	36621.5	29317.8	11487.7	10469.9	21783.9	28053.0	32631.9	31406.0	95277.3	93153.5
1981	15695.7	16335.1	42865.0	37983.0	11031.1	9316.7	21663.6	30126.0	29991.3	27976.8	93152.3	90556.2
1982	18814.2	18255.5	55276.0	46850.8	9808.0	8622.3	22128.3	28816.0	23266.4	22940.8	87516.4	81203.8
1983	5377.0	5389.1	16717.0	14692.4	8292.4	8312.0	22661.1	25781.0	21536.7	20563.2	76427.2	78400.2
1984	6418.3	6485.0	23632.0	20250.6	10521.7	11874.3	37079.9	38741.0	25965.2	24933.3	83997.1	77331.3

OBS.	EXPORTS	EXPORTS1	IMPORTS	IMPORTS1	GDPN	GDPNS1	OILEXP	OILEXS1	OILEXPRAR	OILXBS1	DOOILCON	DOILCS1
1965	11648.0	11012.4	7996.0	7525.5	37922.0	36113.1	10787.0	10183.4	1202.4	1207.1	64.1699	64.7299
1966	11282.0	10895.0	7502.0	8307.2	39516.0	37765.2	10470.0	10154.1	1164.5	1213.2	65.5737	67.0547
1967	11976.0	10469.9	8024.0	8877.0	41625.0	39519.0	11087.0	9634.1	1225.2	1149.8	66.8571	68.9372
1968	11559.0	11309.4	8928.0	9313.0	45162.0	43103.5	10349.0	10252.6	1243.3	1231.7	70.6947	71.2138
1969	11436.0	11112.1	9271.0	9217.4	46283.0	41214.6	9970.0	9904.9	1240.1	1232.1	70.2005	72.3308
1970	12226.0	11269.4	9846.0	8844.6	52025.0	46726.2	10565.0	9926.5	1280.3	1202.9	73.1409	74.1911
1971	14520.0	13944.2	10957.0	9150.9	57141.0	53465.4	12853.0	12411.3	1218.4	1176.6	76.9632	77.4340
1972	14453.0	15754.9	12414.0	10500.8	61502.0	60586.4	12660.0	13983.3	1092.0	1206.2	83.2550	81.8759
1973	21212.0	21158.2	14173.0	13349.2	73253.0	71431.8	18860.0	19109.2	1136.1	1151.1	92.5479	87.5628
1974	48785.0	45591.8	21081.0	20011.6	112234.0	106330.7	45355.0	42781.9	995.4152	938.9426	90.8248	97.3447
1975	39278.0	39977.6	29853.0	29884.8	118098.0	109741.2	35838.0	36949.7	766.5785	790.3575	89.7115	101.1213
1976	41057.0	42728.5	39179.0	42199.3	135104.0	134648.9	37410.0	39594.2	743.6974	787.1181	93.6126	106.0233
1977	43506.0	44843.7	55537.0	52961.4	155706.0	155504.0	39581.0	41381.5	724.1600	757.1019	92.7100	110.8271
1978	41957.0	46707.0	63902.1	61288.0	169060.0	181466.8	37544.0	42541.1	687.2950	778.7747	103.2950	116.7338
1979	64024.0	60624.5	60025.0	53895.5	207737.0	207147.9	58756.0	55411.8	744.2350	701.8762	115.7050	123.4316
1980	85463.0	81070.4	64674.5	51101.7	254210.0	252761.8	78610.0	74484.3	661.7450	627.0141	129.5750	132.6852
1981	89614.0	82631.3	72991.0	59646.6	285208.0	283580.9	81893.0	75274.8	634.3700	583.1033	134.6850	140.4635
1982	75197.0	76443.0	84092.0	68979.1	291268.0	291169.1	67351.0	69128.0	551.8800	566.4411	139.0650	141.1437
1983	74517.0	74132.0	42498.0	37353.5	271438.0	294679.1	59218.0	60207.2	523.7750	536.6017	131.7650	139.5486
1984	105159.0	103656.4	62373.0	57330.5	346422.0	340488.1	95109.0	95376.9	533.6300	535.1336	123.0050	128.9650

OBS.	CUUSS1	CUS	DIRTAX	DIRTXS1	OILTAXDI	OILTXS1	OTHTAXDIR	OTHTXS1	INDTAX	INDTXS1	FABS	FABSS1
1965	-1.1405	35.5556	3245.0	3199.8	2188.0	2211.5	1057.0	988.2935	1086.0	1150.2	3652.1	3719.9
1966	-178.9481	86.0000	3672.0	3337.6	2355.0	2310.2	1317.0	1027.5	1200.0	1285.3	4125.7	3520.1
1967	-373.1322	151.1111	4191.0	3420.6	2929.0	2336.8	1262.0	1083.9	1223.0	1336.3	4348.4	3774.5
1968	-273.2342	-132.2222	4364.0	3679.3	3046.0	2501.1	1318.0	1178.2	1181.0	1158.5	4588.6	4168.3
1969	-213.6291	-153.5556	4111.0	3653.1	2694.0	2466.4	1417.0	1186.6	1264.0	1215.8	4186.5	5163.3
1970	-23.9057	-34.0909	4585.0	3863.7	2843.0	2591.2	1742.0	1272.5	1450.0	1329.6	4433.9	4764.9
1971	319.3892	39.7727	6615.0	5110.8	4770.0	3632.5	1845.0	1478.4	1532.0	1396.0	4330.4	4339.1
1972	708.1904	-22.5000	7084.0	5911.1	5090.0	4203.3	1994.0	1707.7	1650.0	1503.2	4151.5	3544.2
1973	1128.6	949.5349	10184.0	8624.1	7802.0	6607.5	2382.0	2016.5	1714.0	1653.8	3738.9	3784.6
1974	5311.0	5804.9	29454.0	24912.1	26820.0	22057.7	2634.0	2854.4	2260.0	2249.0	4722.2	4720.3
1975	2427.2	2271.9	26139.0	22151.3	22854.0	18778.5	3285.0	3372.8	3143.0	3170.7	4498.7	4333.6
1976	165.6174	479.3023	25406.0	22902.3	21255.0	18987.4	4151.0	3915.0	3043.0	3233.2	9997.8	10379.2
1977	-1972.5	-2882.6	26093.0	23862.8	21322.0	19209.4	4771.0	4653.4	3470.0	3538.3	11318.7	13284.3
1978	-3538.1	-5303.3	23893.0	24758.9	17603.0	18212.2	6290.0	6546.8	4293.0	4372.6	13851.2	15078.2
1979	1388.4	753.4884	31931.0	32713.6	25584.0	26423.4	6347.0	6290.2	4840.0	4885.2	16668.2	15610.5
1980	7249.2	5143.0	45107.0	47091.8	37944.0	39558.0	7163.0	7533.8	6031.0	5507.4	25005.1	25969.7
1981	5867.8	4388.4	73267.0	73691.4	63258.0	63715.1	10009.0	9976.4	7057.0	6015.6	39380.0	43280.7
1982	211.8436	-3592.6	52118.0	58410.2	42603.0	49122.3	9515.0	9287.9	9467.0	7595.9	60309.7	54448.1
1983	9121.8	5163.9	42806.0	46382.3	34082.0	36926.3	8724.0	9456.0	17248.0	16231.1	162160.7	129037.1
1984	11571.4	11120.5	61798.0	71627.2	51475.0	61209.7	10323.0	10417.4	21925.0	21235.5	248211.9	183556.3

OBS.	TIMDEPR	TDEPRS1	WEALTH	WEALTHS1	RWEALTH	RWS1	KAPITALR	KAPRS1	DEBTN	DEBTNS1	DEBT	DEBTS1
1965	3146.3	3086.7	12566.1	12209.4	13130.7	12830.7	87260.2	87260.2	31432.5	32109.7	6985.0	7135.5
1966	3095.9	3086.8	13123.7	12314.8	13529.6	12303.2	91789.1	91789.1	33597.0	35048.1	7466.0	7788.5
1967	3648.0	3136.3	14843.4	13791.2	15100.1	13237.4	96469.6	96469.6	35680.5	37810.0	7929.0	8402.2
1968	4066.0	3397.5	16594.7	15678.7	16594.7	14747.0	106440.6	106440.6	38394.0	39382.3	9532.0	8751.6
1969	4676.2	3503.7	17791.5	18329.6	17511.3	16904.9	115145.4	115145.4	41598.0	40110.8	9244.0	8913.5
1970	5351.1	4067.4	19865.9	19430.8	19268.6	17885.2	125736.0	125736.0	44044.0	40084.3	10010.0	9110.1
1971	6235.2	4967.0	22833.4	22228.1	21399.6	20364.1	136815.7	136815.7	47911.6	40026.9	10889.0	9097.0
1972	7449.3	6014.5	26189.5	24634.2	23722.4	22119.7	149285.8	149285.8	51620.8	41333.8	11732.0	9394.0
1973	8723.3	7288.6	30908.9	30900.9	26238.5	26573.5	162483.6	162483.6	55212.0	42415.3	12840.0	9864.0
1974	9081.5	9679.0	39739.2	40680.5	28901.2	31966.6	177312.7	177312.7	58544.5	42239.3	13615.0	9823.1
1975	11144.0	10052.8	55451.7	52797.5	35477.7	35770.5	195816.2	195816.2	61580.3	49982.5	14321.0	11623.8
1976	14450.1	10958.6	73810.8	73343.4	44066.1	43454.3	218495.6	218495.6	59907.6	56607.9	13932.0	13164.6
1977	15964.9	12230.4	90987.7	94916.2	49182.5	50505.0	247764.8	247764.8	63450.8	63044.3	14756.0	14661.5
1978	16184.8	13793.2	105522.2	104758.2	53294.0	50595.3	278031.5	278031.5	73229.0	69507.7	17030.0	16164.6
1979	18471.5	16027.6	116950.2	113627.9	53794.9	49668.0	301370.5	301370.5	77679.5	73128.9	18065.0	17006.7
1980	20553.3	20073.9	142165.1	139223.6	54282.2	53934.1	318818.4	318818.4	71036.0	61941.9	16520.0	14405.1
1981	23831.7	22946.7	174448.0	179828.5	58382.9	60885.3	334059.3	334059.3	85750.6	72708.7	19942.0	16909.0
1982	24790.5	21789.6	198339.7	193228.2	61367.5	57988.4	350663.3	350663.3	118202.7	104118.7	27489.0	24213.7
1983	28606.4	26208.3	333289.7	300990.7	96326.5	83490.7	352837.0	352837.0	116130.1	106522.9	27007.0	24772.8
1984	26782.0	23858.4	436107.9	373485.6	107681.0	89837.6	358111.8	358111.8	110247.7	110155.3	25639.0	25617.5

OBS.	R	RS1	MULTI	MULTS1	TIMDEP	TDEPS1	KAS	CAPACCS1	C	CS1	T	TS1
1965	.2071	.2334	2.7074	2.5570	3011.0	2675.8	36.0000	171.7822	.5098	.5084	.9814	.9635
1966	.2165	.2347	2.5983	2.5301	3003.0	2621.0	-65.0000	248.2846	.5406	.5106	.9750	.9237
1967	.2097	.2289	2.6996	2.5538	3586.0	3125.2	-48.0000	70.0876	.5190	.5103	1.0328	.9085
1968	.2054	.2243	2.7531	2.6149	4066.0	3781.4	285.0000	-42.8496	.5099	.4925	1.0578	.9238
1969	.2151	.2140	2.7698	2.6603	4751.0	4984.3	485.0000	-398.6241	.4821	.5127	1.1103	.9760
1970	.1976	.2155	2.9179	2.7335	5517.0	5396.2	78.0000	-312.4626	.4968	.4958	1.2505	1.0916
1971	.2060	.2138	2.9877	2.8618	6653.0	7312.7	508.0000	-241.4665	.4251	.4616	1.1974	1.2133
1972	.1908	.2076	3.1895	3.0137	8224.0	8546.3	-164.0000	-441.2693	.4097	.4248	1.2911	1.2860
1973	.2050	.1981	3.1993	3.1911	10276.0	11843.3	-26.0000	-606.8865	.3541	.3895	1.2640	1.3211
1974	.1941	.1941	3.2861	3.3966	12487.0	15695.5	-1125.0	-1600.1	.3273	.3229	1.0652	1.2725
1975	.1442	.1443	4.1506	3.9011	17418.0	21301.2	88.0000	1895.4	.2423	.3195	.9021	1.1205
1976	.1824	.1700	3.6416	3.5813	24204.0	27418.5	-1899.0	-299.1138	.2720	.3107	1.1410	1.0504
1977	.1865	.1632	3.5694	3.6797	29535.0	37211.5	745.0000	1117.7	.2740	.3052	1.1067	1.0474
1978	.1584	.1635	3.8284	3.7242	32046.0	36774.4	2649.0	2101.4	.2776	.2959	.9953	1.0618
1979	.1401	.1440	4.1484	4.0366	40157.0	41292.5	246.0000	720.5461	.2900	.3017	1.1804	1.1872
1980	.1222	.1364	4.4539	4.2862	53829.0	51725.0	-3524.0	-4938.6	.3197	.3218	1.4231	1.5452
1981	.1313	.1304	4.4636	4.5166	71209.0	70980.1	610.0000	-533.4446	.3312	.3393	1.7725	1.9027
1982	.1173	.1158	4.8652	4.8934	80123.0	83024.5	3911.0	6426.0	.3578	.3701	2.2196	2.3244
1983	.1466	.1447	4.4829	4.5055	98978.0	104362.3	-3076.0	742.6782	.2947	.2919	1.9931	1.9407
1984	.1264	.1182	4.7710	4.8256	108467.0	114859.7	-3403.0	-294.8903	.4401	.4539	3.1813	3.0433

OBS.	TARIFFS	TARIFS1	YDISPR	YDISPRS1	UNEMPR	UNRS1	LARFOR	LARFS1	EMPLOY	EMPLS1
1965	312.0000	376.2231	31826.5	29926.3	8.1511	10.2772	2944400	2930346	2704400	2629189
1966	327.0000	412.2603	32481.6	29492.2	8.3178	11.6460	3053700	3049259	2799700	2694145
1967	332.0000	445.3037	33450.3	29544.4	7.9606	12.1777	3165600	3137897	2913600	2755774
1968	497.0000	474.5448	36129.0	32045.0	6.1418	12.9916	3256400	3257010	3056400	2833871
1969	536.0000	487.7573	36527.0	29362.9	7.3185	13.8043	3350400	3353638	3105200	2890693
1970	607.0000	486.6176	40524.3	33881.5	6.1793	13.0830	3463200	3475426	3249200	3020736
1971	634.0000	497.9948	41725.6	38427.1	6.3006	11.1525	3571100	3578974	3346100	3179830
1972	687.0000	540.1587	43959.1	43302.8	6.1899	9.7058	3699600	3701790	3470600	3342503
1973	691.0000	630.8155	48150.0	47858.2	6.1861	7.9193	3831200	3811428	3594200	3509592
1974	839.0000	827.9912	55048.3	57079.2	6.1148	4.7695	3957600	3936667	3715600	3748906
1975	1110.0	1137.7	53535.8	51647.9	6.0222	5.2763	4068250	4111789	3823250	3894810
1976	1374.0	1564.2	60177.0	57688.8	5.2088	5.1494	4262000	4247431	4040000	4028713
1977	1973.0	2041.3	63357.8	59608.2	4.3068	6.2457	4411600	4423408	4221600	4147134
1978	2438.0	2517.6	65738.1	63342.3	4.0724	6.5102	4542800	4569515	4357800	4272030
1979	2583.0	2628.2	72106.0	63686.8	5.1869	7.1508	4723400	4746754	4478400	4407326
1980	3207.0	2683.4	70621.3	67572.0	5.3181	6.6515	4889000	4899926	4629000	4574007
1981	4016.0	2974.6	60916.1	58153.0	6.0537	7.1275	5054800	5076160	4748800	4714357
1982	5214.0	3342.9	62868.5	55970.2	7.2676	8.4613	5228700	5233727	4848700	4790883
1983	2517.0	1500.1	53154.7	55354.3	10.0727	10.2869	5361000	5408052	4821000	4851731
1984	2803.0	2113.5	57818.8	49630.5	13.4545	11.6103	5723000	5568795	4953000	4922244

OBS.	FAUS	FAUSS1	STCFS	STCFS1	PBCFS	PBCFS1	M1	M1S1	M2	M2S1	CORE	CORS1
1965	811.5700	826.6551	-1.0000	-16.0863	56.0000	206.8686	4632.0	4542.6	7643.0	7218.4	2.2236	2.3329
1966	916.8300	782.2532	-65.0000	85.4040	59.0000	221.8806	4745.0	4923.7	7748.0	7544.7	2.2599	2.4723
1967	966.3000	838.7720	-4.0000	-17.7190	53.0000	184.8066	5274.0	5256.5	8860.0	8381.7	2.2791	2.5870
1968	1019.7	926.2778	4.0000	-37.6828	78.0000	-208.1667	5804.0	5593.0	9870.0	9374.4	2.3569	2.6693
1969	930.3400	1147.4	169.0000	-148.7723	108.0000	-457.8518	6342.0	5670.0	11093.0	10654.4	2.5252	3.0790
1970	1007.7	1082.9	-18.0000	137.6626	132.0000	-414.1252	6604.0	5958.7	12121.0	11354.9	2.4824	2.9435
1971	984.1800	986.1491	61.0000	137.0694	185.0000	-640.5360	7918.0	6644.4	14571.0	13957.1	2.5385	2.8023
1972	943.5200	805.5071	82.0000	222.0603	117.0000	-300.3296	8980.0	7709.6	17204.0	16256.0	2.6565	2.7519
1973	869.5200	880.1301	144.0000	-14.8544	89.0000	-333.0321	11009.0	9387.0	21284.0	21230.3	2.5941	2.6576
1974	1098.2	1097.7	-159.0000	-147.1117	-576.0000	-1063.0	15560.0	13294.7	28047.0	28990.2	2.1573	2.1406
1975	1046.2	1007.8	-244.0000	153.9192	-369.0000	1040.4	23988.0	17615.7	41406.0	38916.9	2.5722	2.6865
1976	2325.1	2413.8	-848.0000	-1355.2	-1263.0	844.0494	26983.0	22919.7	51187.0	50338.2	2.6933	2.8337
1977	2632.3	3089.4	-160.0000	-522.8069	-12.0000	723.5105	34000.0	28286.4	63535.0	65497.9	2.9524	3.1483
1978	3221.2	3506.6	-341.0000	-126.1647	1416.0	653.6069	41134.0	34414.5	73180.0	71189.0	3.2657	3.3762
1979	3876.3	3630.3	-256.0000	310.6774	-244.0000	-336.1313	43886.0	40485.9	84043.0	81778.4	3.1800	3.5212
1980	5815.1	6039.5	-1369.0	-1869.3	-2866.0	-3780.3	49915.0	48112.9	103744.0	99837.9	3.3462	3.4225
1981	9158.1	10065.3	-2651.0	-3307.1	2658.0	2170.7	53482.0	55190.7	124691.0	126170.8	3.5862	3.6890
1982	14025.5	12662.4	-4121.0	-1776.8	7817.0	7987.7	49013.0	46861.6	129136.0	129886.1	4.0068	4.3183
1983	15327.1	12196.3	-804.0000	1641.1	-302.0000	1071.6	64294.0	59734.3	163272.0	164096.6	4.6166	4.5005
1984	18733.0	13853.3	-1313.0	-682.4956	-1107.0	1370.6	69100.0	64740.7	177567.0	179600.4	4.2634	4.6309

TABLE 4.3

DYNAMIC MULTIPLIERS ON SELECTED VARIABLES

INCREASE IN GOVERNMENT EXPENDITURE. MONEY FINANCED CASE

											CU/GDP	
YEAR	GDPREAL	CONNDURR	CONDURR	INVPRIR	IMPCGSR	IMPKRGR	IMPORTS	EXPORTS	M1	INFLATION	1	2
1979	0.715	0.07	0.06	-0.06	0.06	0.06	0.24	0.04	0.17	0.4	2.8	0.8
1980	0.81	0.08	0.08	-0.50	0.11	0.11	0.46	0.10	0.37	1.1	12.33	10.60
1981	0.78	0.28	0.08	0.01	0.19	0.15	0.78	0.19	0.50	1.9	8.89	6.85
1982	0.61	0.38	0.06	0.02	0.28	0.18	1.19	0.13	0.52	2.4	0.31	-2.29
1983	0.99	0.51	0.06	0.01	0.12	0.22	0.94	0.17	0.94	3.1	9.58	8.27
1984	0.42	0.51	0.04	0.03	0.16	0.29	1.40	0.08	0.97	3.3	9.26	8.17
Mean	0.72	0.32	0.06	-0.43	0.15	0.17	0.78	0.12	0.57	2.03	7.19	5.40

TABLE 4.4

DYNAMIC MULTIPLIERS ON SELECTED VARIABLES

INCREASE IN GOVERNMENT EXPENDITURE. BOND FINANCED.

											CU/GDP	
YEAR	GDPREAL	CONNDURR	CONDURR	INVPRIR	IMPCGSR	IMPKRGR	IMPORTS	EXPORTS	INTER	INFLATION	1	2
1979	0.37	0.03	0.01	-0.32	0.03	0.19	0.13	0.03	0.03	0.002	0.8	1.1
1980	0.38	0.08	0.02	-0.28	0.05	0.06	0.23	0.07	0.04	0.005	10.6	11.2
1981	0.40	0.12	0.02	-0.25	0.09	0.07	0.39	0.11	0.05	0.011	6.9	7.7
1982	0.30	0.16	0.01	-0.27	0.14	0.09	0.59	0.09	0.05	0.012	2.3	-1.5
1983	0.71	0.24	0.01	-0.17	0.07	0.12	0.53	0.14	0.10	0.018	8.3	9.3
1984	0.11	0.24	0.01	-0.17	0.08	0.16	0.75	0.03	0.03	0.018	8.2	7.9
Mean	0.38	0.14	0.01	-0.23	0.08	0.12	0.44	0.08	0.05	0.011	7.2	5.95

TABLE 4.5

DYNAMIC MULTIPLIERS ON SELECTED VARIABLES
RESTRICTIVE MONETARY POLICY. REDUCTION IN DOMESTIC CREDIT (20%)

											CV/GDP	
YEAR	GDPREAL	CONDURR	CONNDURR	INVPRIR	IMPCGSR	IMPKRGR	IMPORTS	EXPORTS	M1	INFLATION	1	2
1979	0.20	0.01	0.01	0.01	0.01	0.01	0.07	0.38	0.05	0.00	0.8	1.14
1980	0.80	0.07	0.00	0.01	0.09	0.09	0.39	0.10	0.30	0.00	10.6	11.5
1981	0.76	0.07	0.06	0.00	0.16	0.12	0.66	0.75	0.43	0.00	6.9	8.0
1982	0.28	0.03	0.05	0.01	0.13	0.08	0.55	1.33	0.24	0.00	-2.3	-1.3
1983	0.74	0.04	0.09	0.00	0.08	0.15	0.62	1.93	0.63	0.00	8.3	10.0
1984	0.01	0.00	0.02	0.01	0.04	0.07	0.33	0.47	0.22	0.00	8.2	8.4
Mean	0.46	0.03	0.04	0.00	0.26	0.08	0.43	0.77	0.31	0.00	7.2	6.29

TABLE 4.6

DIFFERENCES (%) BETWEEN ACTUAL AND FITTED VALUES
RESTRICTIVE MONETARY POLICY. INTEREST RATE INCREASE (2pts)

											CU/GDP	
YEAR	GDPREAL	CONNDURR	CONDURR	INVPRIR	IMPCGSR	IMPKRGR	IMPORTS	EXPORTS	M1	INFLATION	1	2
1979	-8.6	-1.7	-17.45	-23.3	-4.6	-4.7	-4.6	1.2	-8.0	-1.92	0.8	2.8
1980	-4.7	-2.9	-18.62	-37.7	-6.9	-8.4	-7.6	2.9	-12.0	-2.72	10.6	14.2
1981	-2.9	-3.25	-17.64	-42.7	-8.5	-10.5	-9.38	4.8	-14.2	-2.83	6.9	11.1
1982	-1.5	-3.0	-15.0	-44.7	-8.9	-10.3	-9.5	5.6	-15.0	-2.96	2.3	1.9
1983	-3.3	-1.7	-17.6	-46.3	-6.9	-6.3	-6.5	9.8	-14.0	-2.66	8.3	11.7
1984	-1.3	-1.27	-11.6	-44.3	-2.9	-2.9	-4.4	3.2	-15.0	-2.72	8.2	10.4

TABLE 4.7

DYNAMIC MULTIPLIERS ON SELECTED VARIABLES.
RESTRICTIVE MONETARY POLICY. INCREASE IN THE VOLUME OF REQUIRES RESERVES.

											CU/GDP	
YEAR	GDPREAL	CONNDURR	CONDURR	INVPRIR	IMPCGSR	IMPKRGR	IMPORTS	EXPORTS	M1	INFLATION	1	2
1979	0.53	0.05	0.04	0.04	0.05	0.05	0.18	0.50	0.13	0.01	0.8	0.2
1980	1.30	0.19	0.11	0.03	0.15	0.14	0.60	2.9	0.47	0.03	10.6	10.4
1981	1.46	0.35	0.14	0.00	0.30	0.23	1.25	2.5	0.82	0.05	6.9	6.8
1982	1.10	0.49	0.12	0.03	0.47	0.30	1.98	2.0	0.88	0.08	-2.3	-1.4
1983	1.65	0.56	0.10	0.00	0.17	0.32	1.34	2.0	1.37	0.18	8.3	9.1
1984	0.31	0.50	0.04	0.06	0.19	0.38	1.76	0.8	1.18	0.10	8.2	8.1
Mean	1.09	0.35	0.09	0.02	0.22	0.23	1.18	1.78	0.83	0.07	7.2	5.53

TABLE 4.8

DIFFERENCES (%) BETWEEN ACTUAL AND FITTED VALUES

RELAXATION OF MONETARY CONSTRAINTS. ELIMINATION OF REQUIRED RESERCES

											CU/GDP	
YEAR	GDPREAL	CONNDURR	CONDURR	INVPRIR	IMPCGSR	IMPKRGR	IMPORTS	EXPORTS	M1	INFLATION	1	2
1979	0.57	0.11	0.8	-0.41	0.29	0.30	0.30	1.61	0.3	0.01	0.8	0.2
1980	2.36	2.66	3.76	-0.65	1.53	1.66	1.59	3.55	1.4	0.06	10.6	10.1
1981	3.74	5.21	8.2	0.24	3.76	4.05	3.0	4.4	3.0	0.14	6.9	7.1
1982	4.51	8.2	10.1	0.54	6.17	7.03	6.5	3.6	4.8	0.24	-2.3	-2.2
1983	7.25	10.6	15.0	0.41	9.97	11.28	10.8	4.0	7.6	0.37	8.3	7.1
1984	5.21	13.7	15.0	2.8	12.94	14.06	13.7	2.25	9.0	0.45	8.2	6.1

TABLE 4.9

DYNAMIC MULTIPLIERS ON SELECTED VARIABLES

EXCHANGE RATE DEVALUATION (25%)

											CU/GDP	
YEAR	GDPREAL	CONNDURR	CONDURR	INVPRIR	IMPCGSR	IMPKRGR	IMPORTS	EXPORTS	M1	INFLATION	1	2
1979	-0.10	-0.05	-0.00	0.001	0.05	0.13	0.35	0.05	0.37	4.5	0.8	-1.0
1980	-0.26	-0.05	-0.15	0.006	0.10	0.29	0.50	0.10	0.49	1.9	10.6	7.8
1981	-0.33	-0.08	-0.20	-0.01	0.13	0.43	0.54	0.14	0.47	0.83	6.9	4.2
1982	-0.36	-0.12	-0.30	-0.08	0.22	0.56	0.50	0.16	0.40	0.37	2.3	-4.2
1983	-0.29	-0.15	-0.24	-0.16	0.28	0.63	0.34	0.28	0.36	0.08	8.3	7.8
1984	-0.30	-0.16	-0.20	-0.15	0.34	0.39	0.27	0.12	0.30	-0.10	8.2	7.0
Mean	-0.27	-0.18	-0.19	-0.06	0.18	0.45	0.41	0.14	0.39	1.26	7.2	3.6

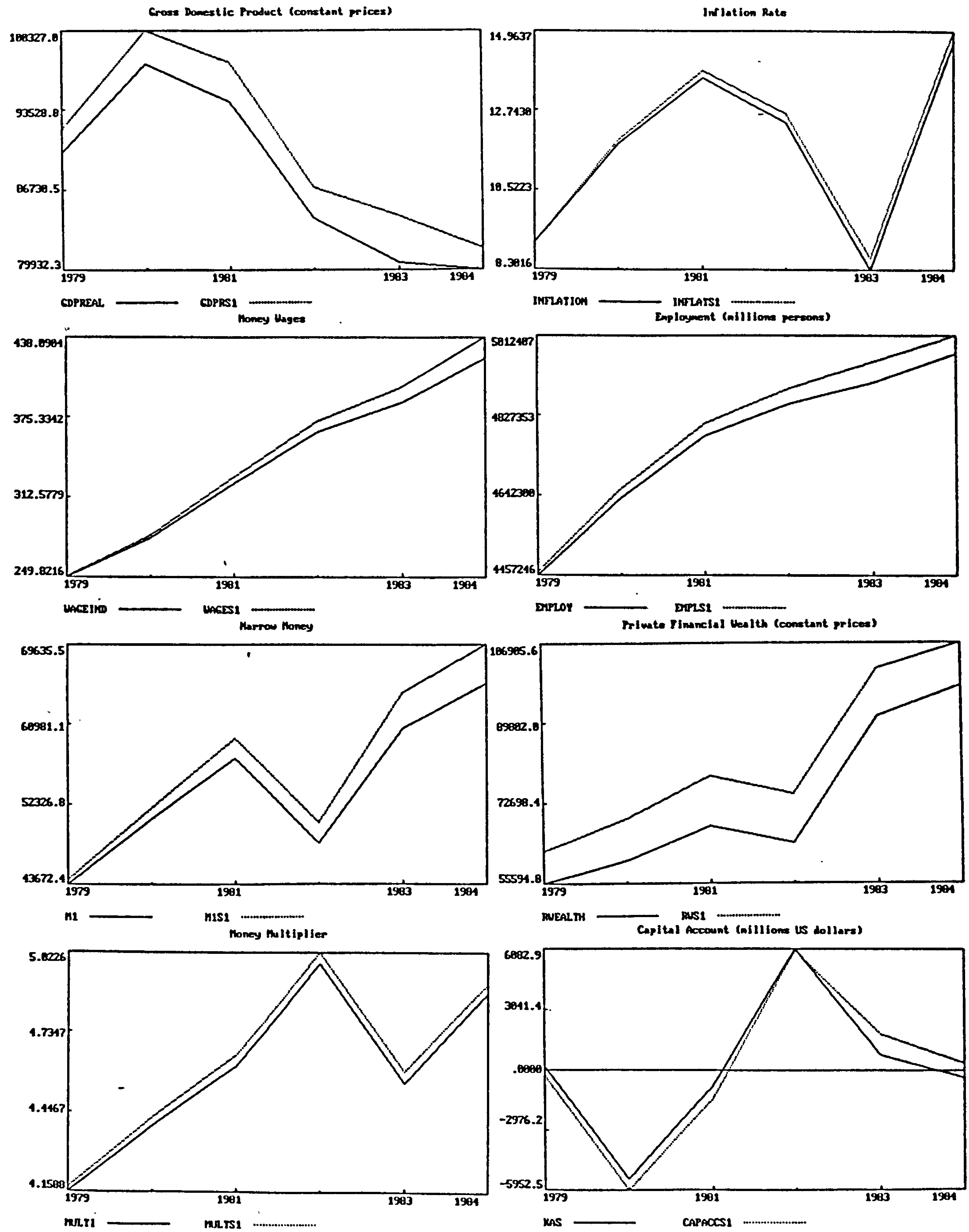
TABLE 4.10

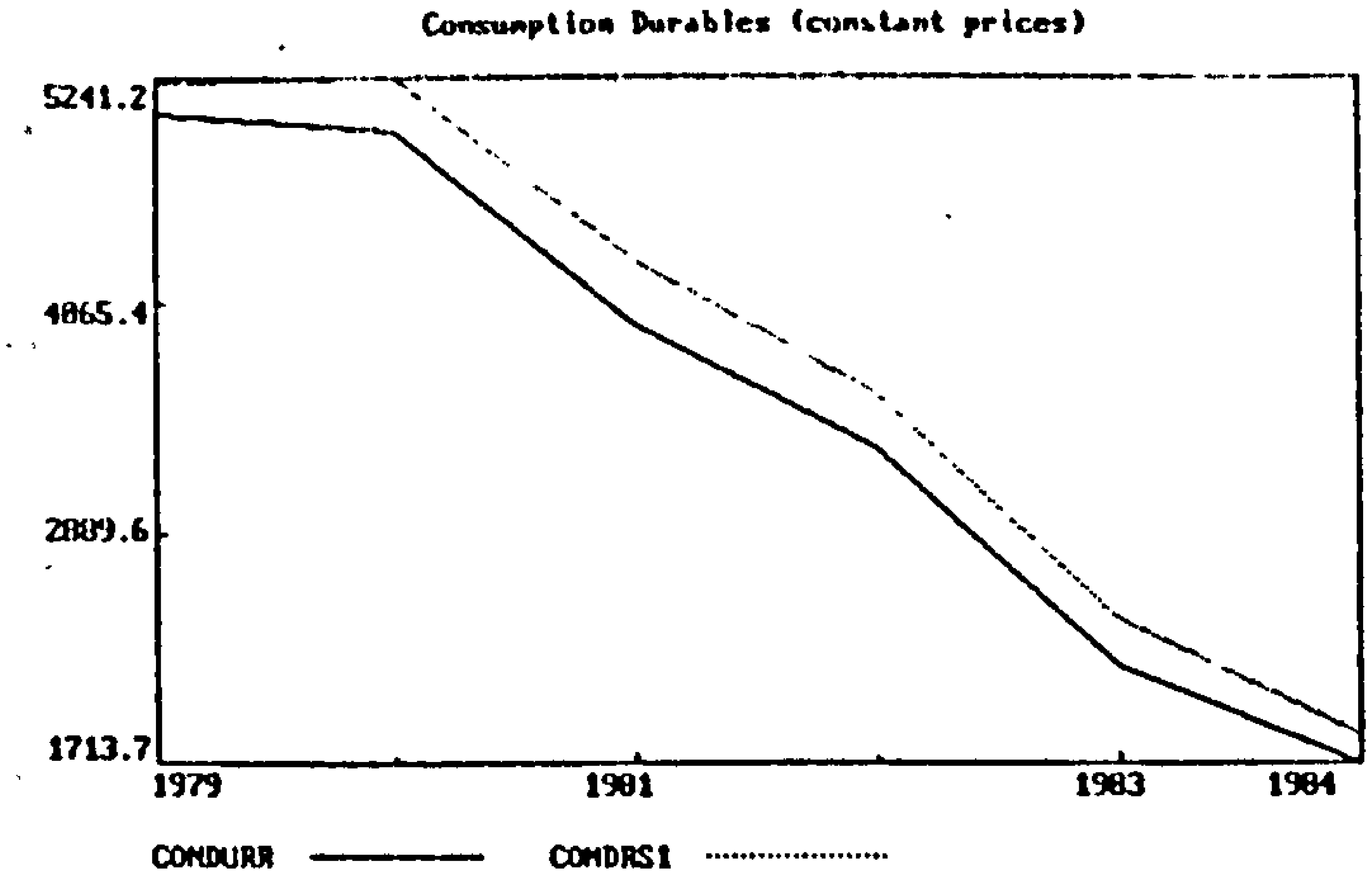
DYNAMIC MULTIPLIERS ON SELECTED VARIABLES
EXTERNAL SHOCK. OIL PRICE INCREASE

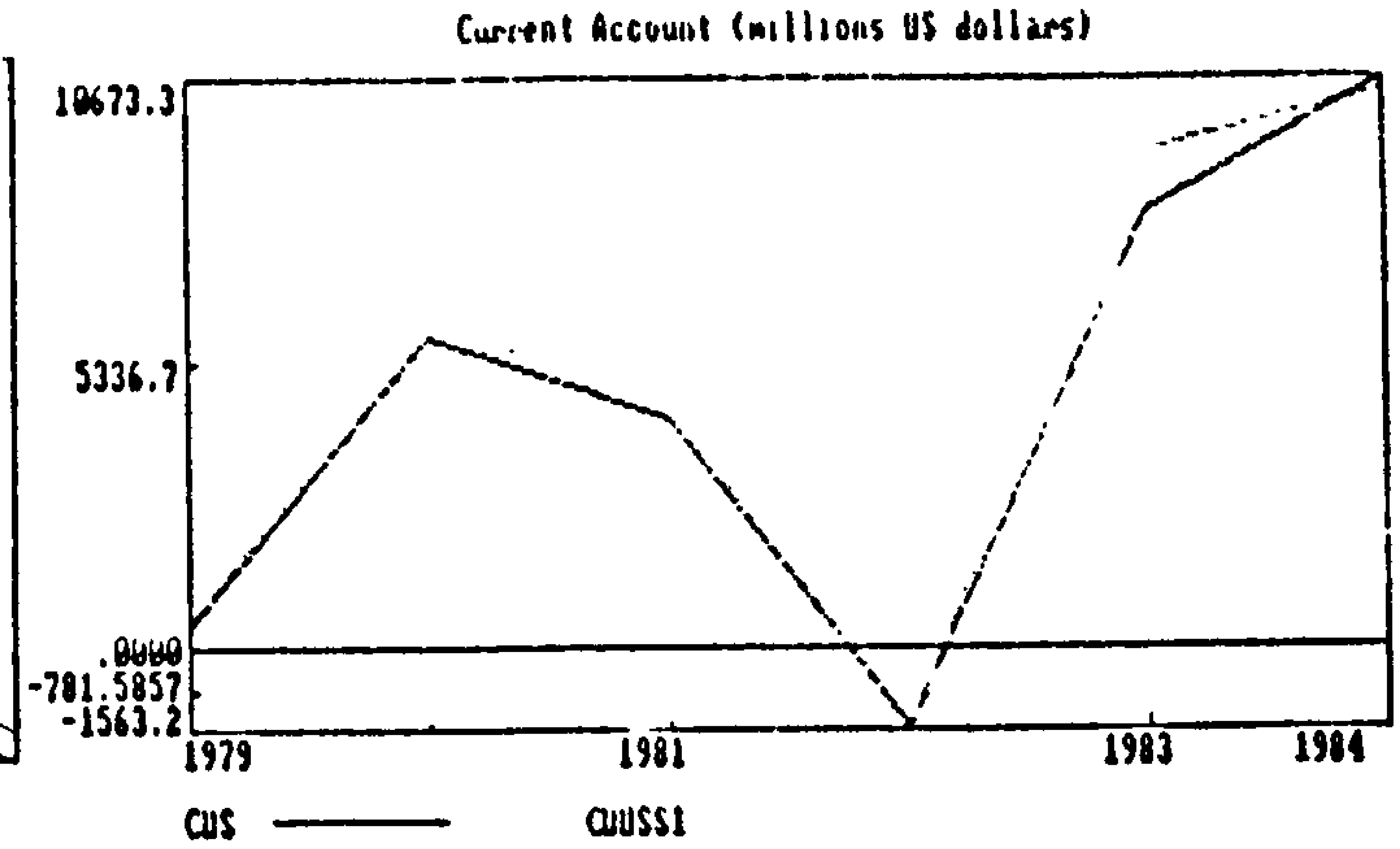
YEAR	GDPREAL	CONDURR	CONNDURR	INVPRIR	IMPCGSR	IMPKRGR	IMPORT	EXPORTS	M1	INFLATION	CU/GDP 1	CU/GDP 2
1979	0.34	0.36	0.05	0.13	0.13	0.18	0.15	1.00	0.17	0.00	0.8	5.4
1980	0.36	0.49	0.10	0.01	0.26	0.44	0.34	1.10	0.32	0.01	10.6	14.8
1981	0.30	0.40	0.12	0.12	0.35	0.70	0.48	1.21	0.42	0.02	6.9	10.1
1982	0.21	0.27	0.12	0.17	0.40	0.79	0.53	1.22	0.45	0.02	-2.3	0.7
1983	0.26	0.36	0.13	0.12	0.50	0.83	0.70	1.37	0.52	0.02	8.3	11.0
1984	0.26	0.27	0.13	0.15	0.53	0.75	0.68	1.06	0.54	0.02	8.2	11.0
Mean	0.28	0.36	0.11	0.12	0.36	0.61	0.48	1.16	0.40	0.01	7.2	8.8

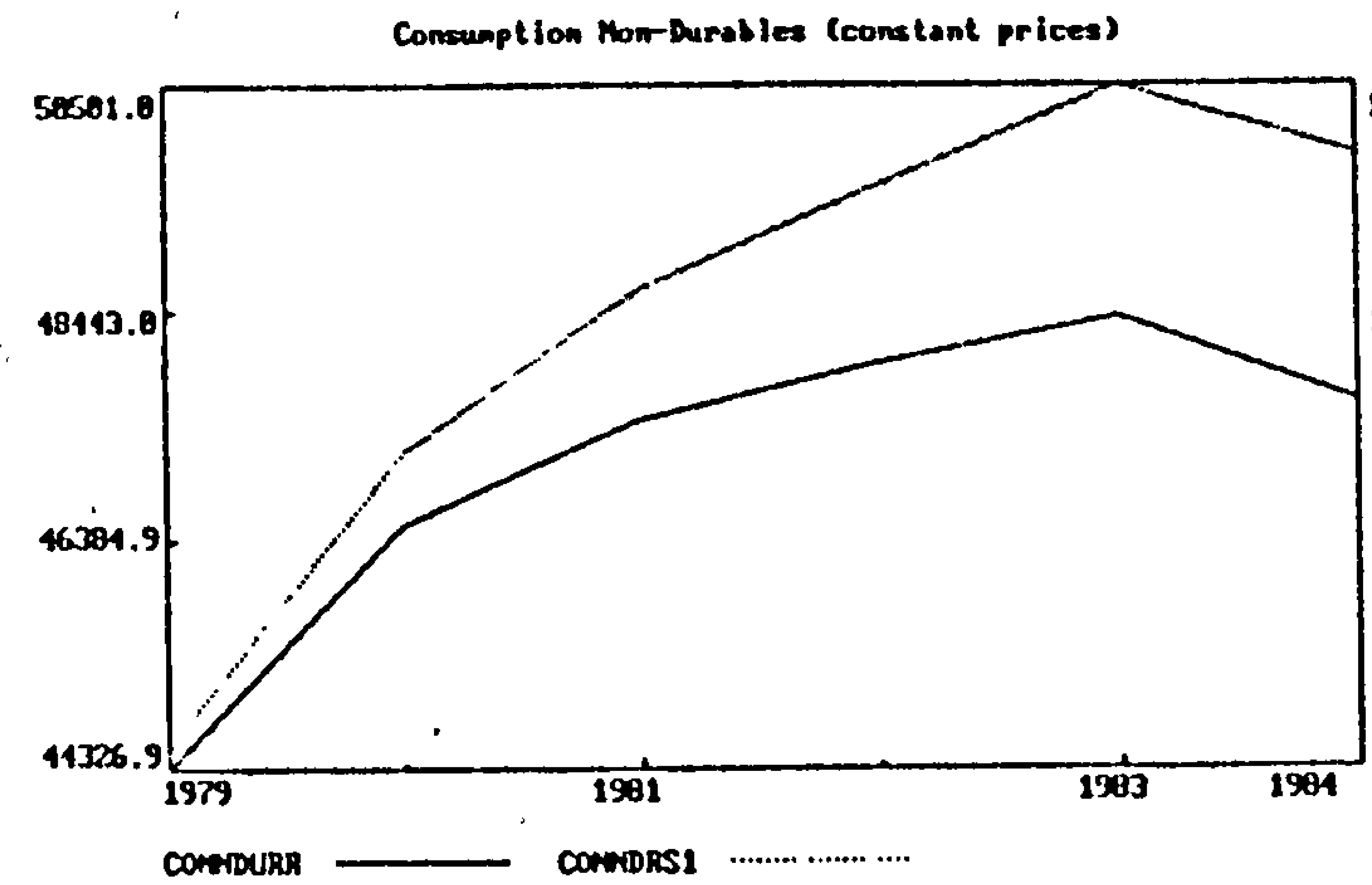
FIGURE 4.1

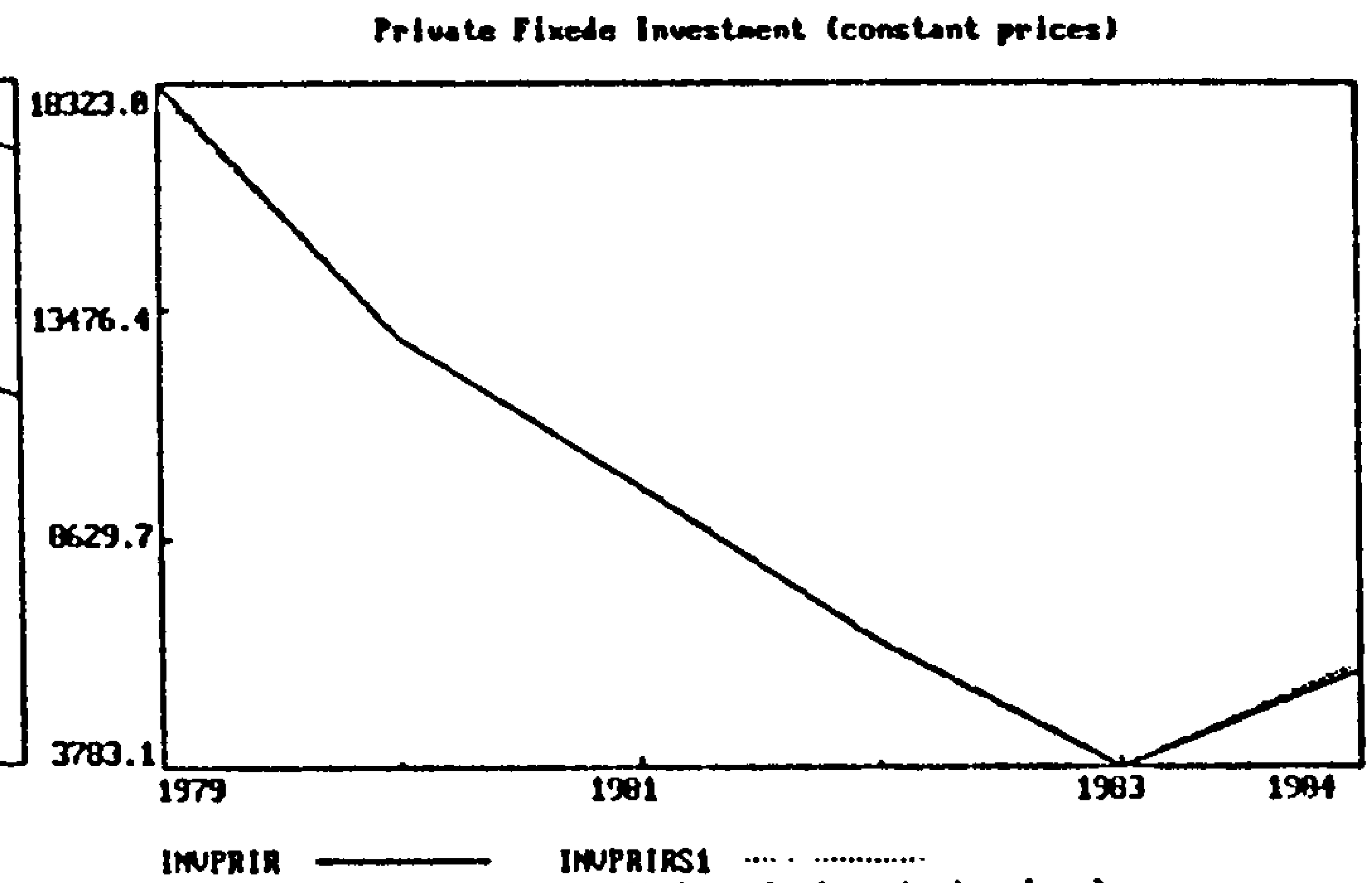
FISCAL POLICY. MONEY FINANCING

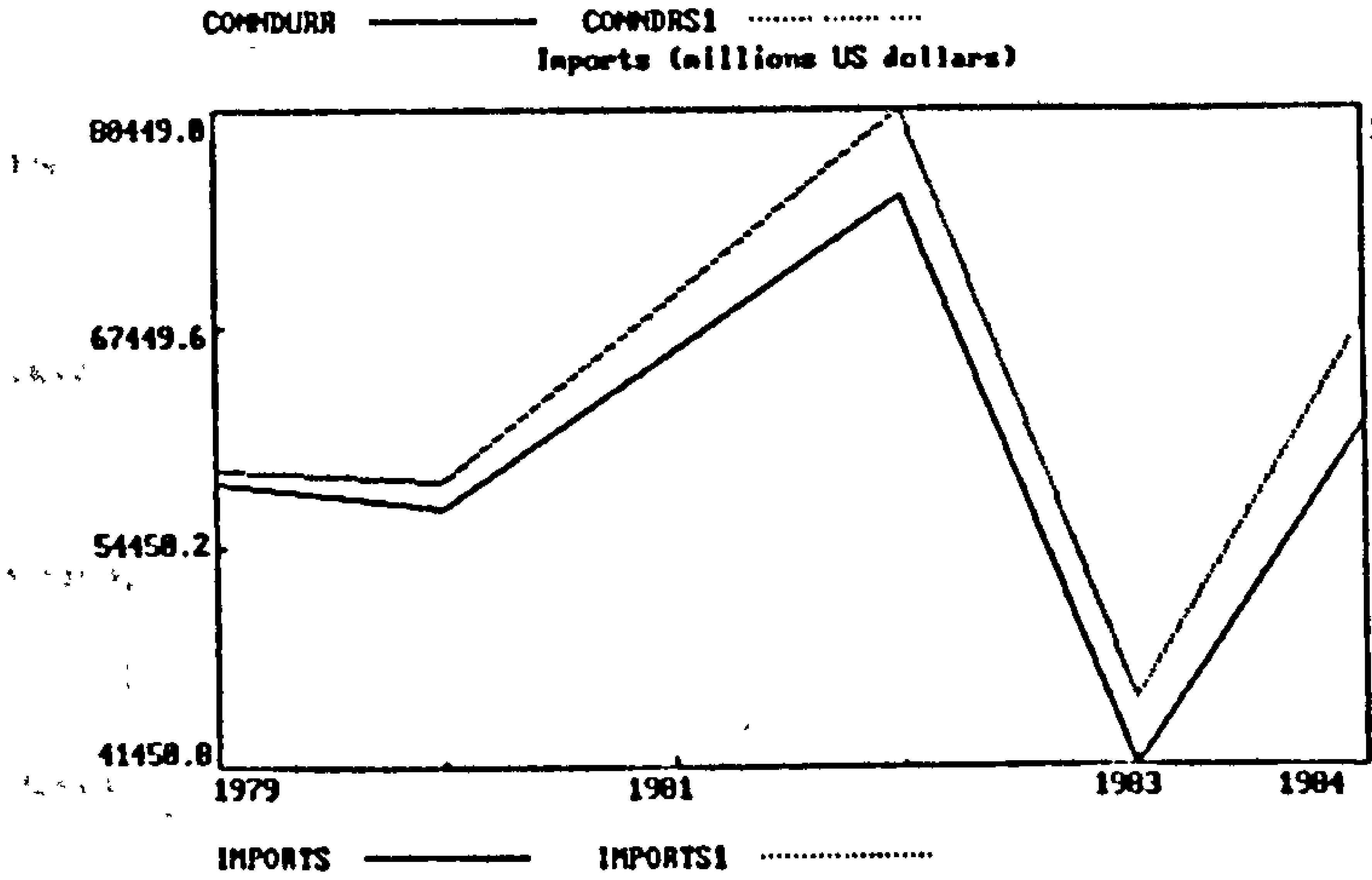


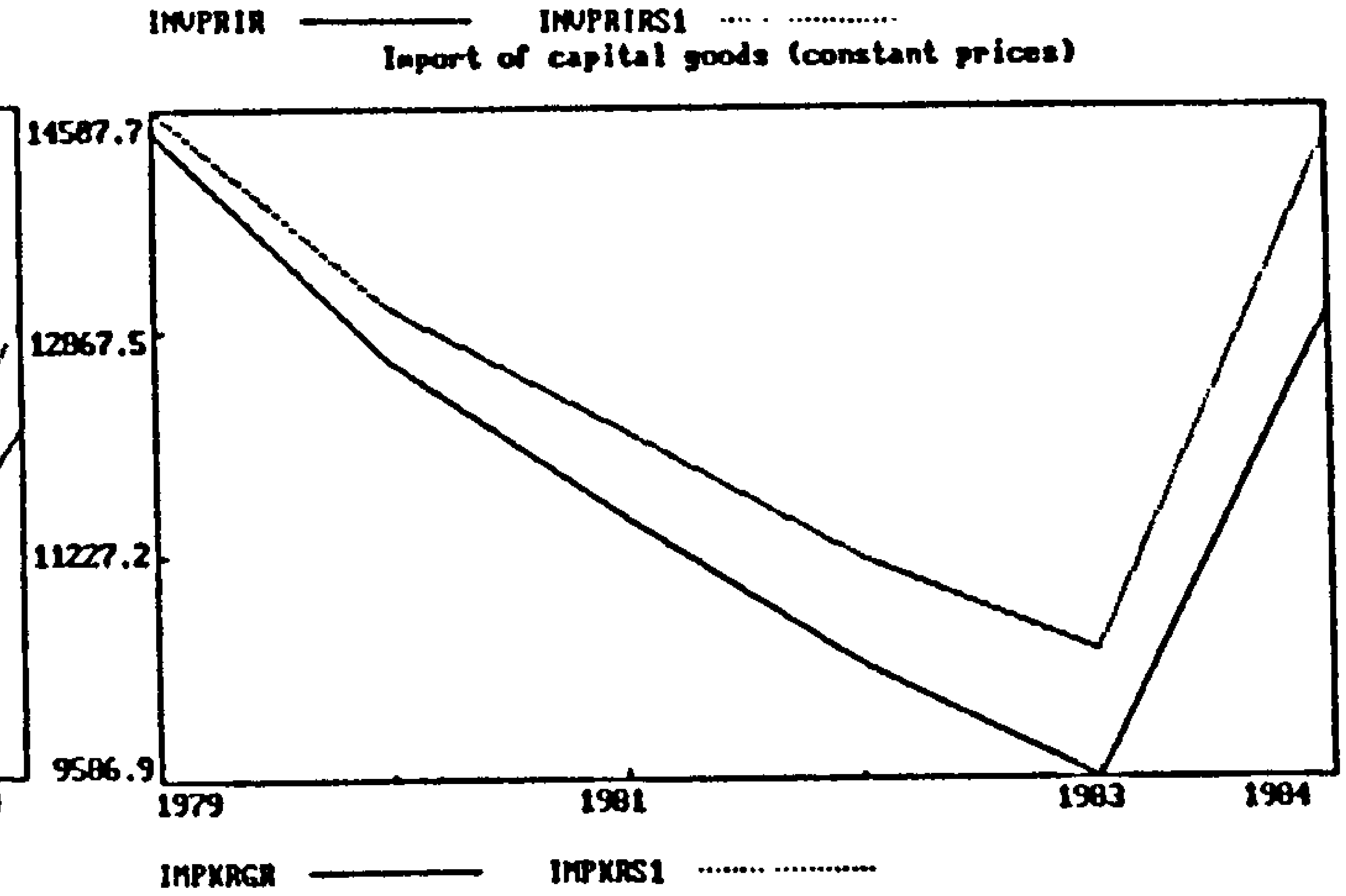

Consumption Durables (constant prices)
5241.2
4865.4
2889.6
1713.7
1979
1981
1983
1984
CONDURR
CONDRS1

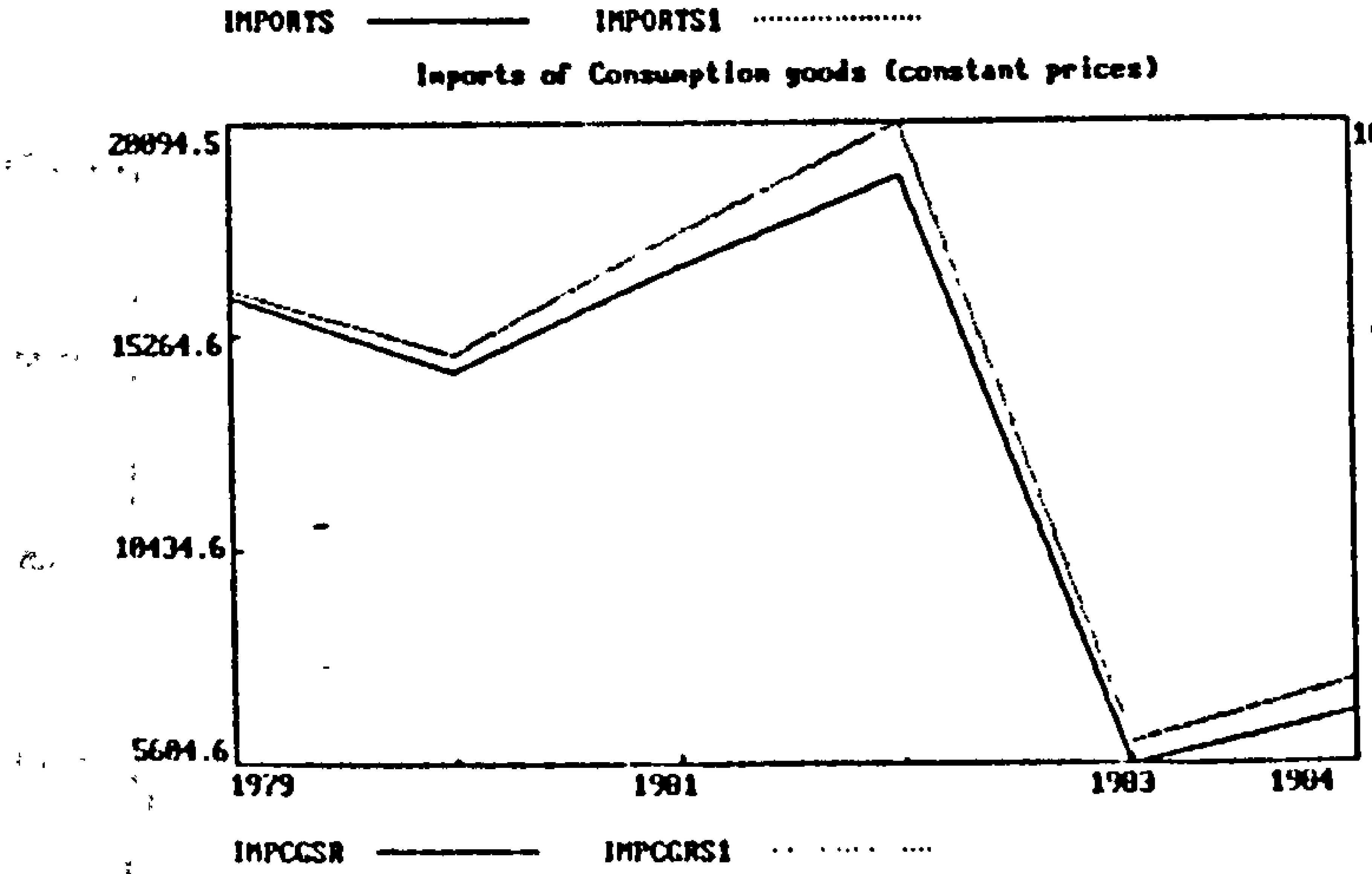

Current Account (millions US dollars)
10673.3
5336.7
.0000
-781.5857
-1563.2
1979
1981
1983
1984
CUS
CUUSS1


Consumption Non-Durables (constant prices)
50501.0
48443.0
46384.9
44326.9
1979
1981
1983
1984
COMNDURR
COMNDRS1


Private Fixede Investment (constant prices)
18323.8
13476.4
8629.7
3783.1
1979
1981
1983
1984
INVPRIR
INVPRIRS1


Imports (millions US dollars)
80449.0
67449.6
54450.2
41450.8
1979
1981
1983
1984
IMPORTS
IMPORTS1


Import of capital goods (constant prices)
14507.7
12867.5
11227.2
9586.9
1979
1981
1983
1984
IMPKRGR
IMPKRS1


Imports of Consumption goods (constant prices)
20094.5
15264.6
10434.6
5604.6
1979
1981
1983
1984
IMPCGSR
IMPCGRS1

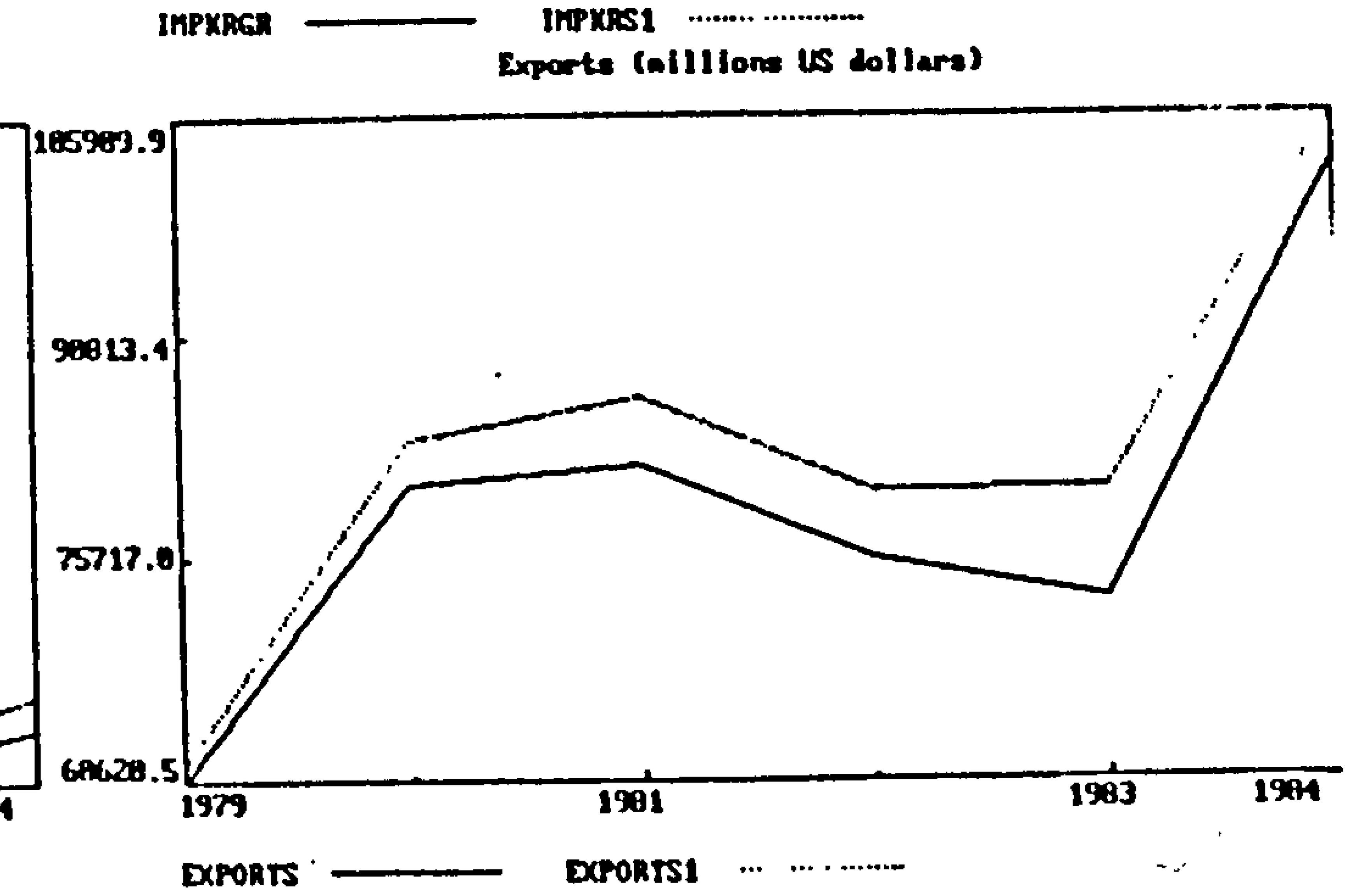
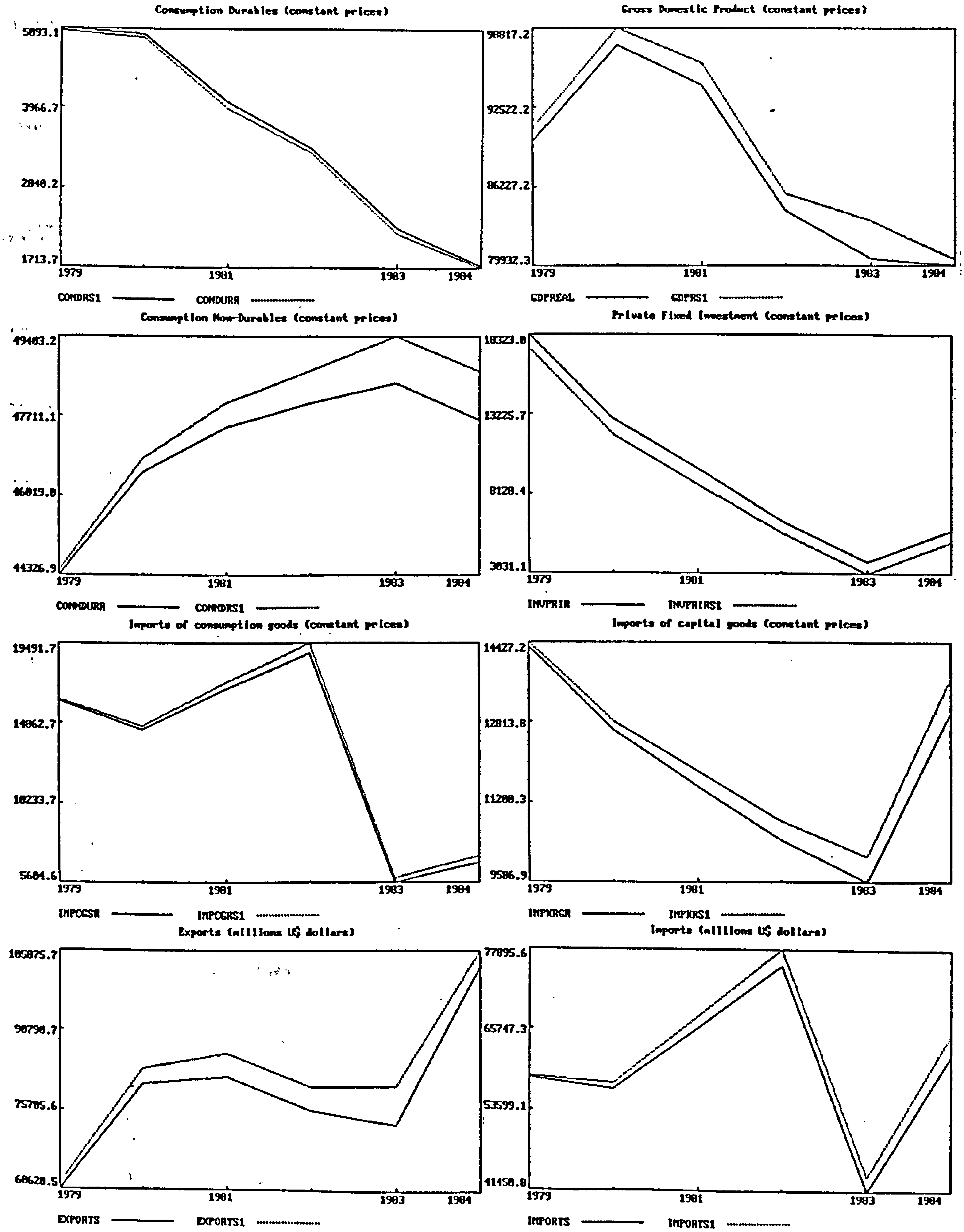
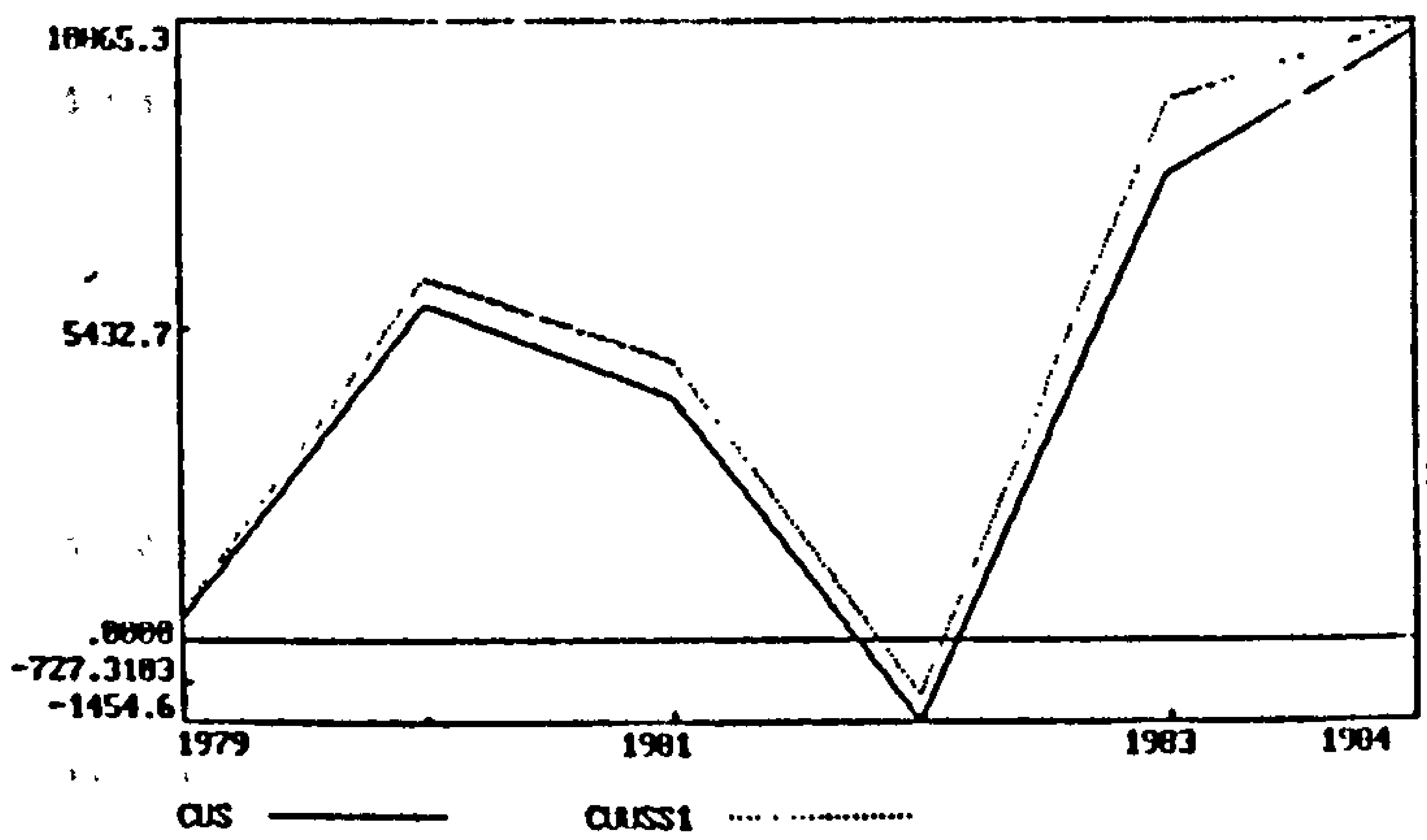

Exports (millions US dollars)
105909.9
90813.4
75717.0
60620.5
1979
1981
1983
1984
EXPORTS
EXPORTS1

FIGURE 4.2

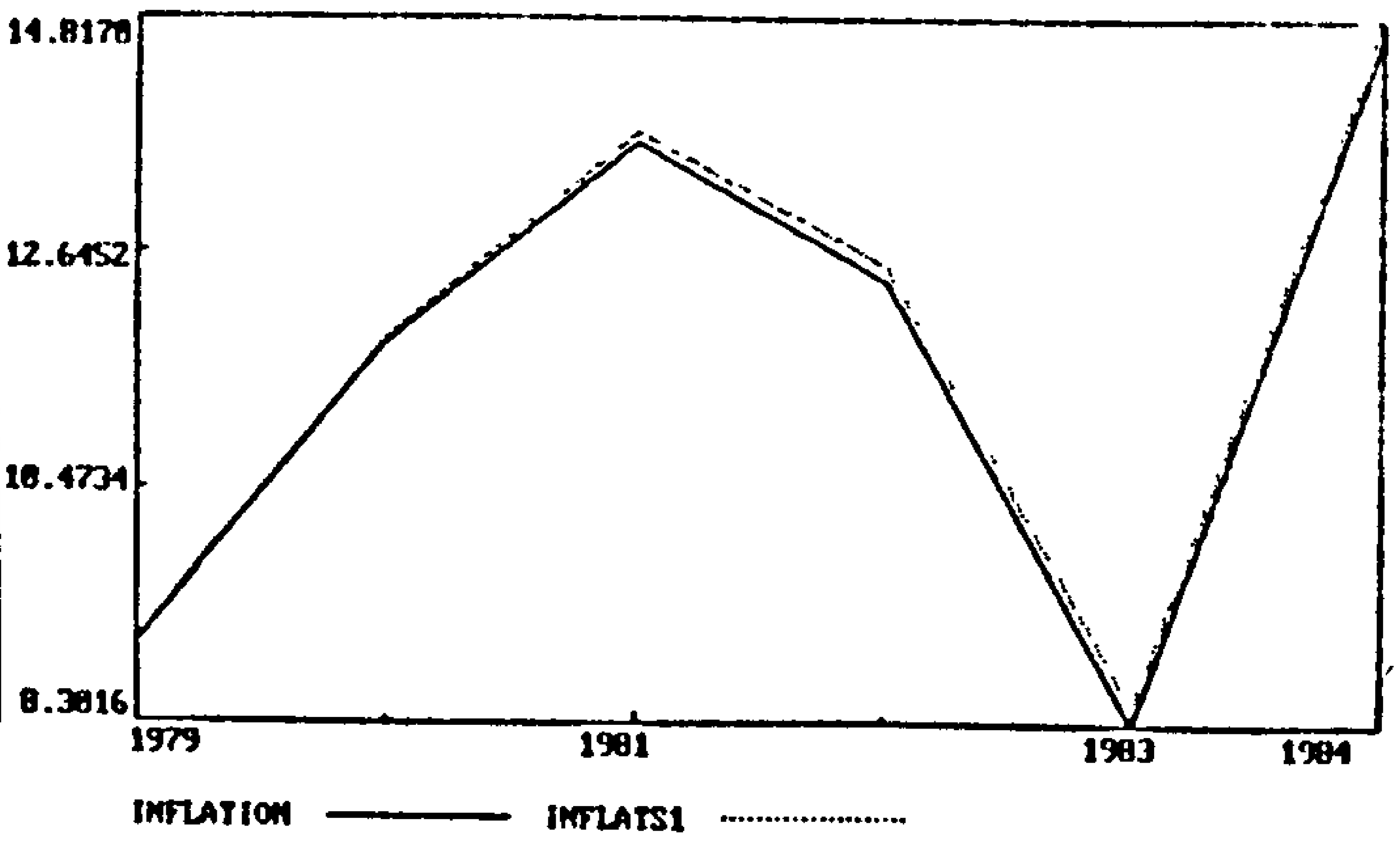
FISCAL POLICY. BOND FINANCING



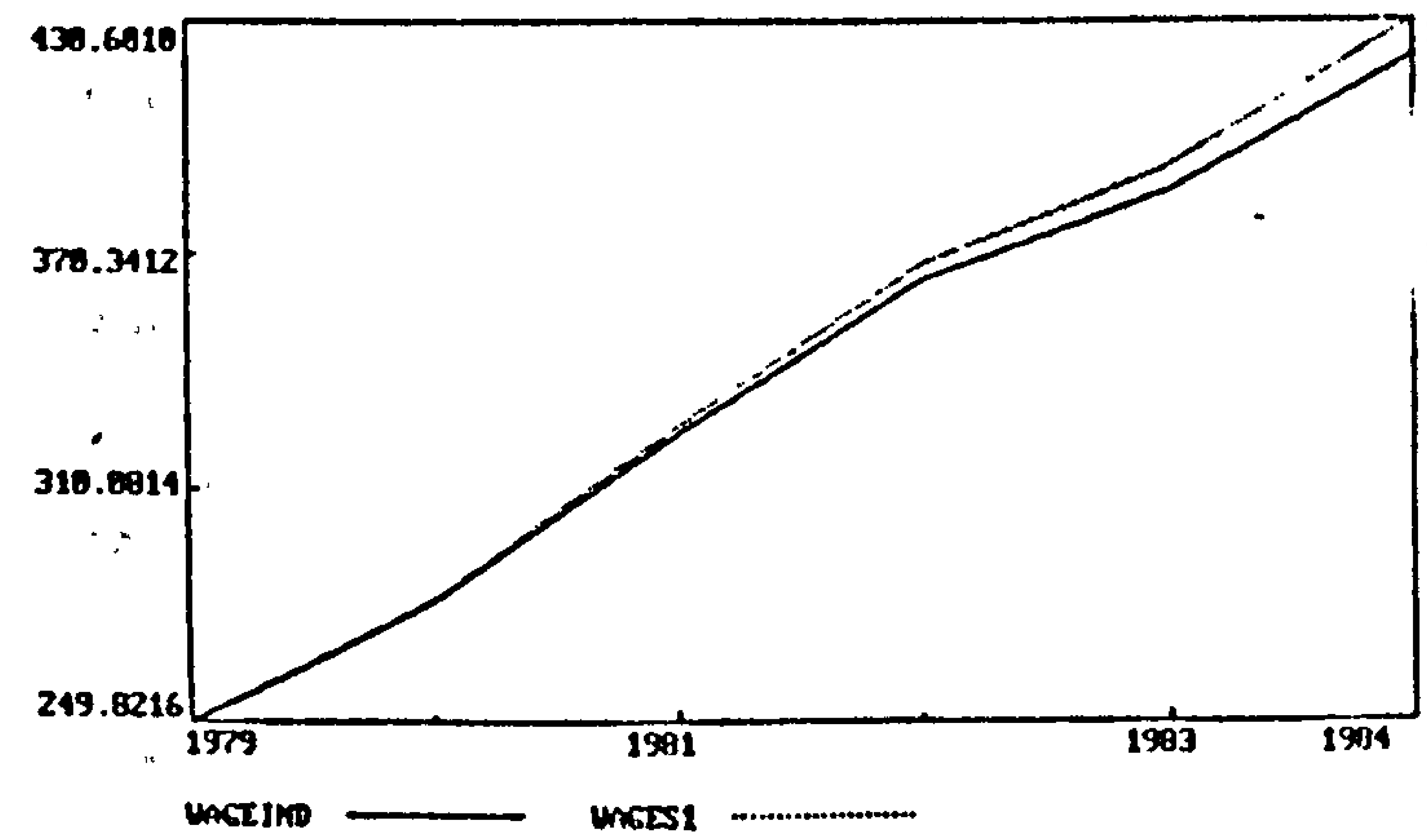
Current Account (millions US dollars)



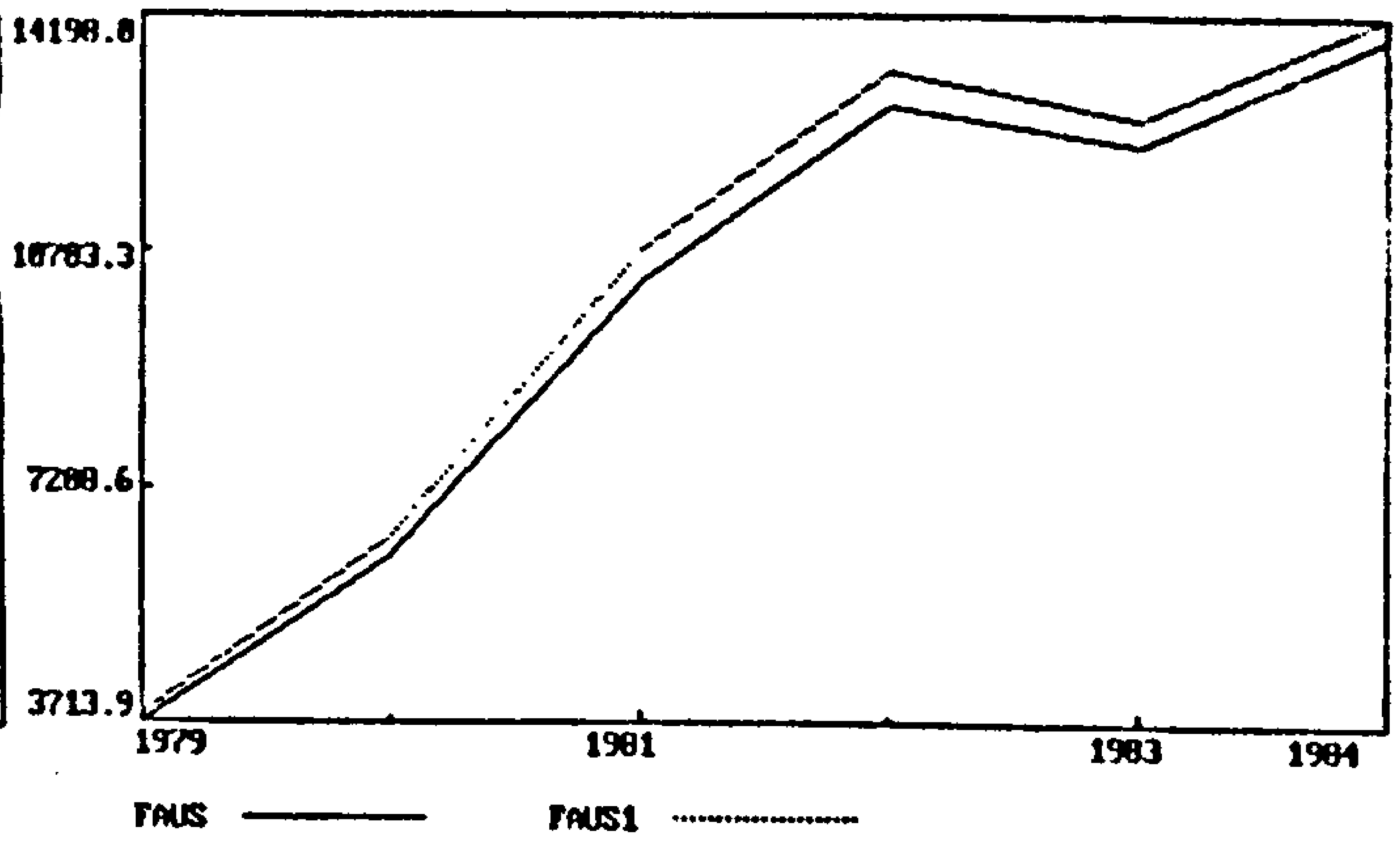
Inflation Rate



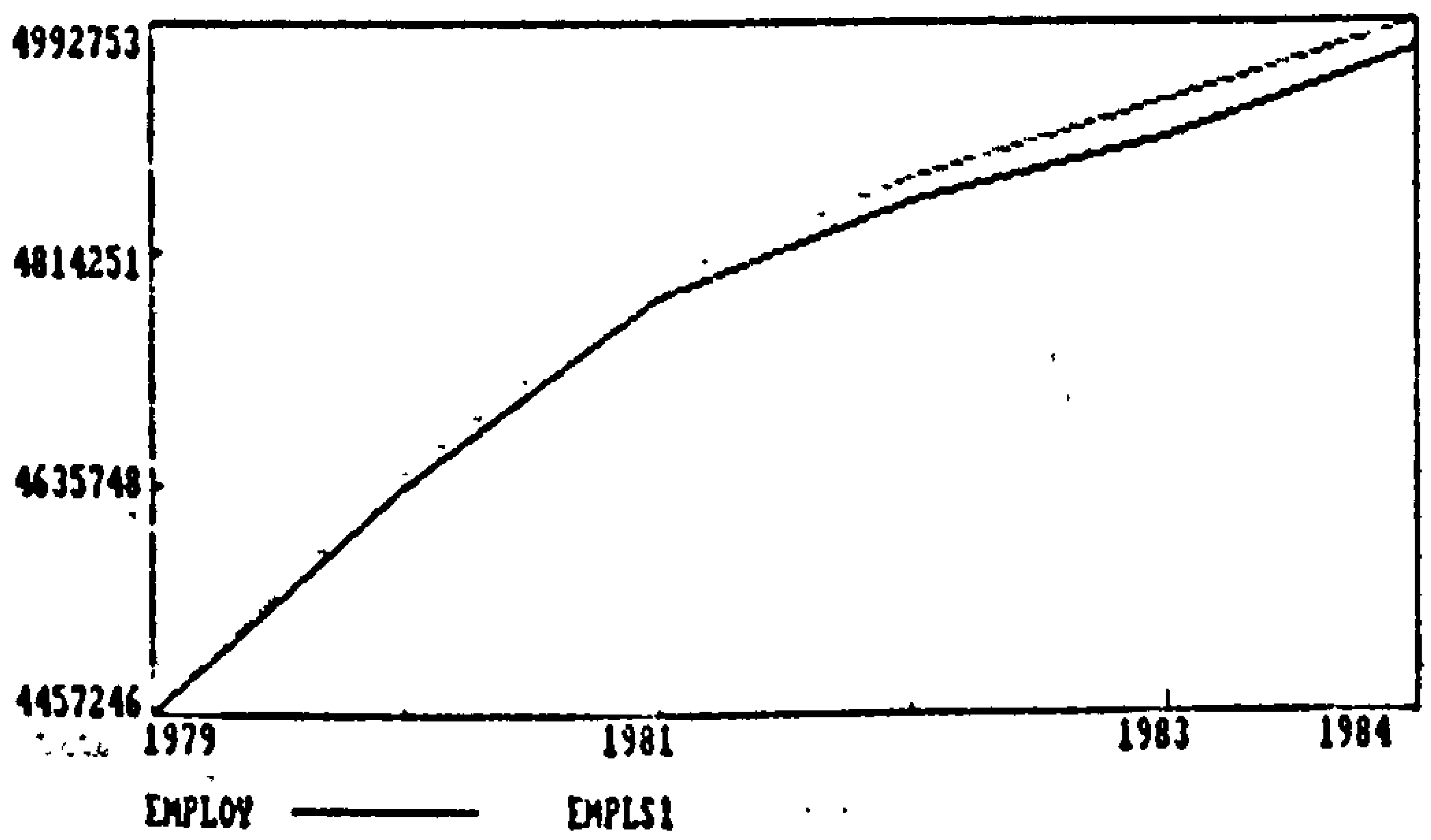
Money Wages Index



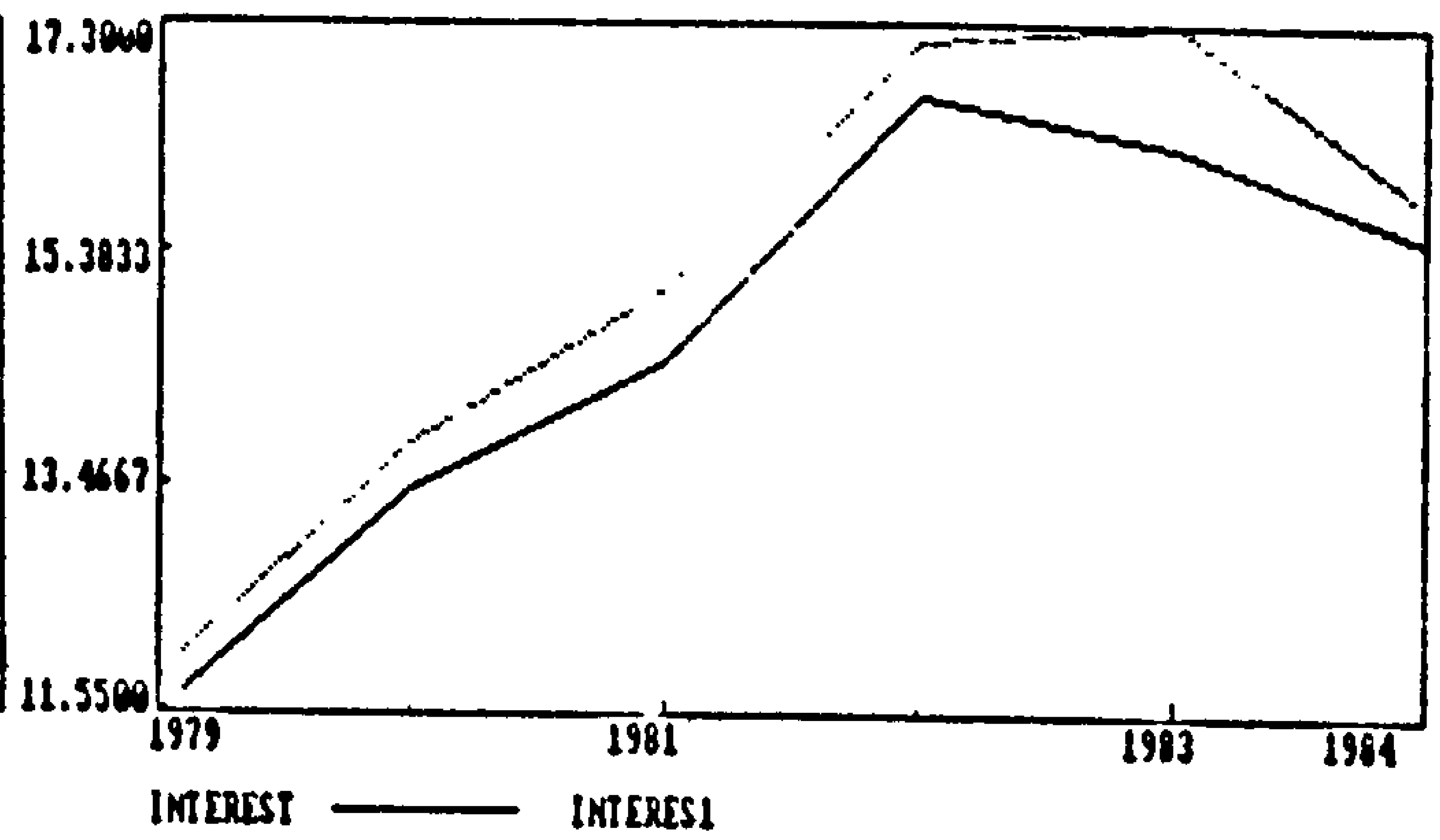
Private Sector Foreign Asset (millions US dollars)



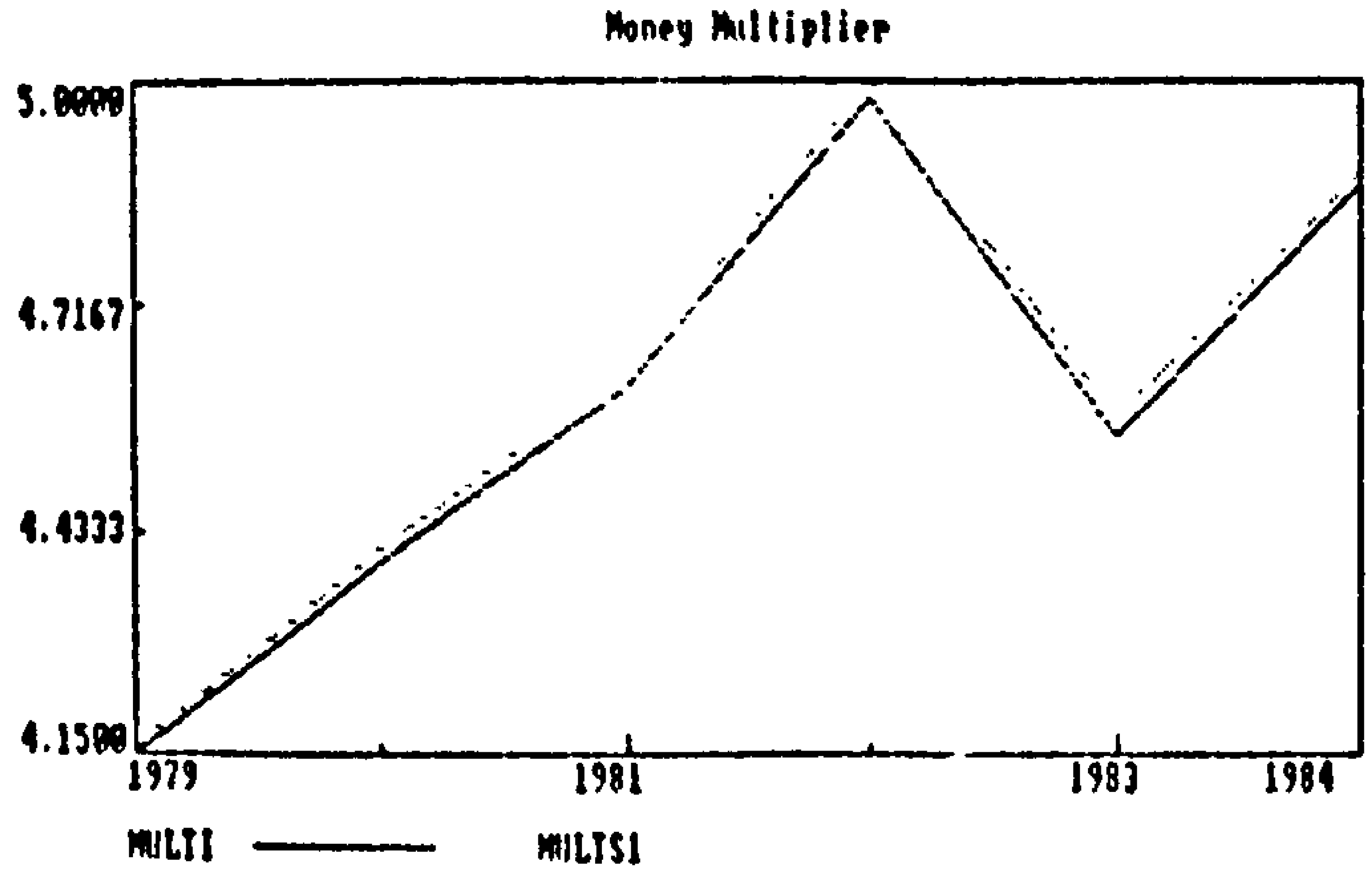
Employment (millions persons)



Interest Rate

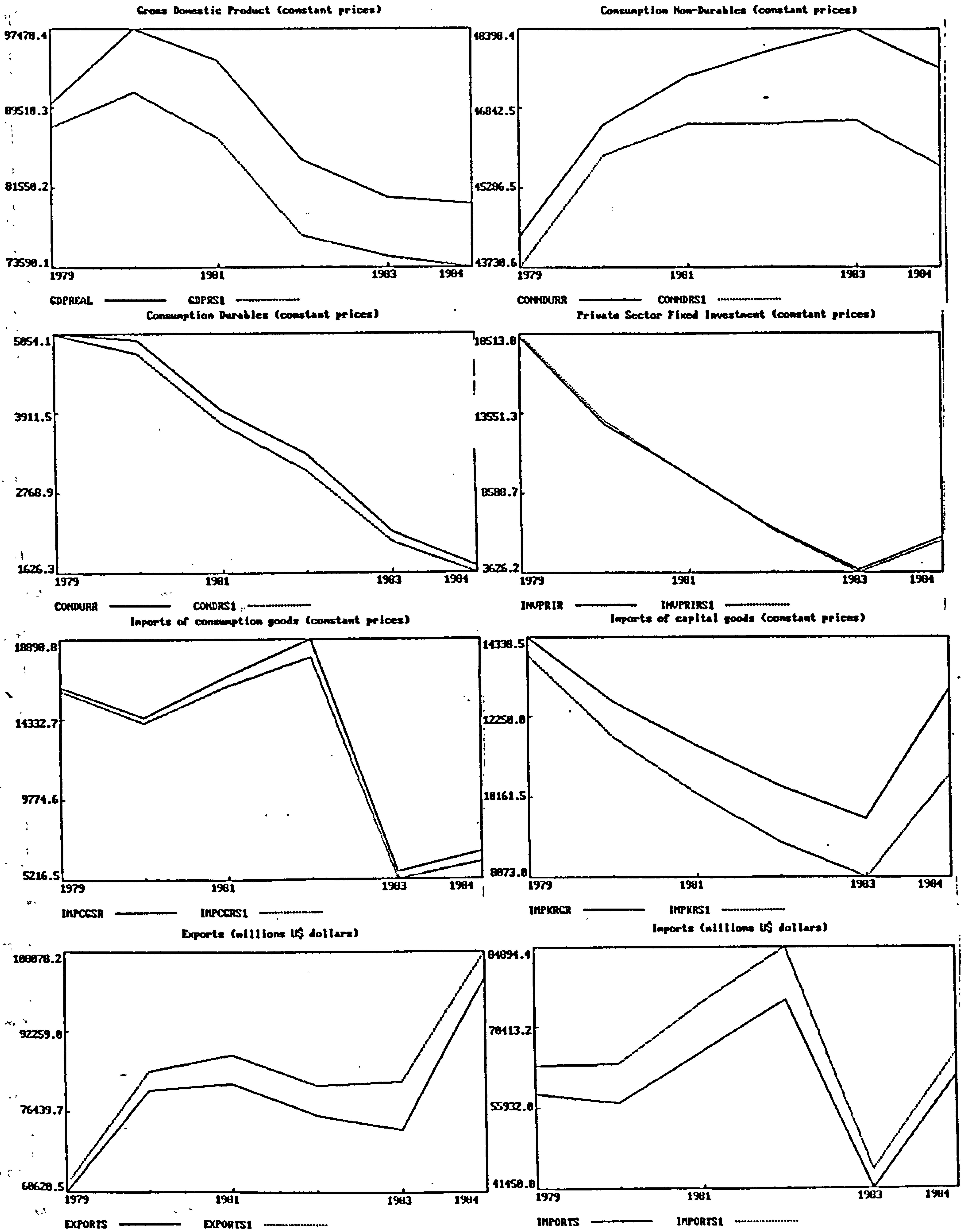


Money Multiplier

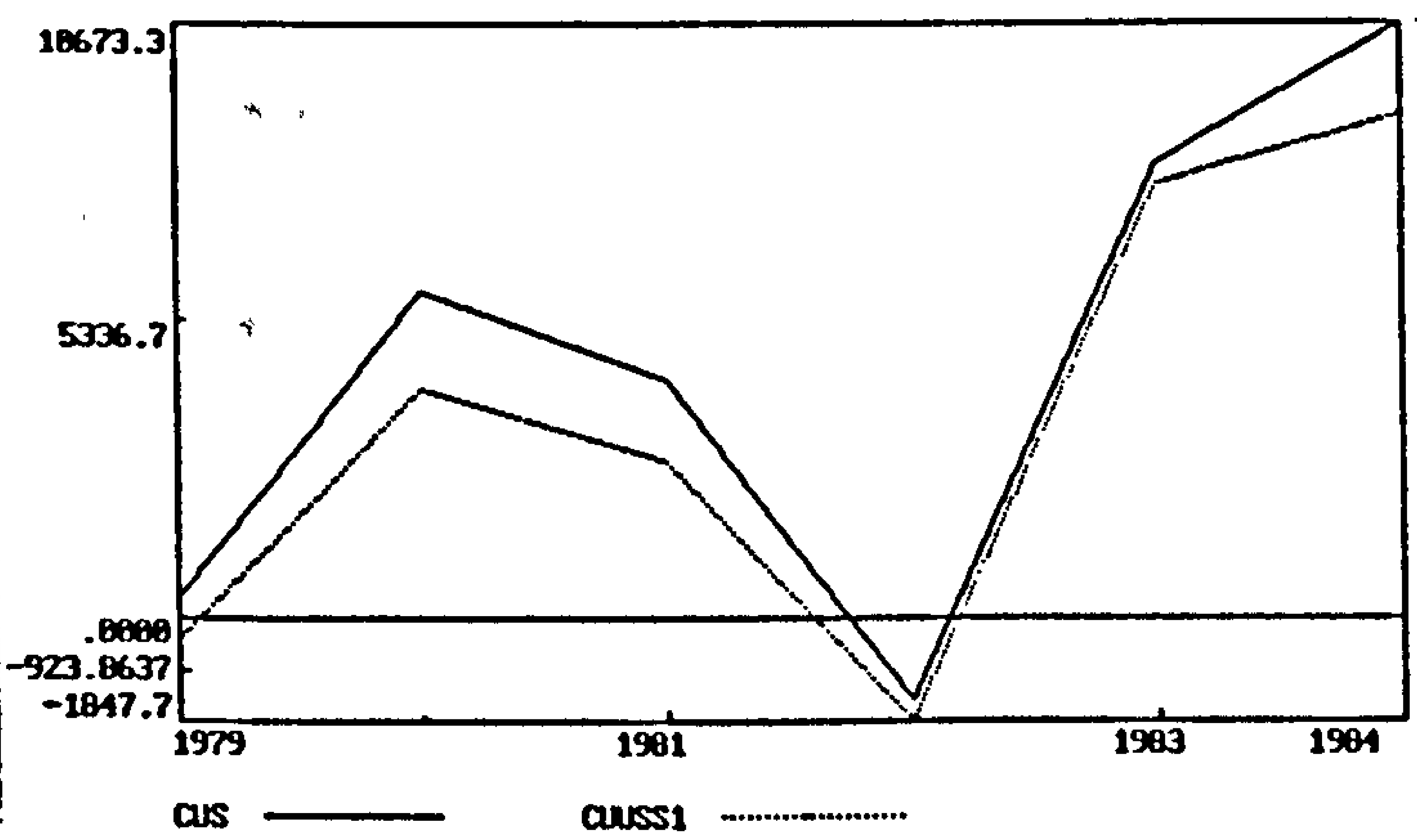


FIGURES 4.3

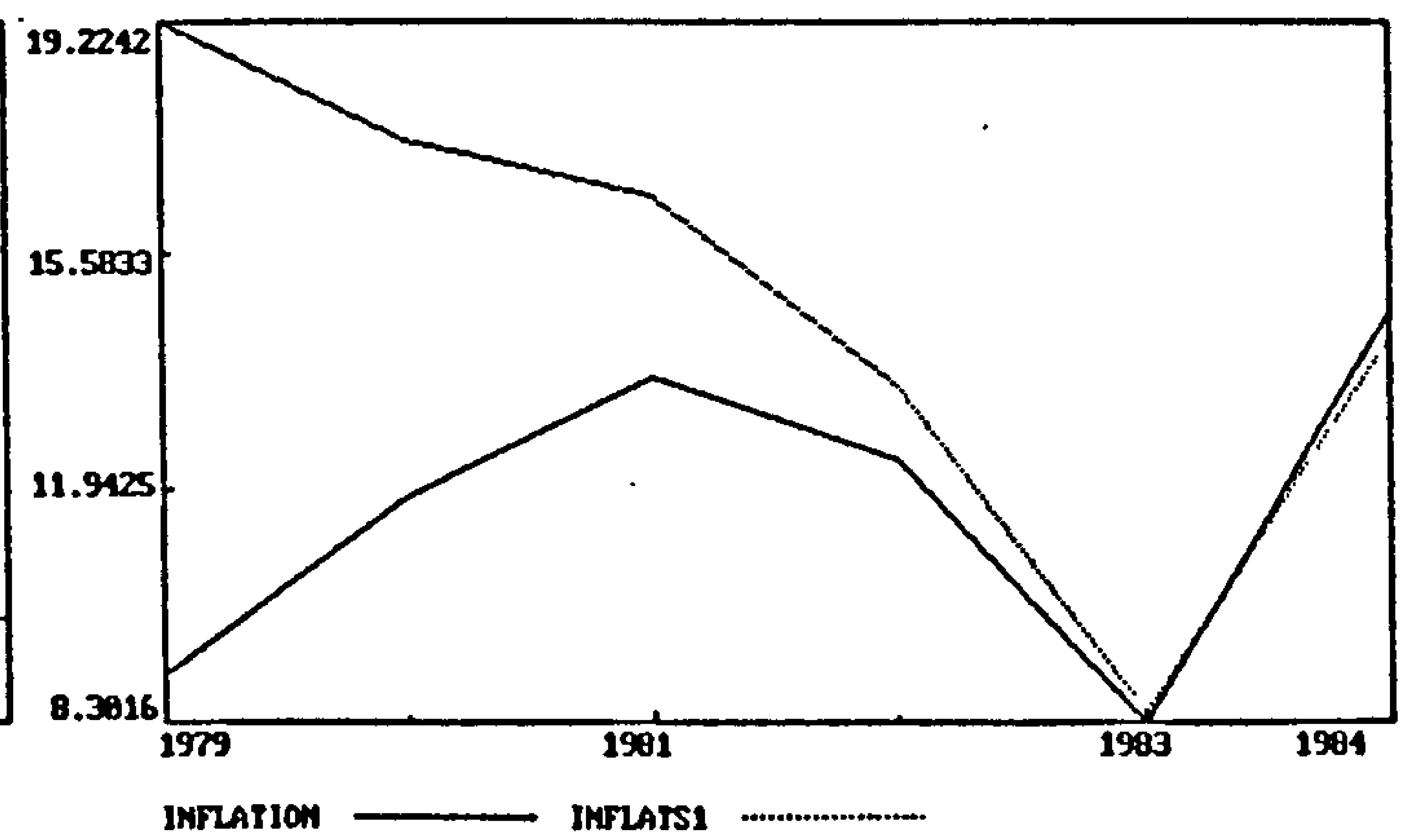
EXTERNAL SHOCK. EXCHANGE RATE DEPRECIATION



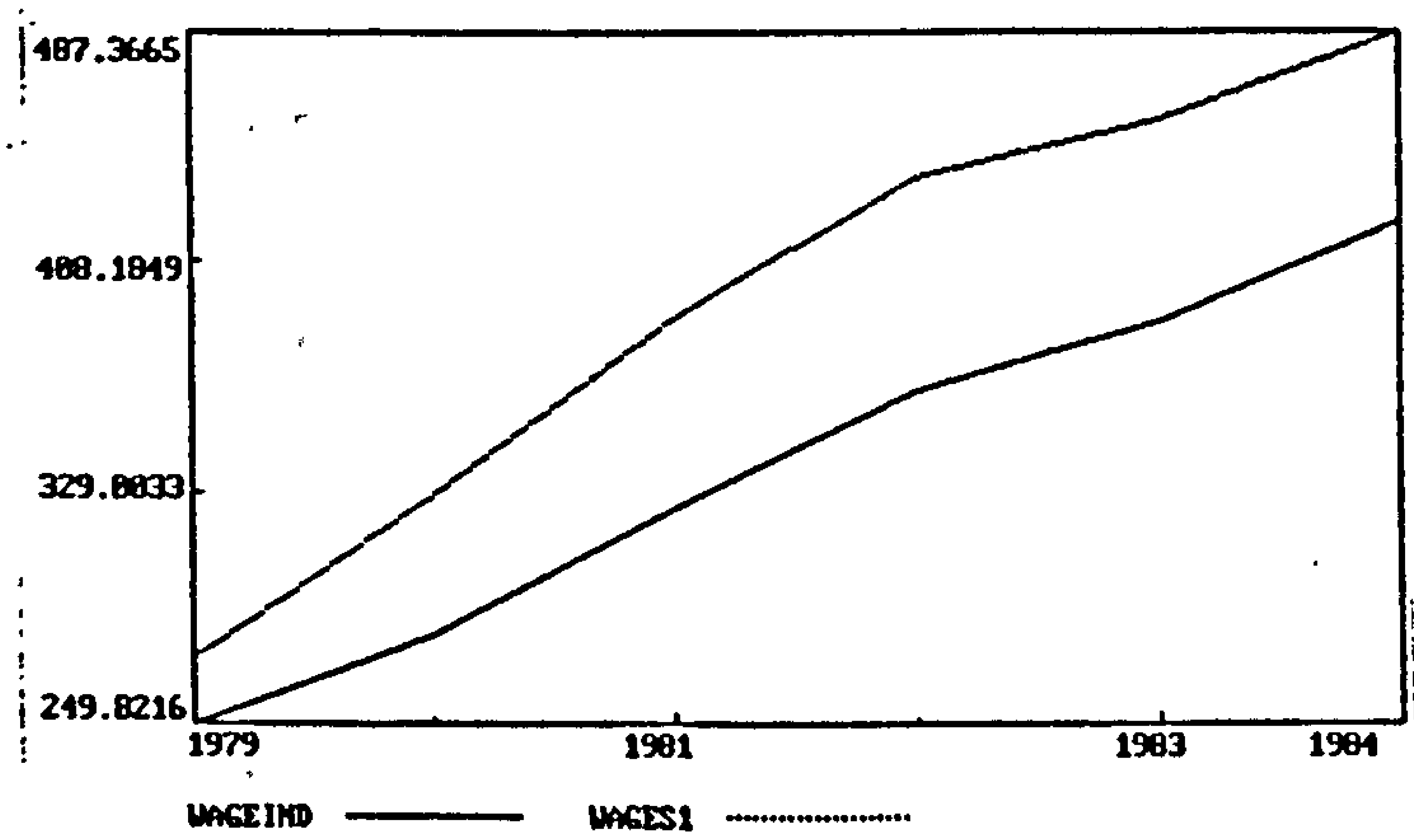
Current Account (millions U$ dollars)



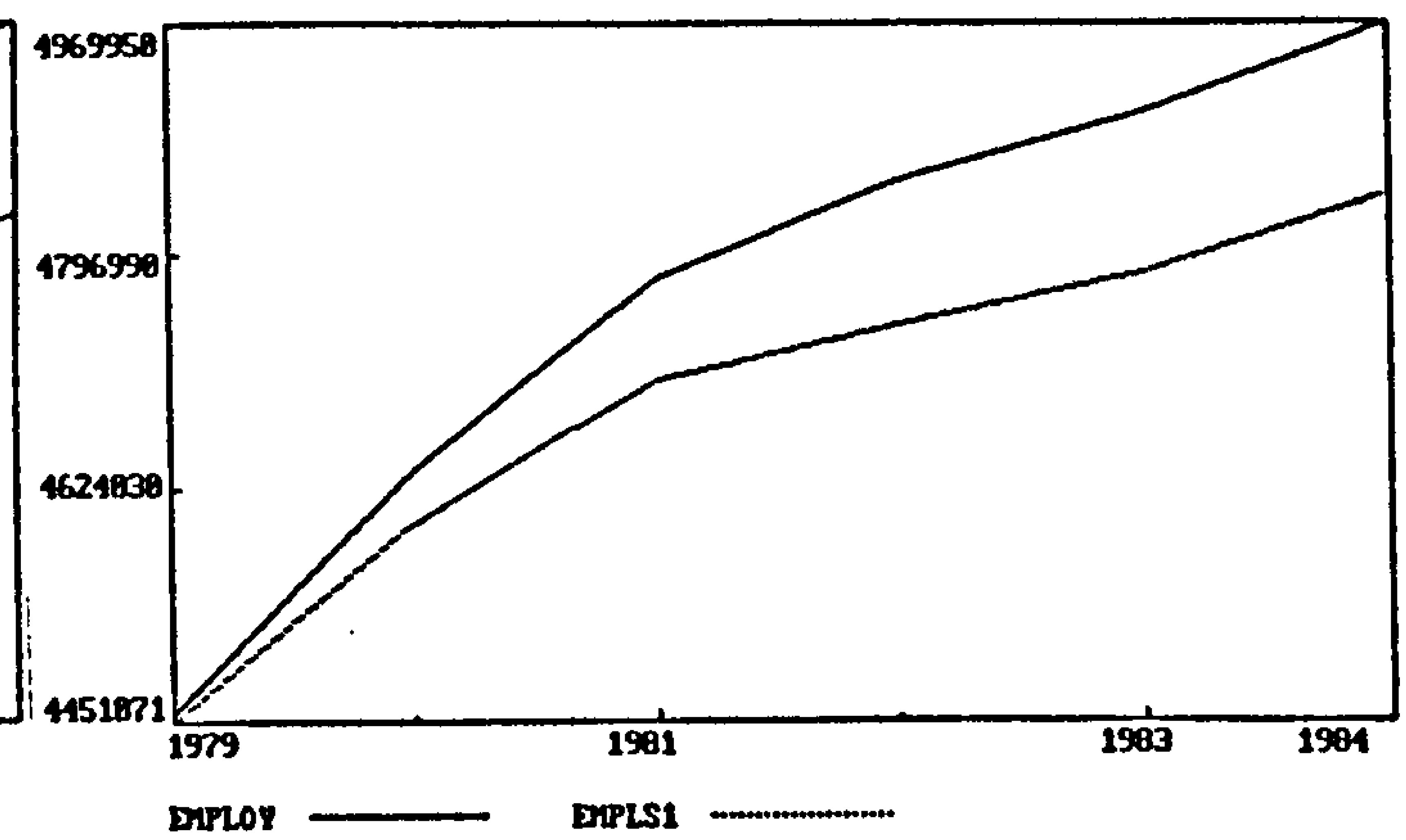
Inflation Rate



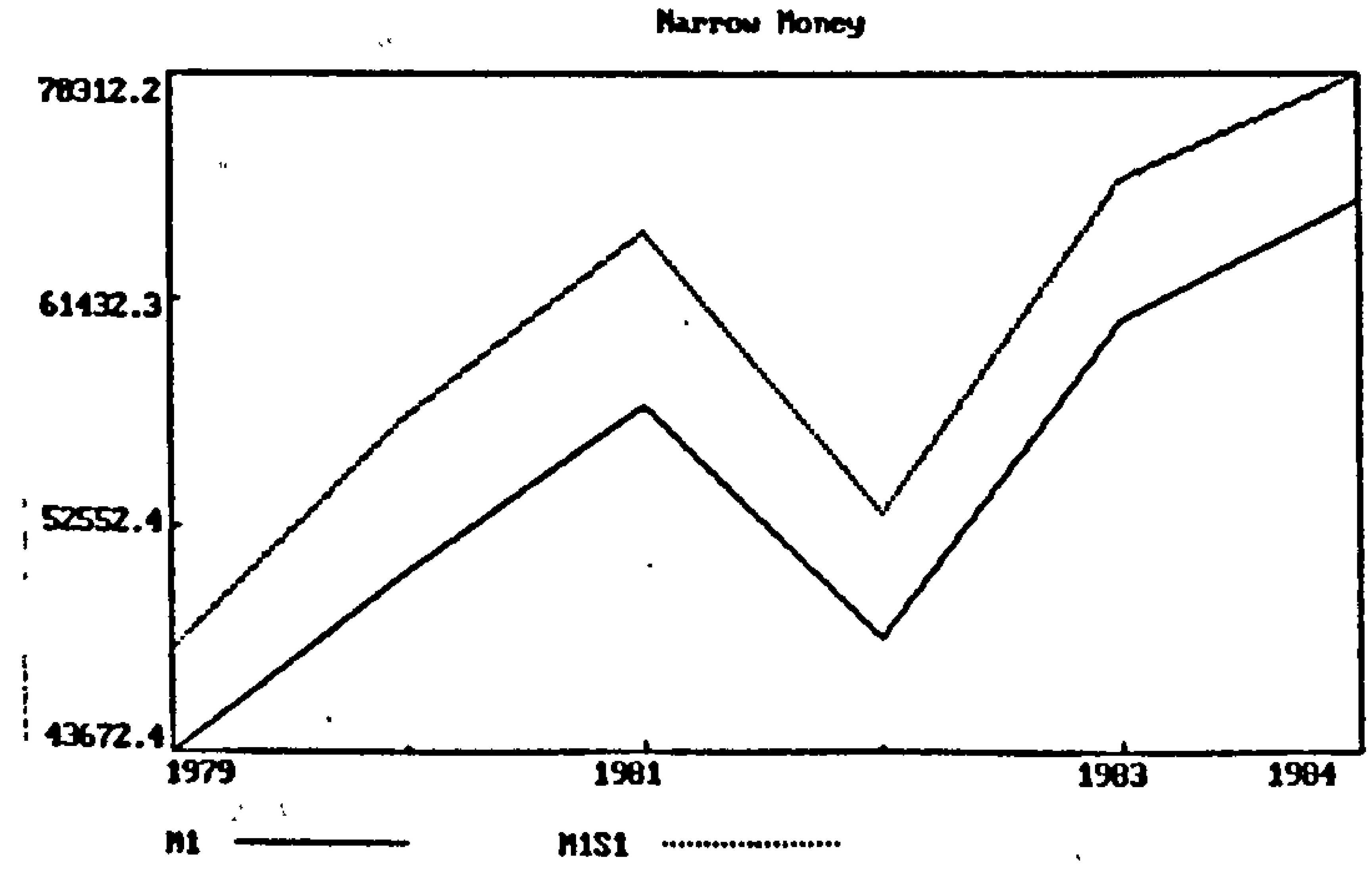
Money Wages Index



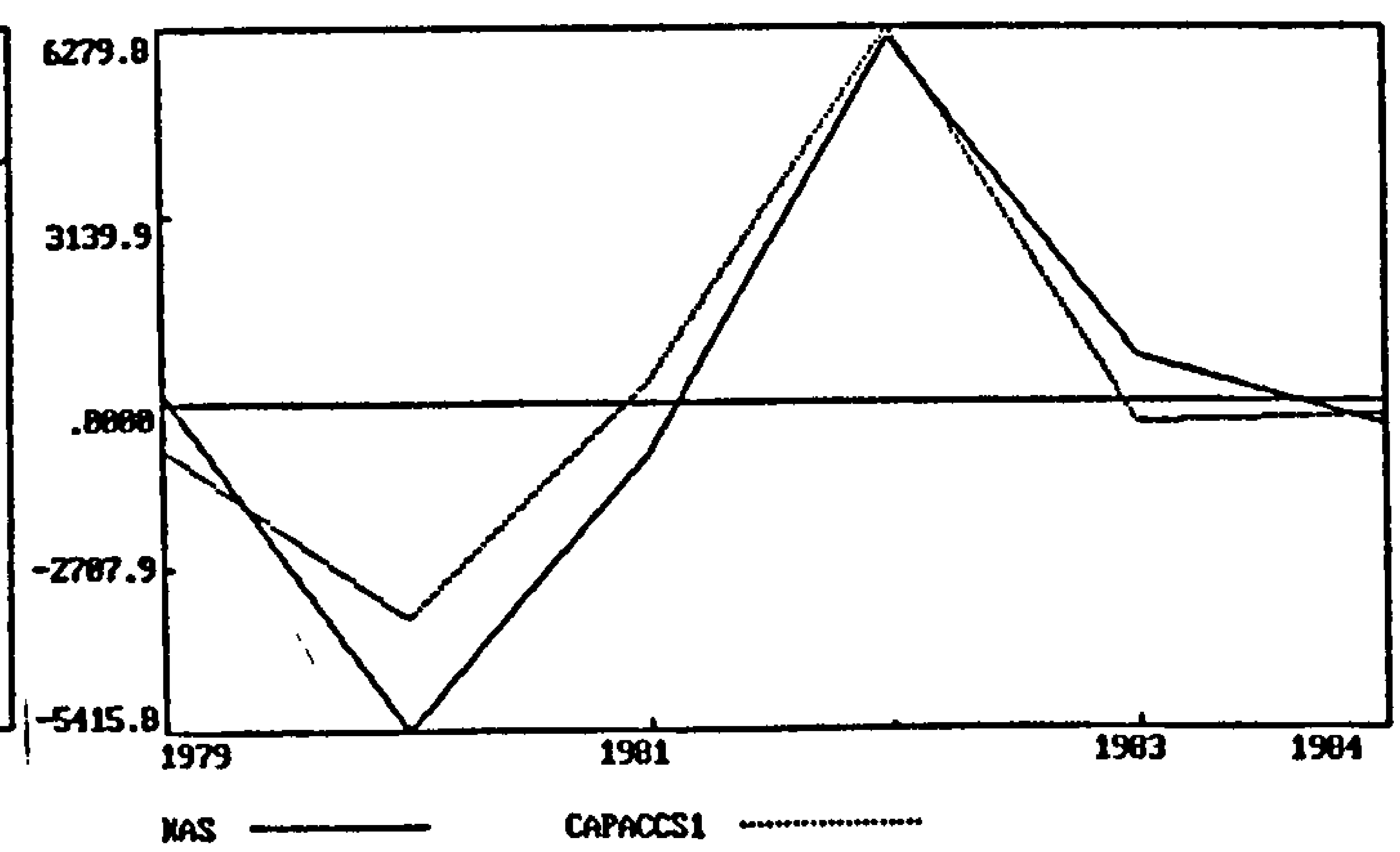
Employment (millions persons)



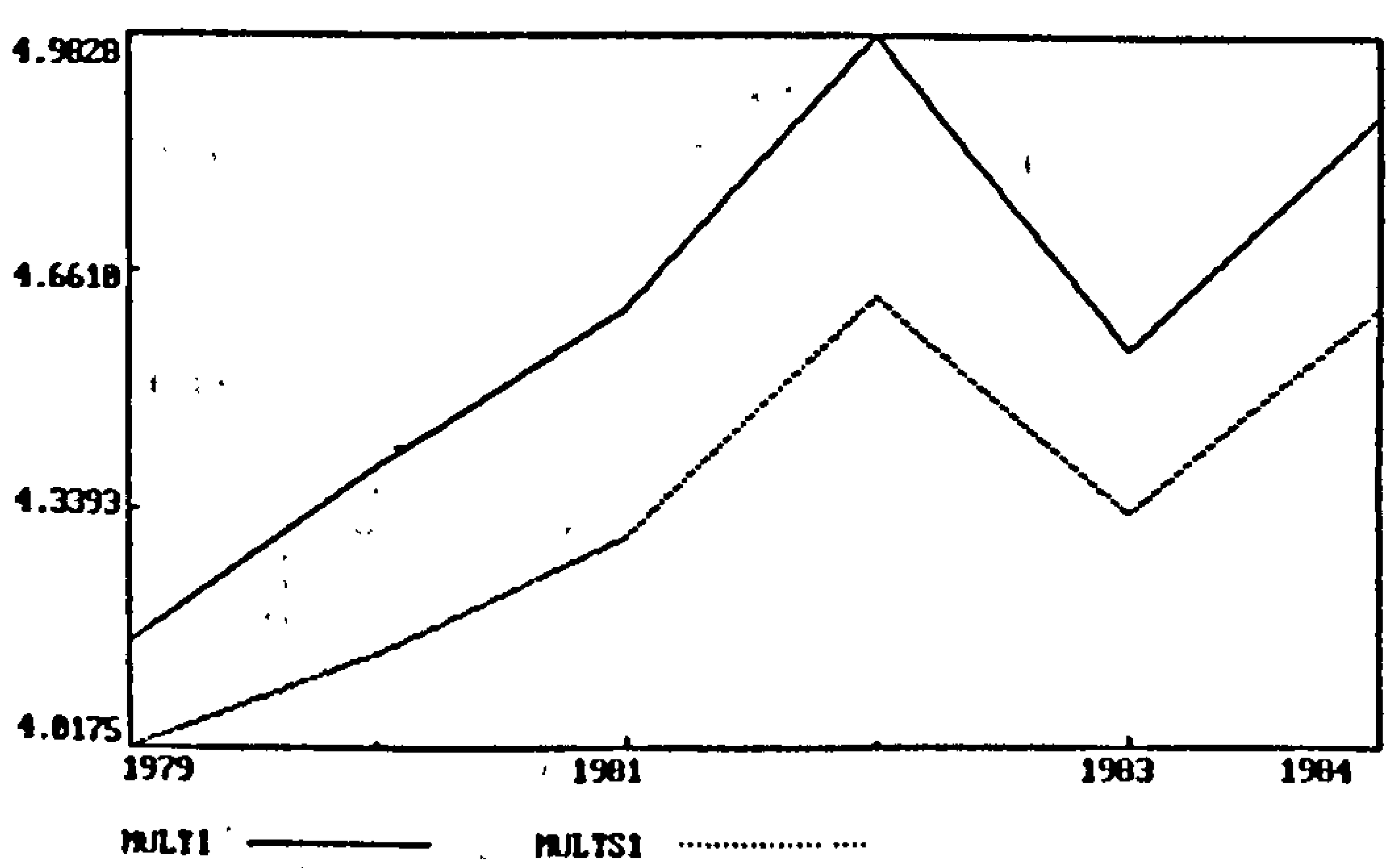
Narrow Money



Capital Account (millions US dollars)



Money multiplier



Private Sector Financial Wealth (constant prices)

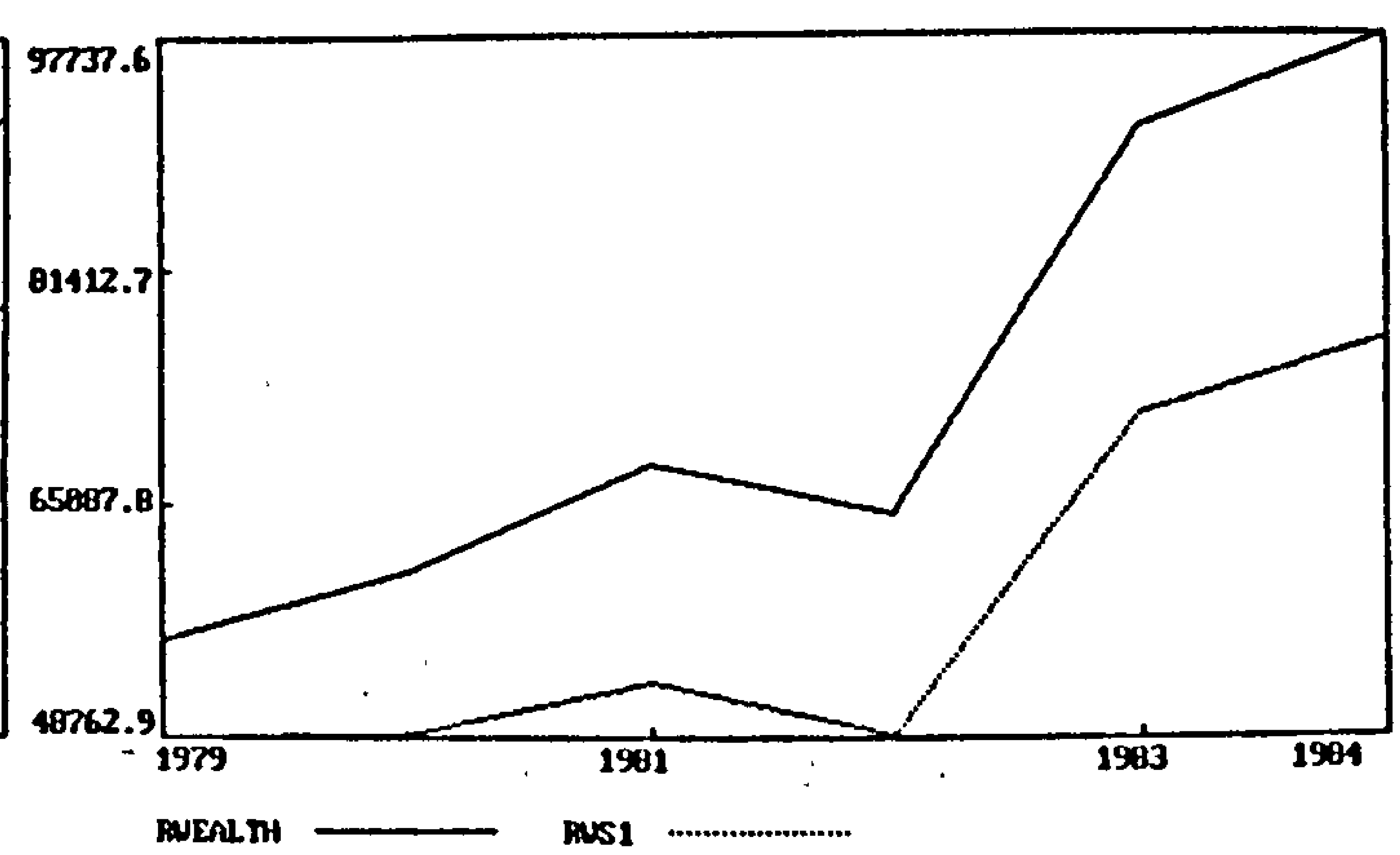
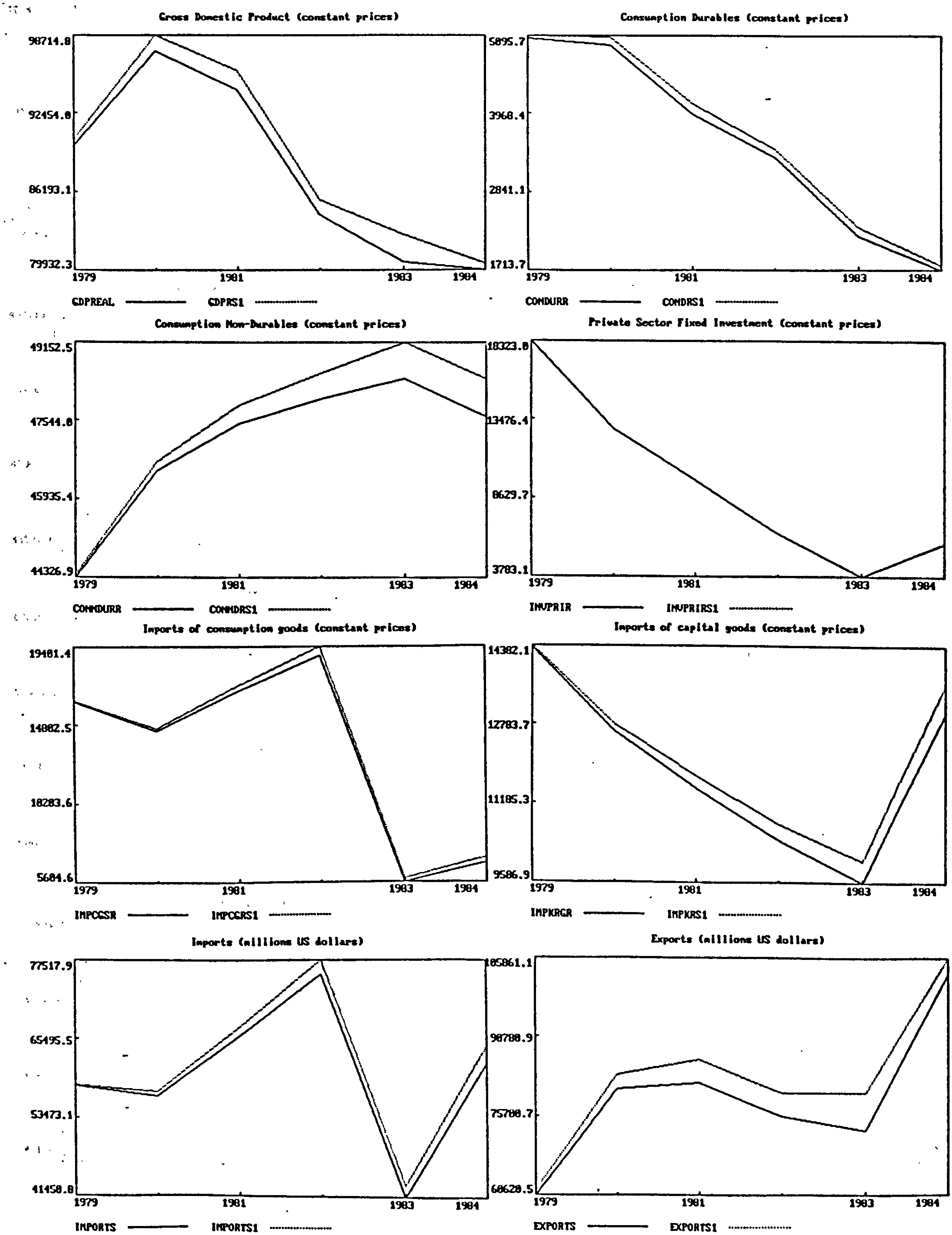
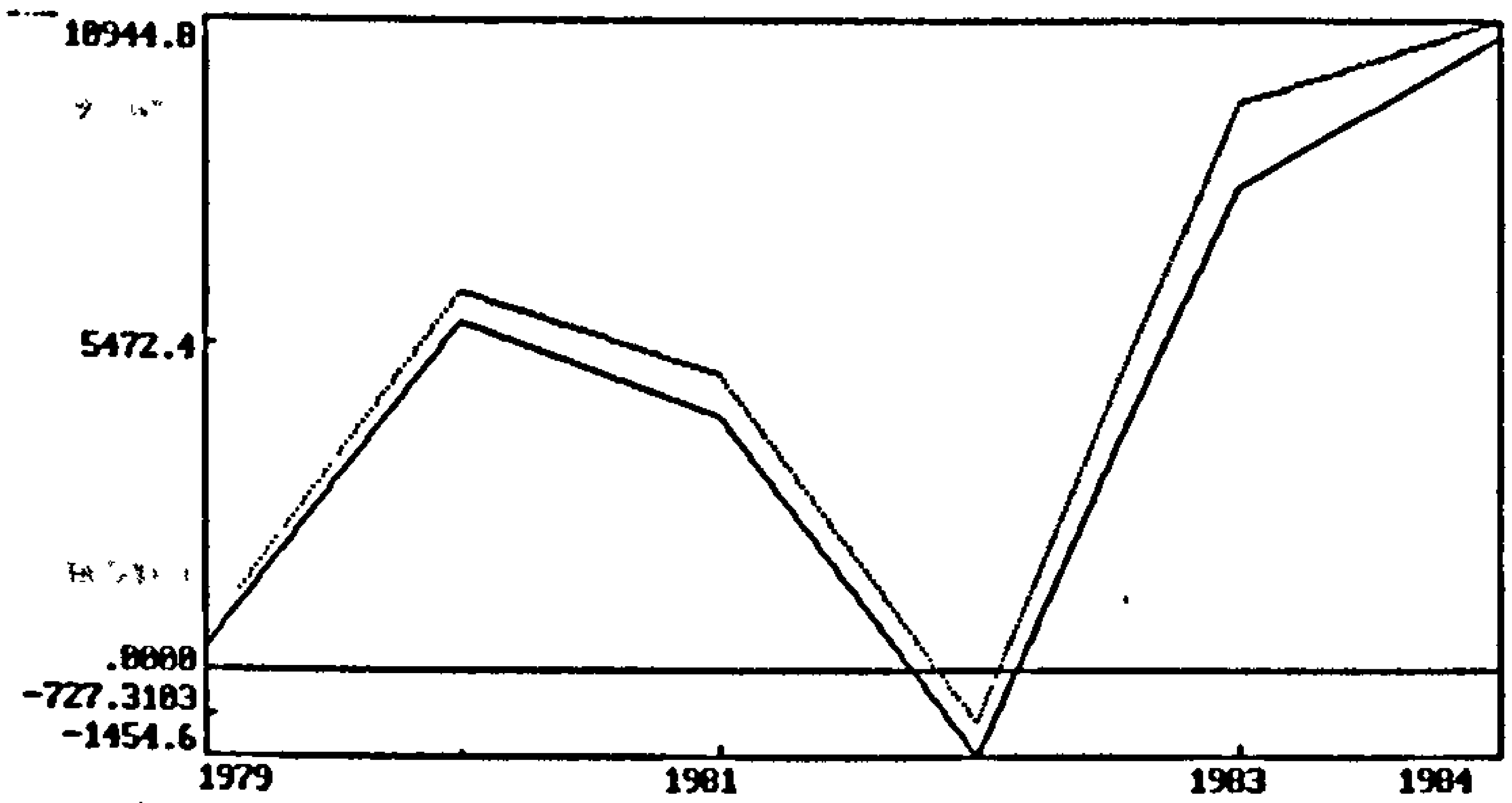


FIGURE 4.4

MONETARY POLICY. INCREASE IN THE REQUIRED BANK RESERVES

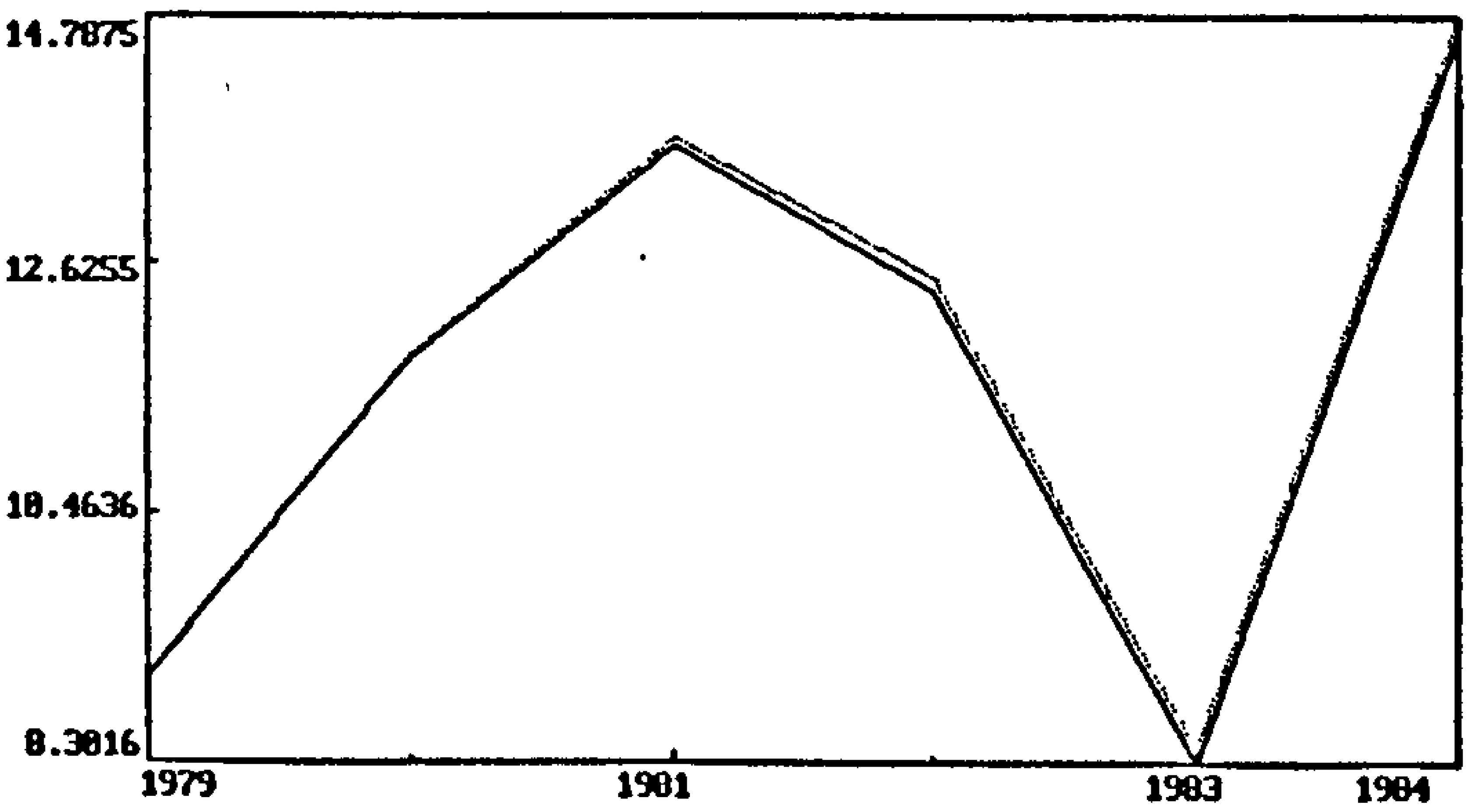


Current Account (millions US dollars)



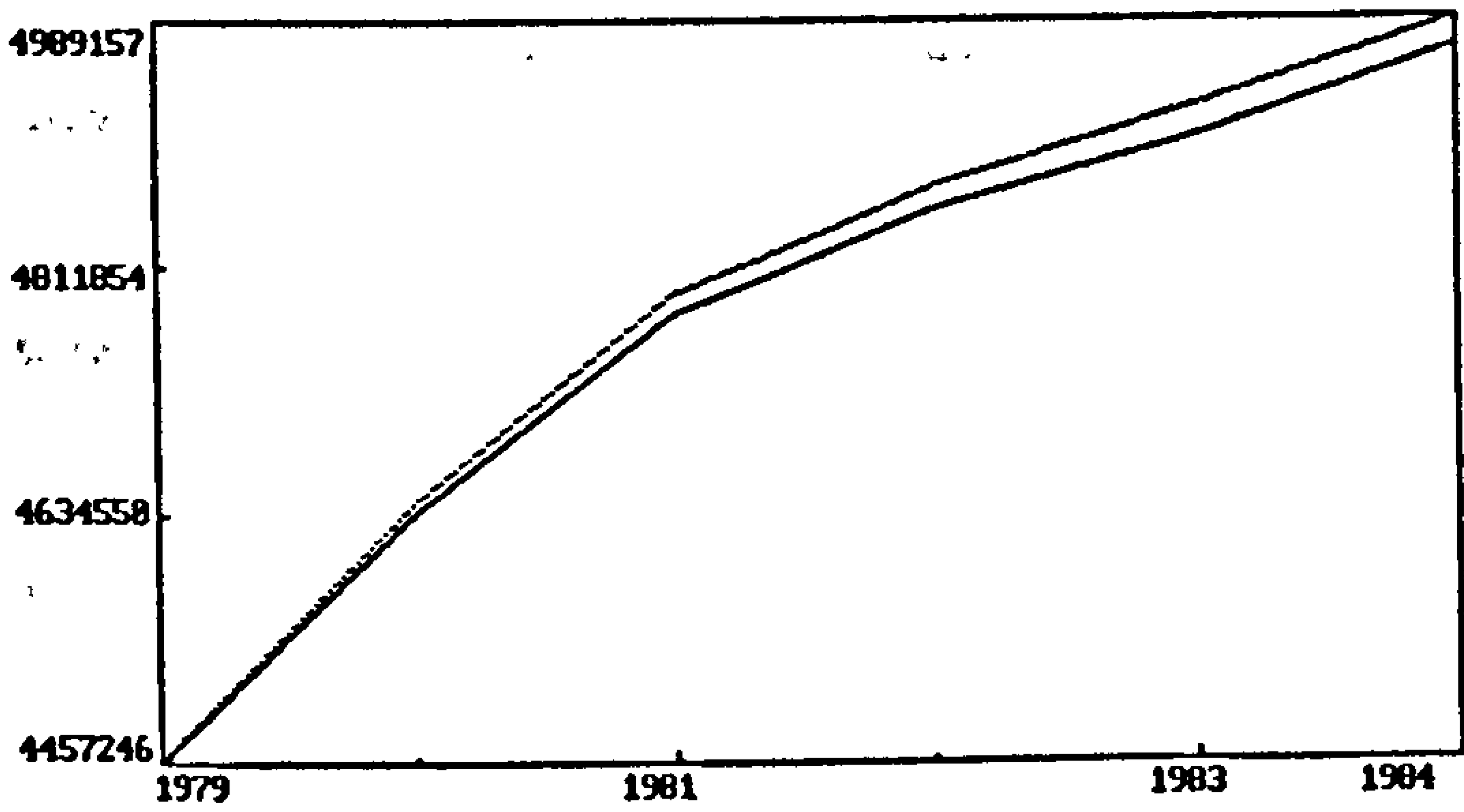
CUS ——— CUUSS1 ....

Inflation Rate



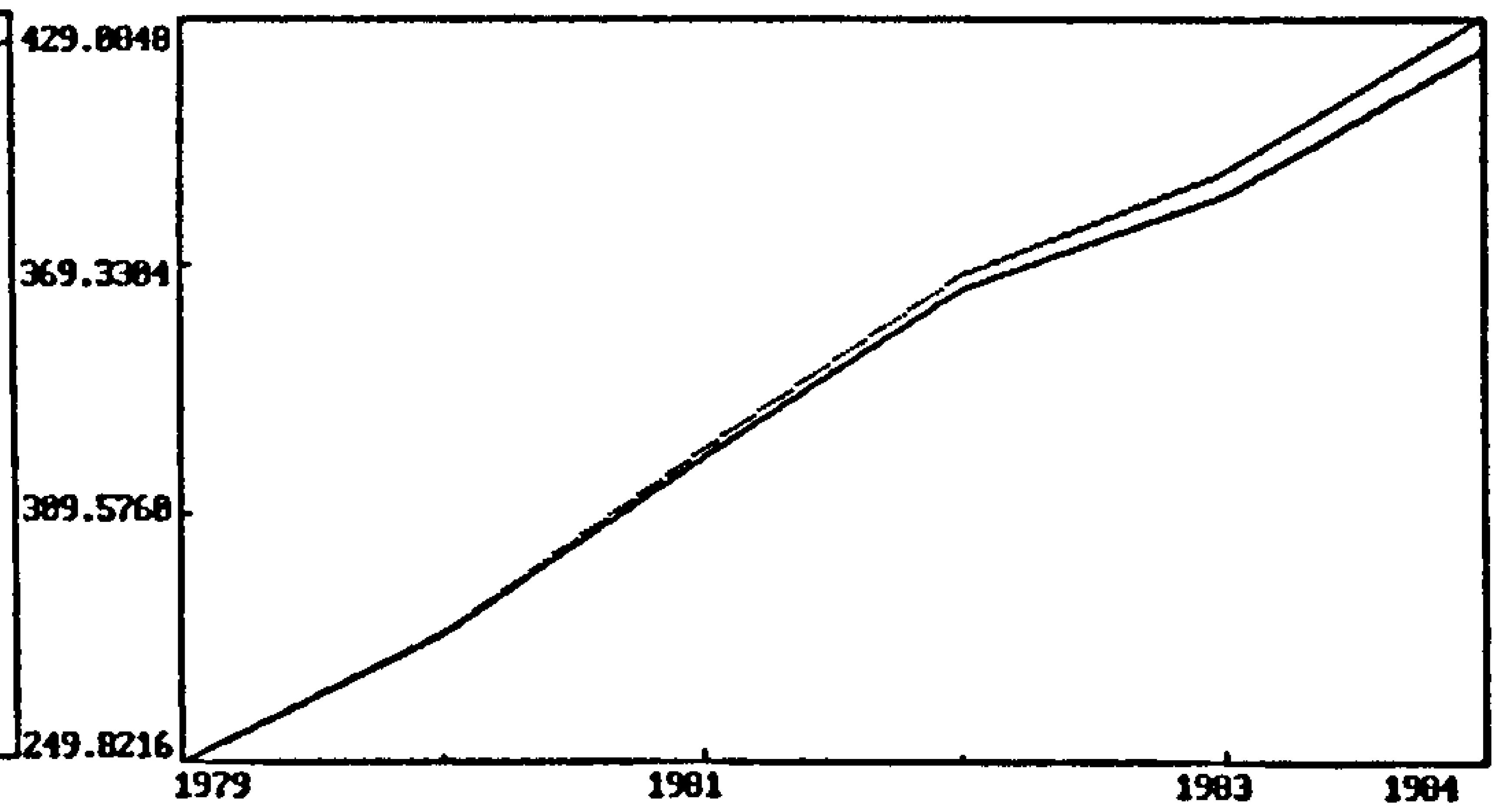
INFLATION ——— INFLATS1 ....

Employment (millions persons)



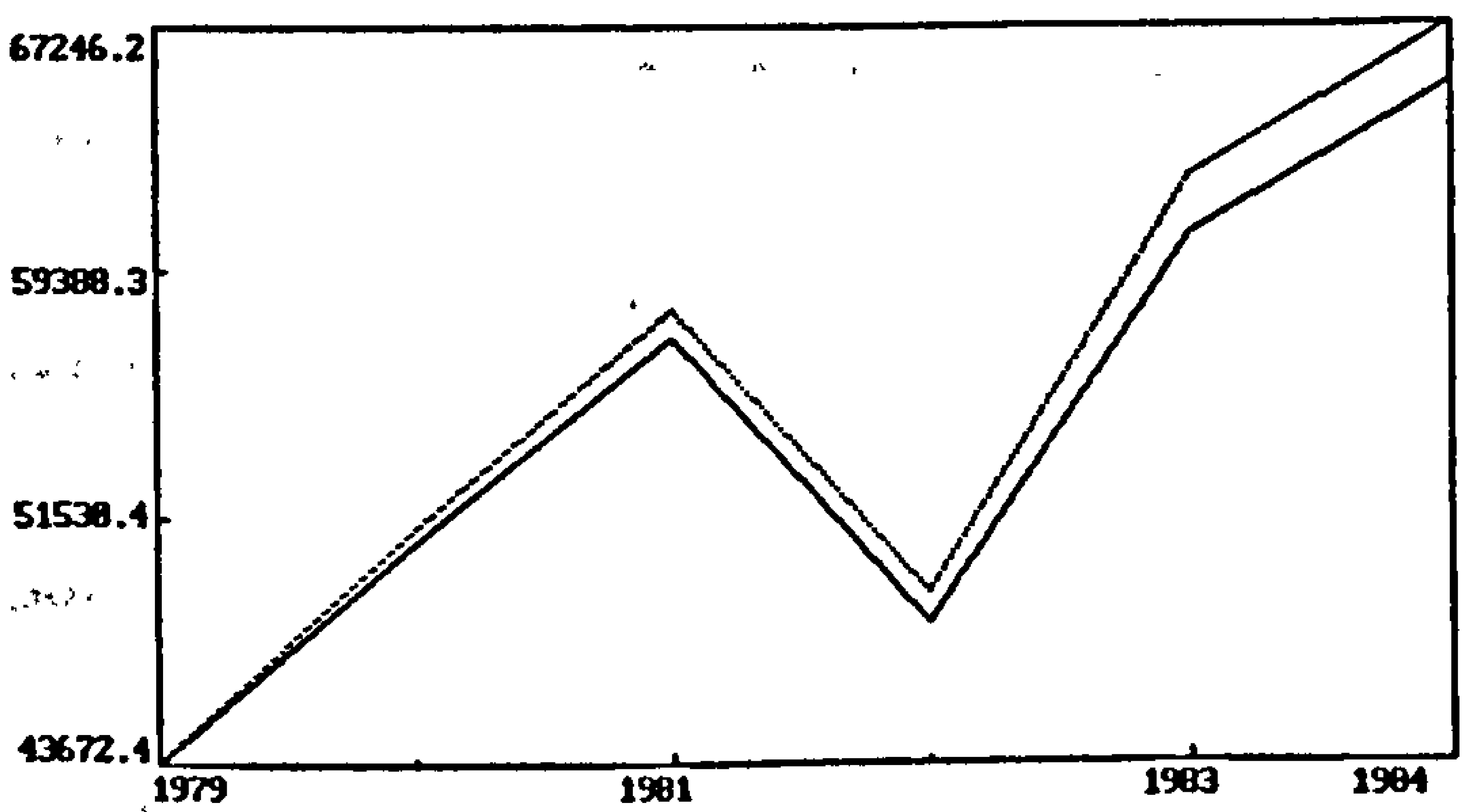
EMPLOY ——— EMPLS1 ....

Money Wages



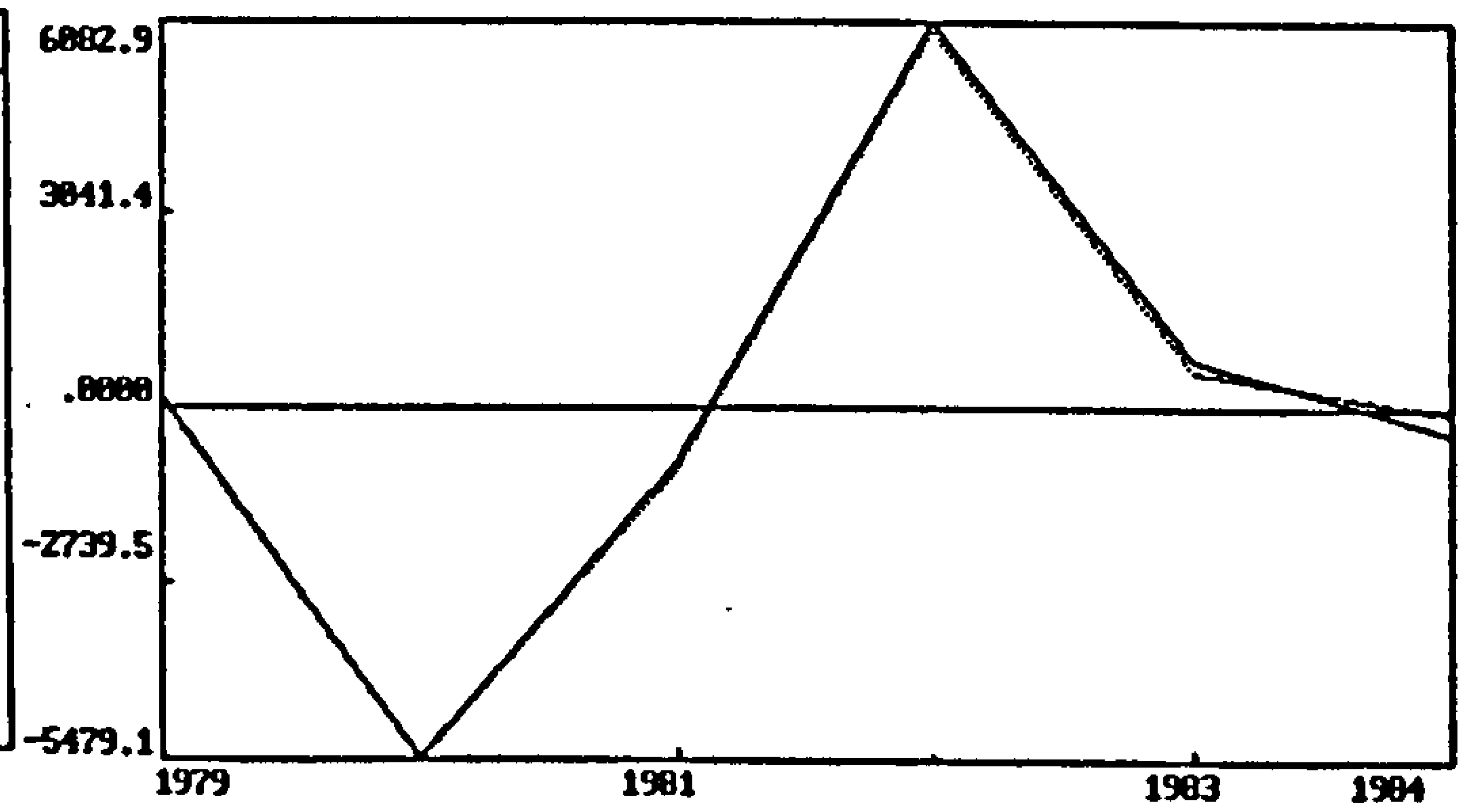
WAGEIND ——— WAGES1 ....

Narrow Money



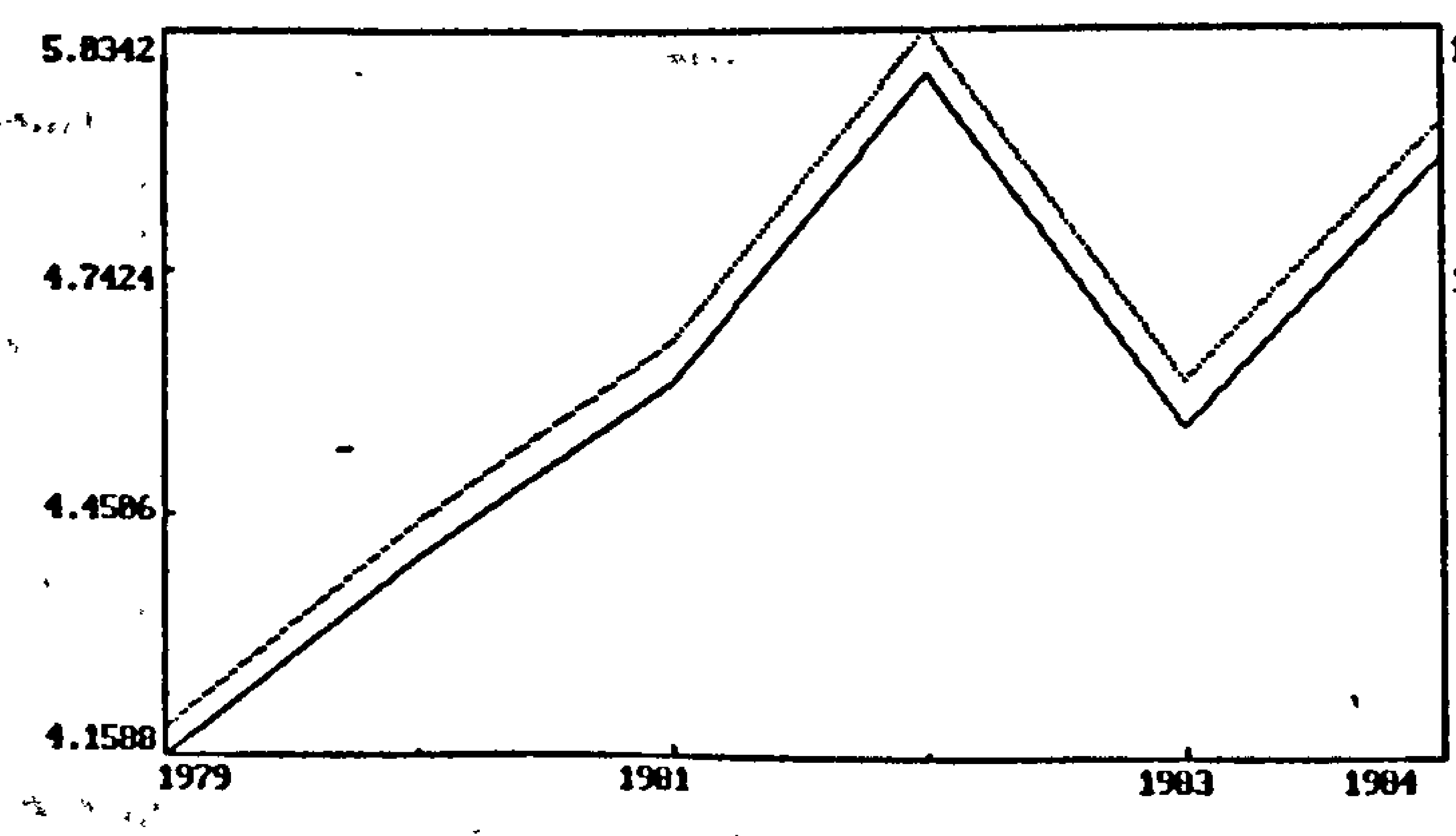
M1 ——— M1S1 ....

Capital Account (millions US dollars)



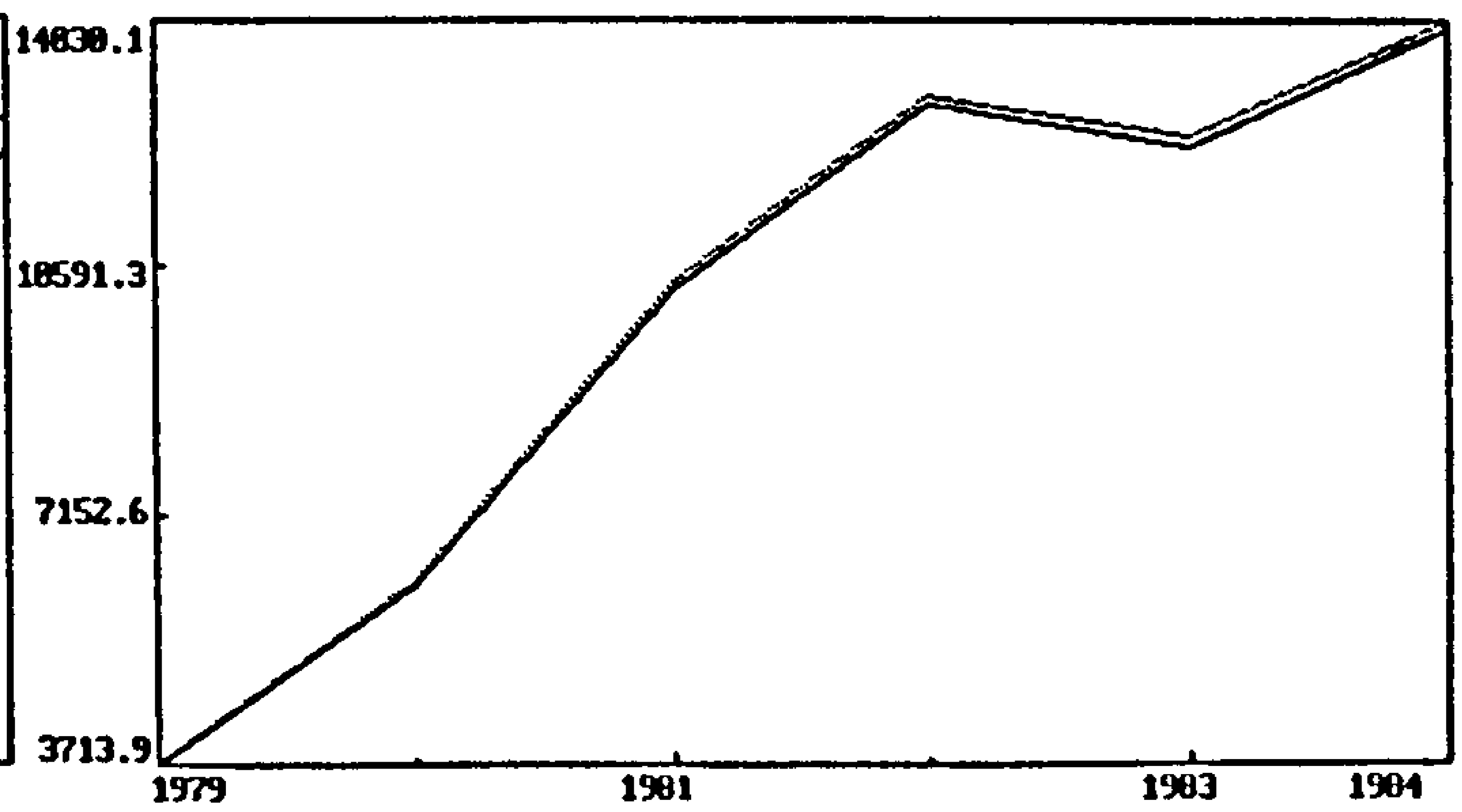
KAS ——— CAPACCS1 ....

Money Multiplier



MULTI ——— MULTS1 ....

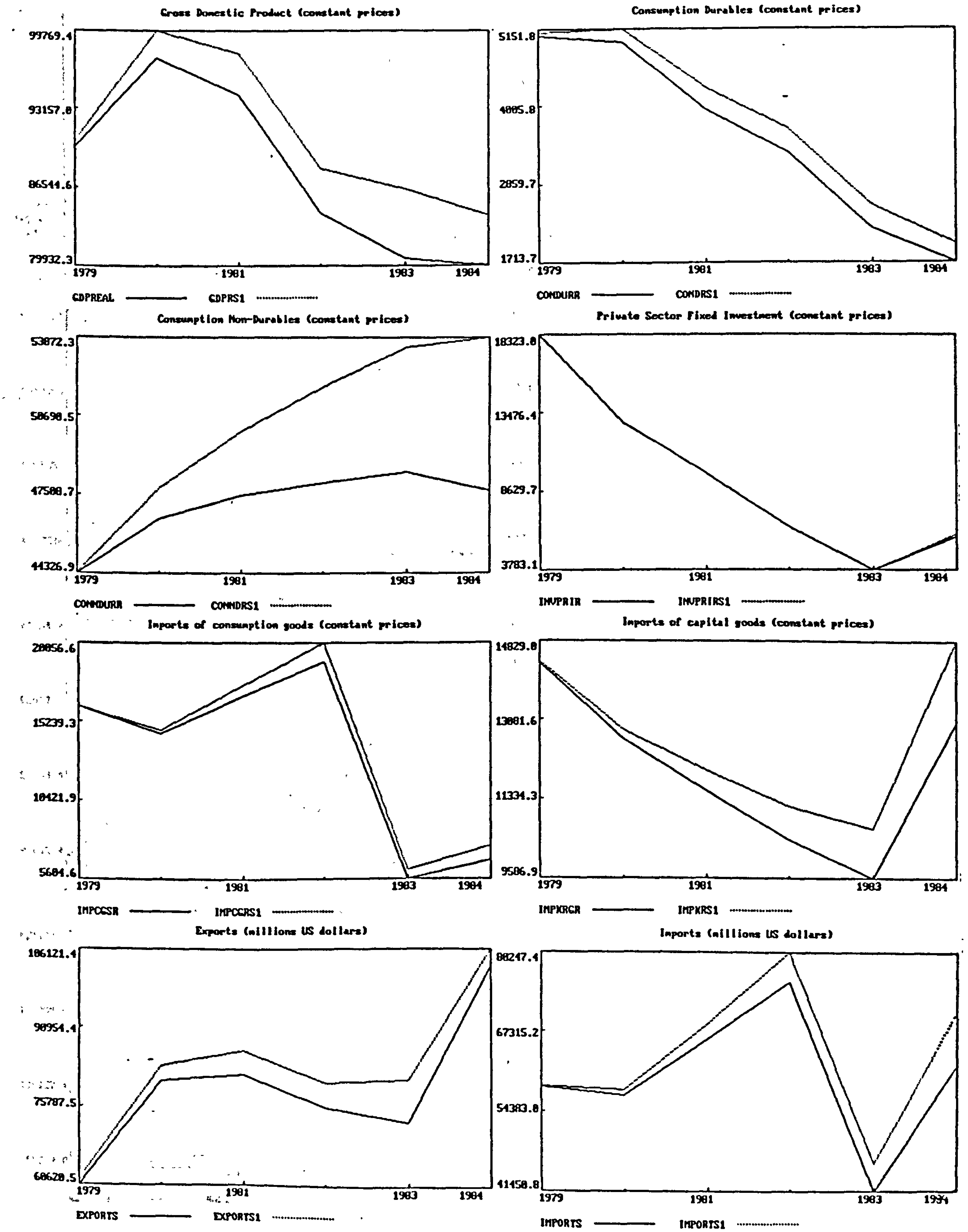
Private Sector Foreign Assets (millions US dollars)



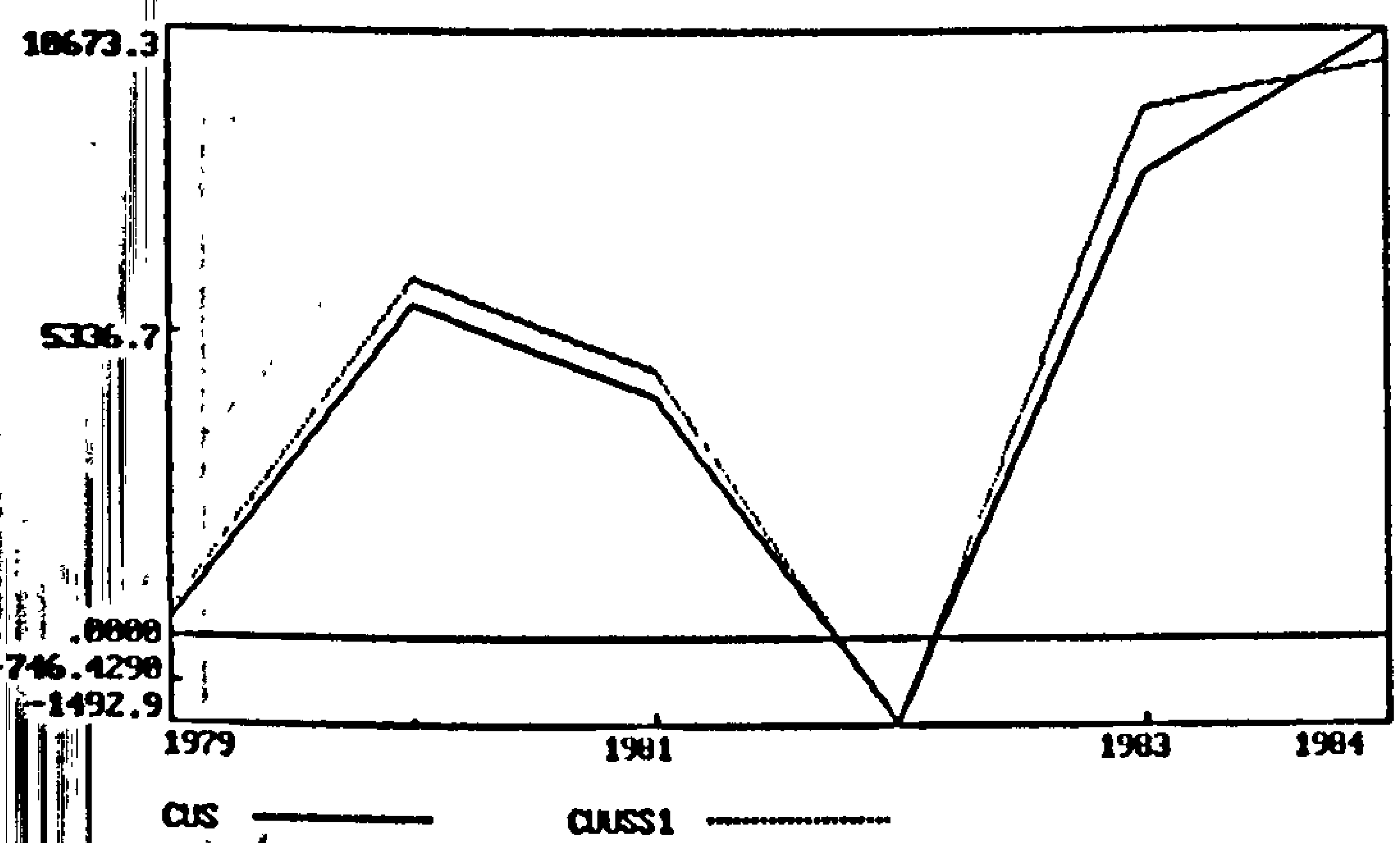
FAUS ——— FAUSS1 ....

FIGURE 4.5

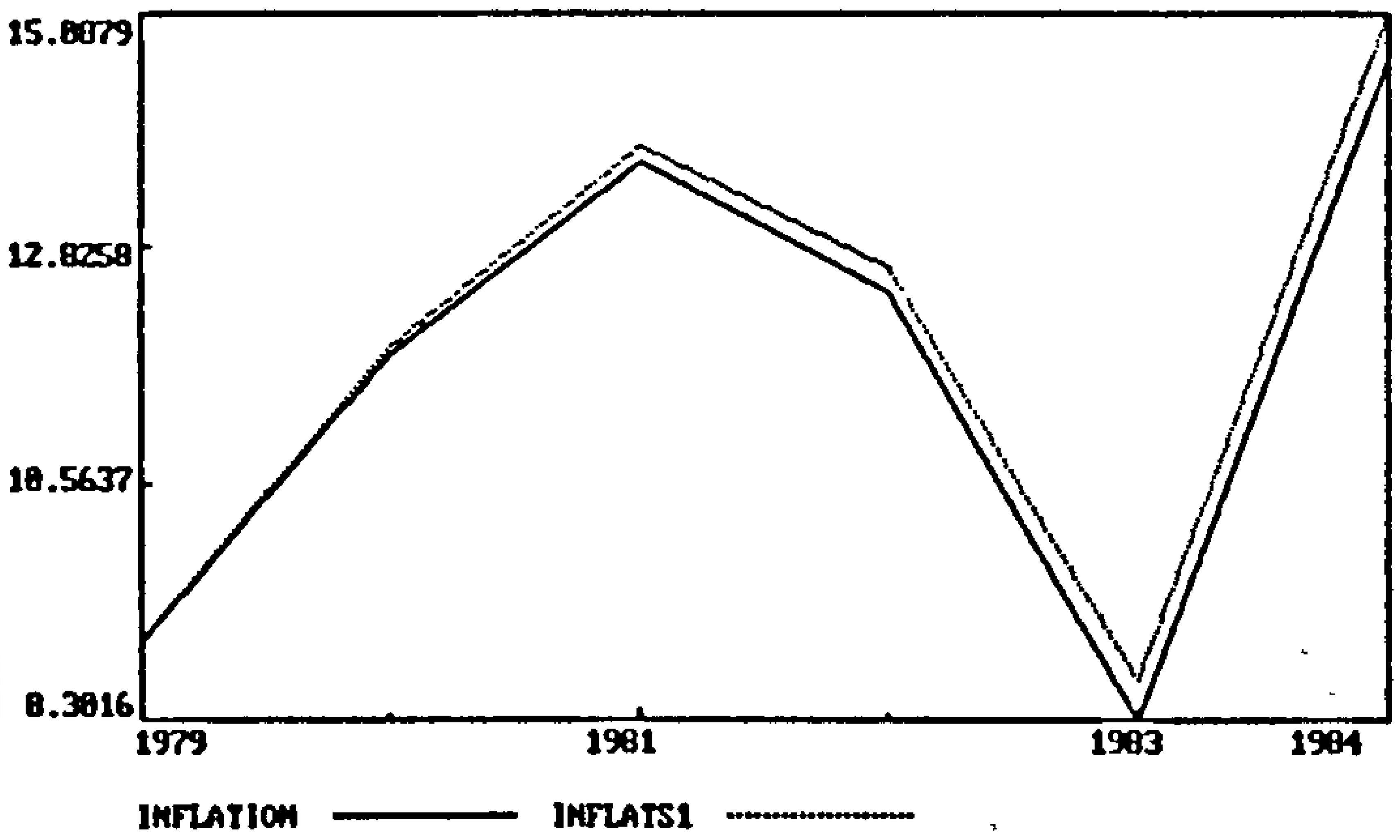
MONETARY POLICY. ELIMINATION OF REQUIRED BANK RESERVES



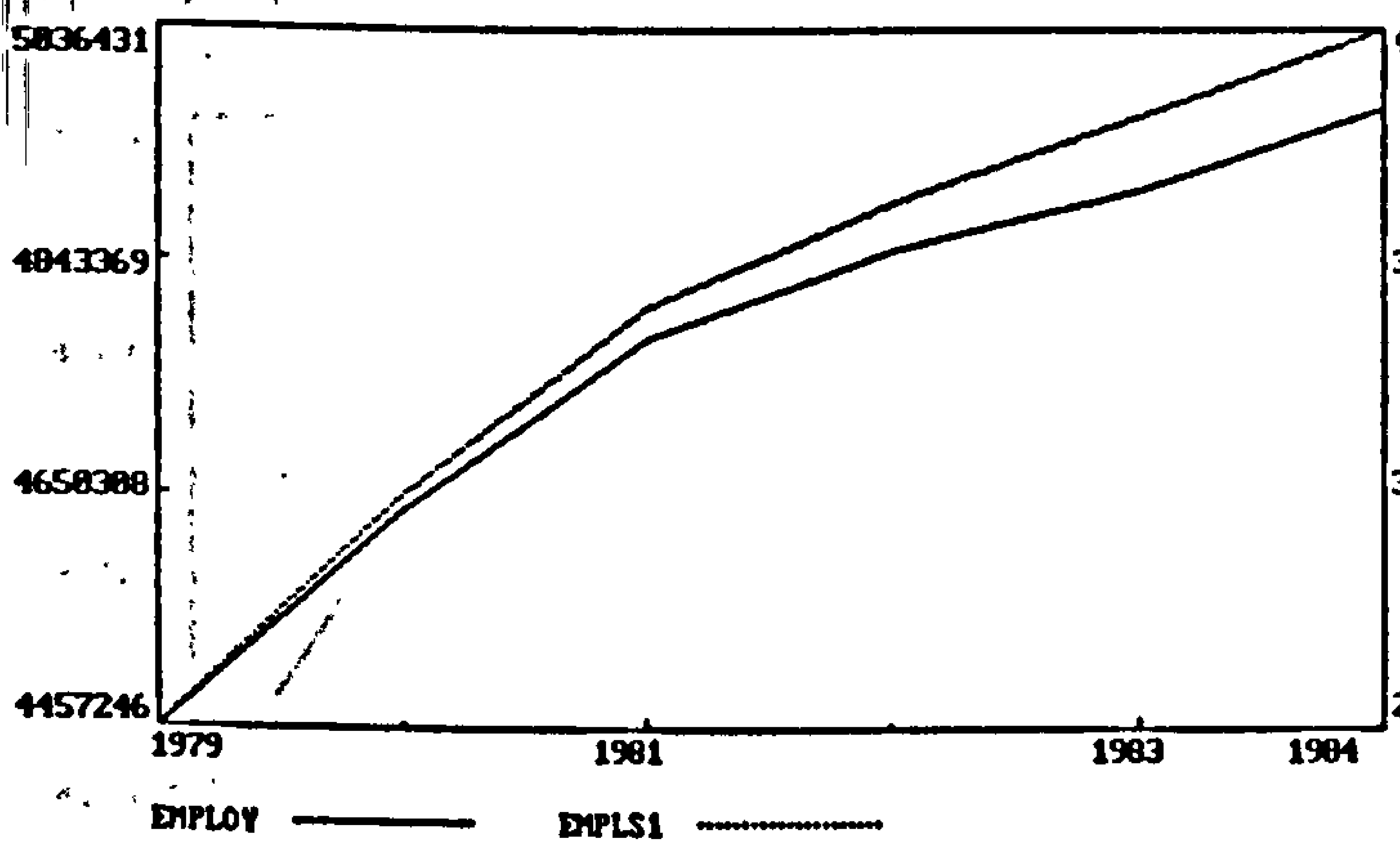
Current Account (millions US dollars)



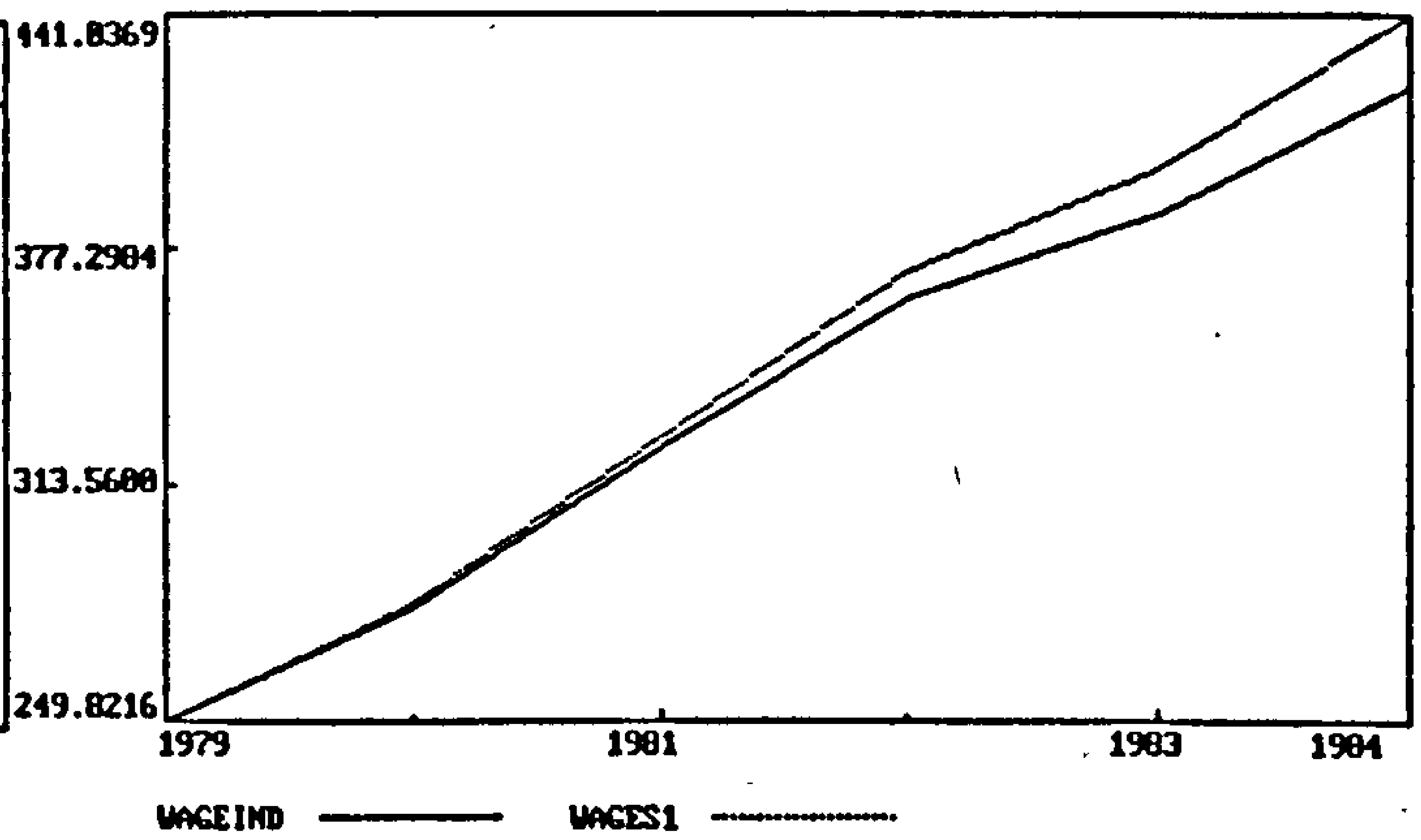
Inflation Rate



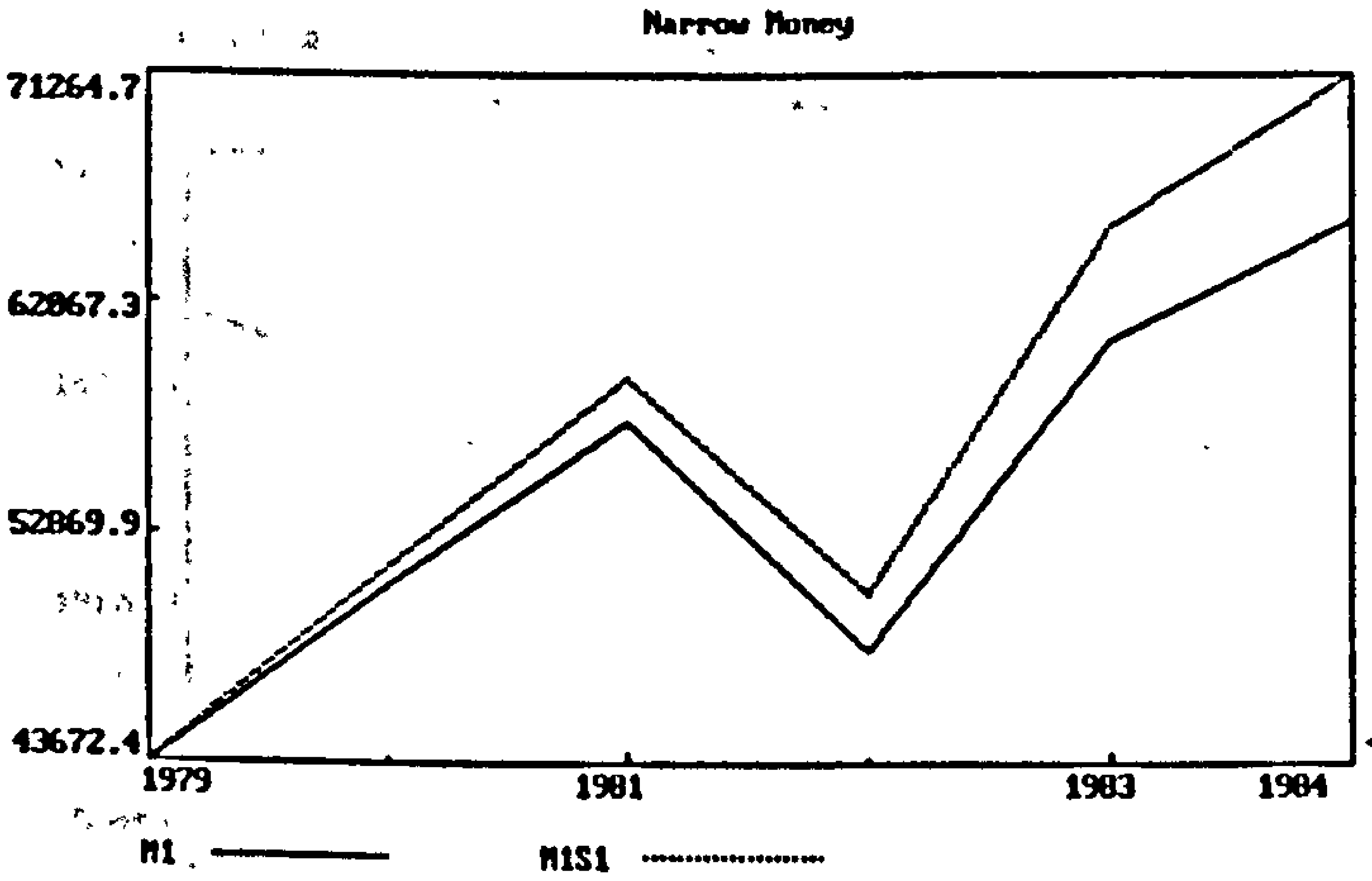
Employment (millions persons)



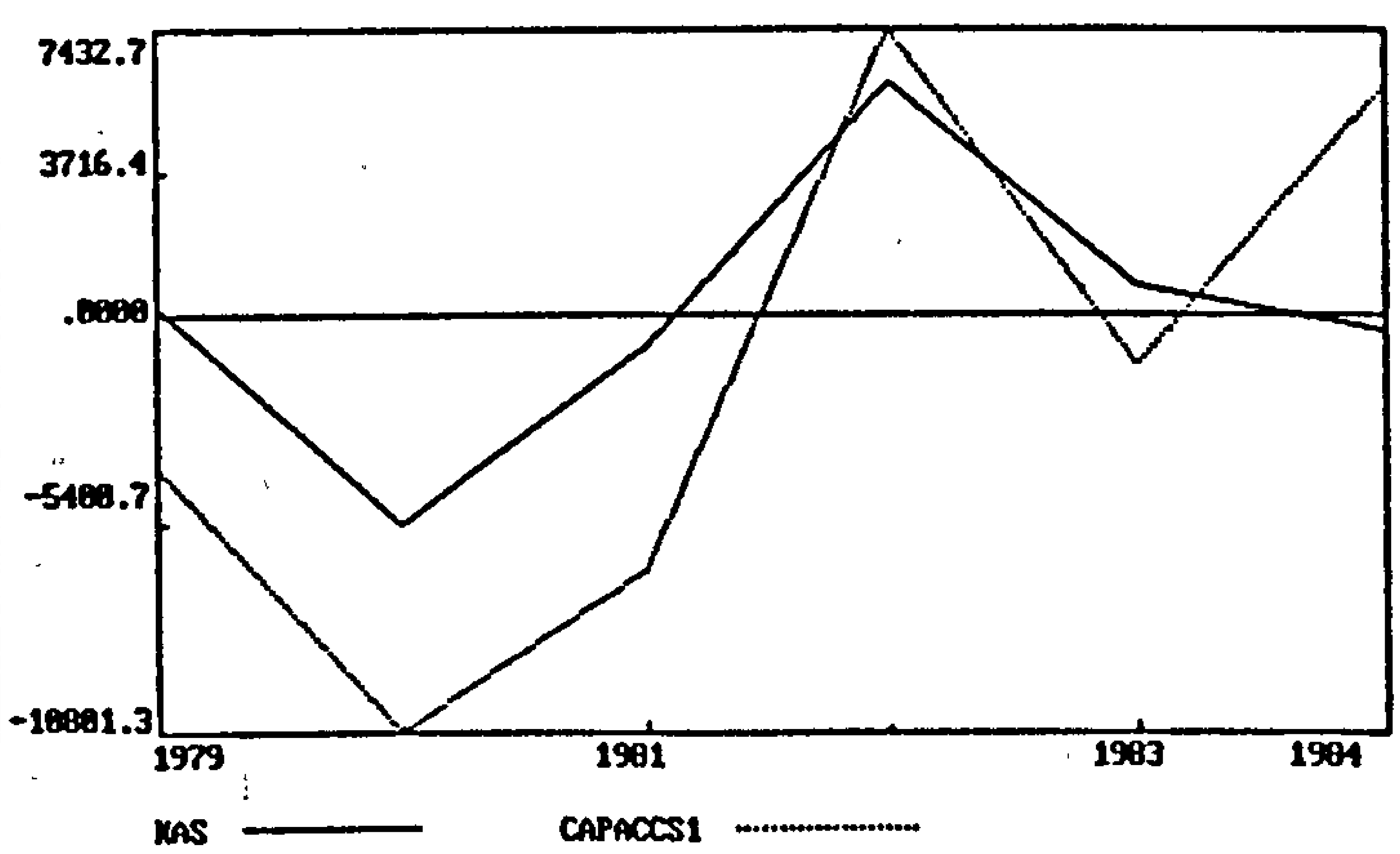
Money Wages



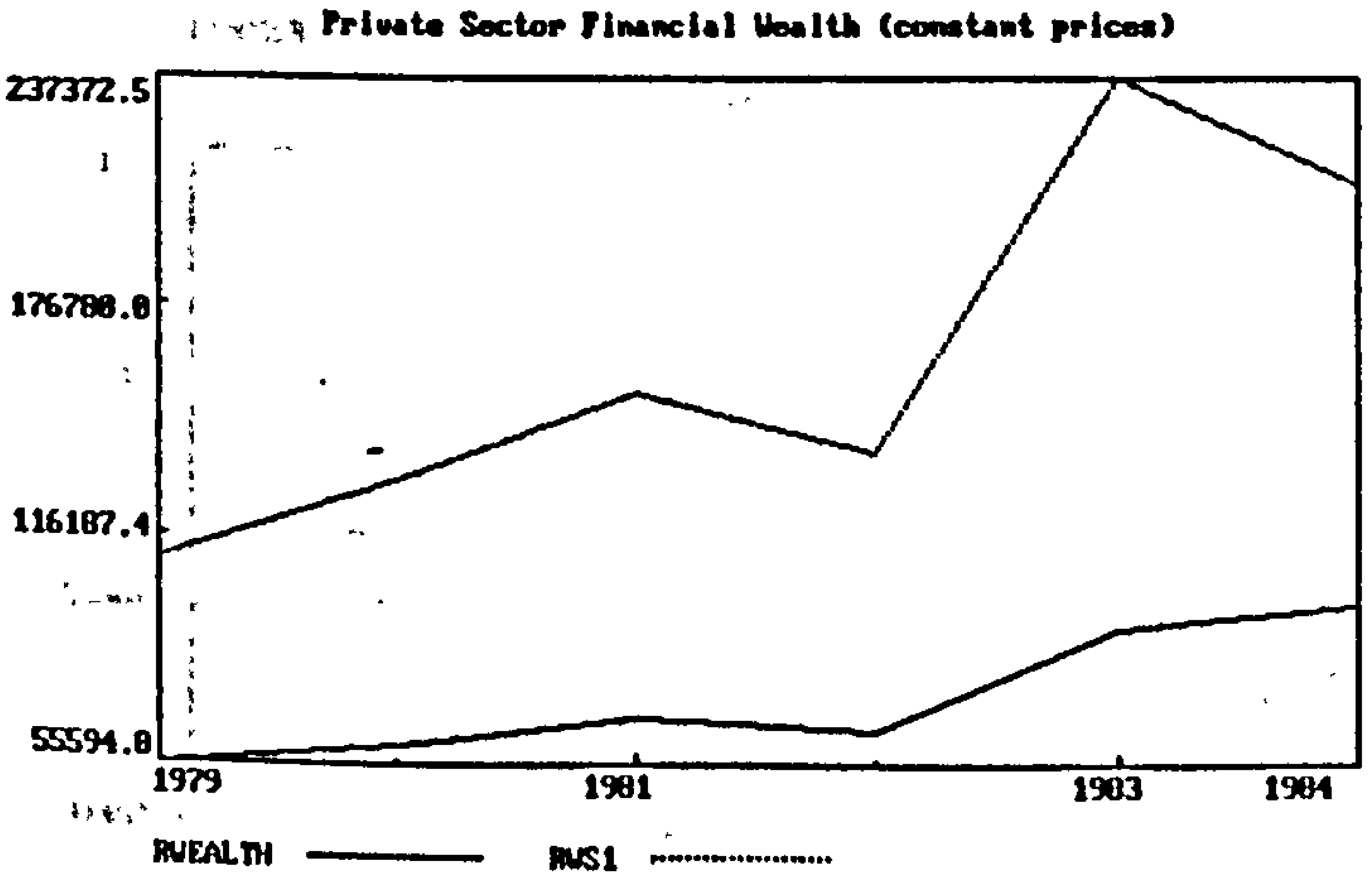
Narrow Money



Capital Account (millions US dollars)



Private Sector Financial Wealth (constant prices)



Money Multiplier

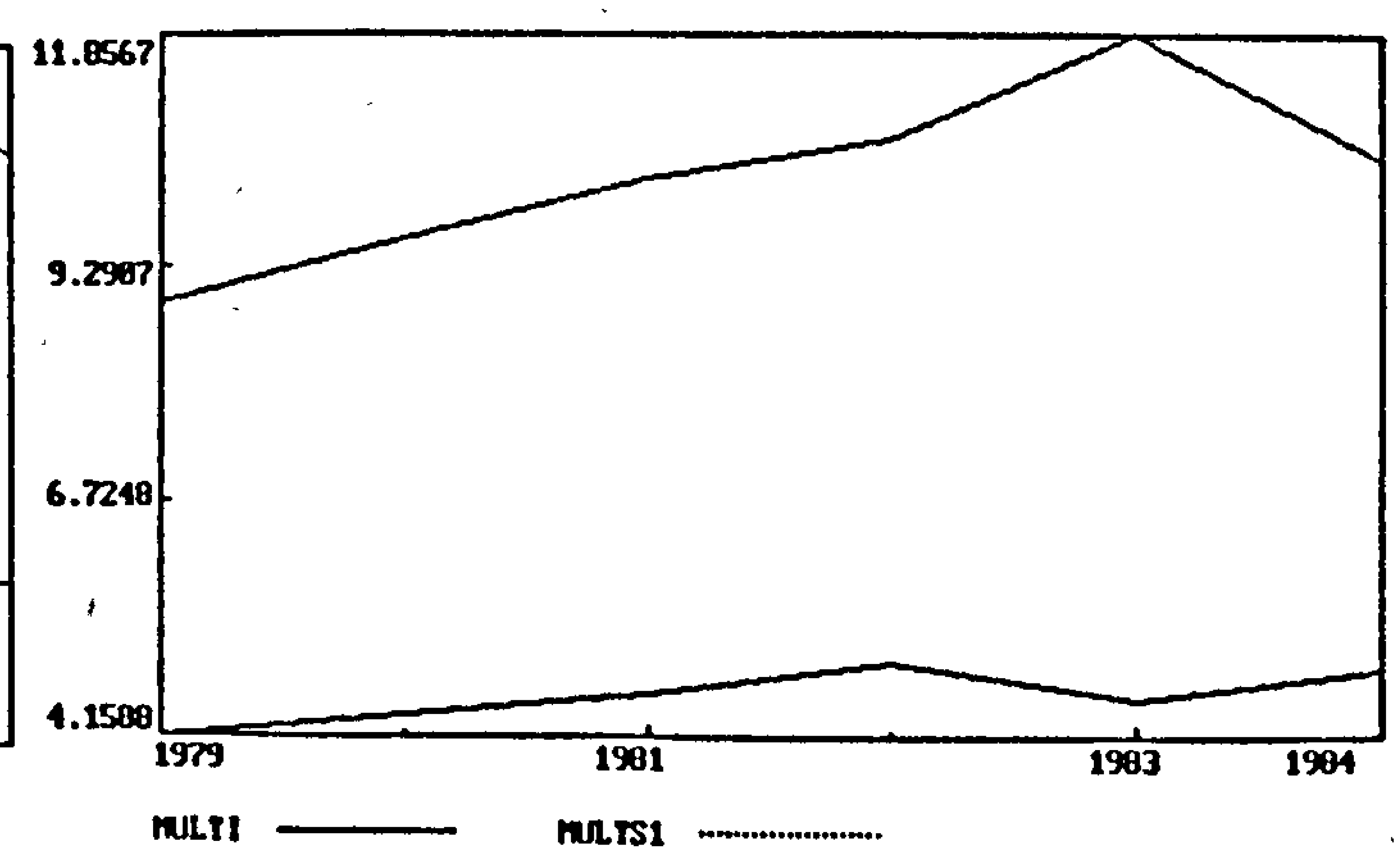
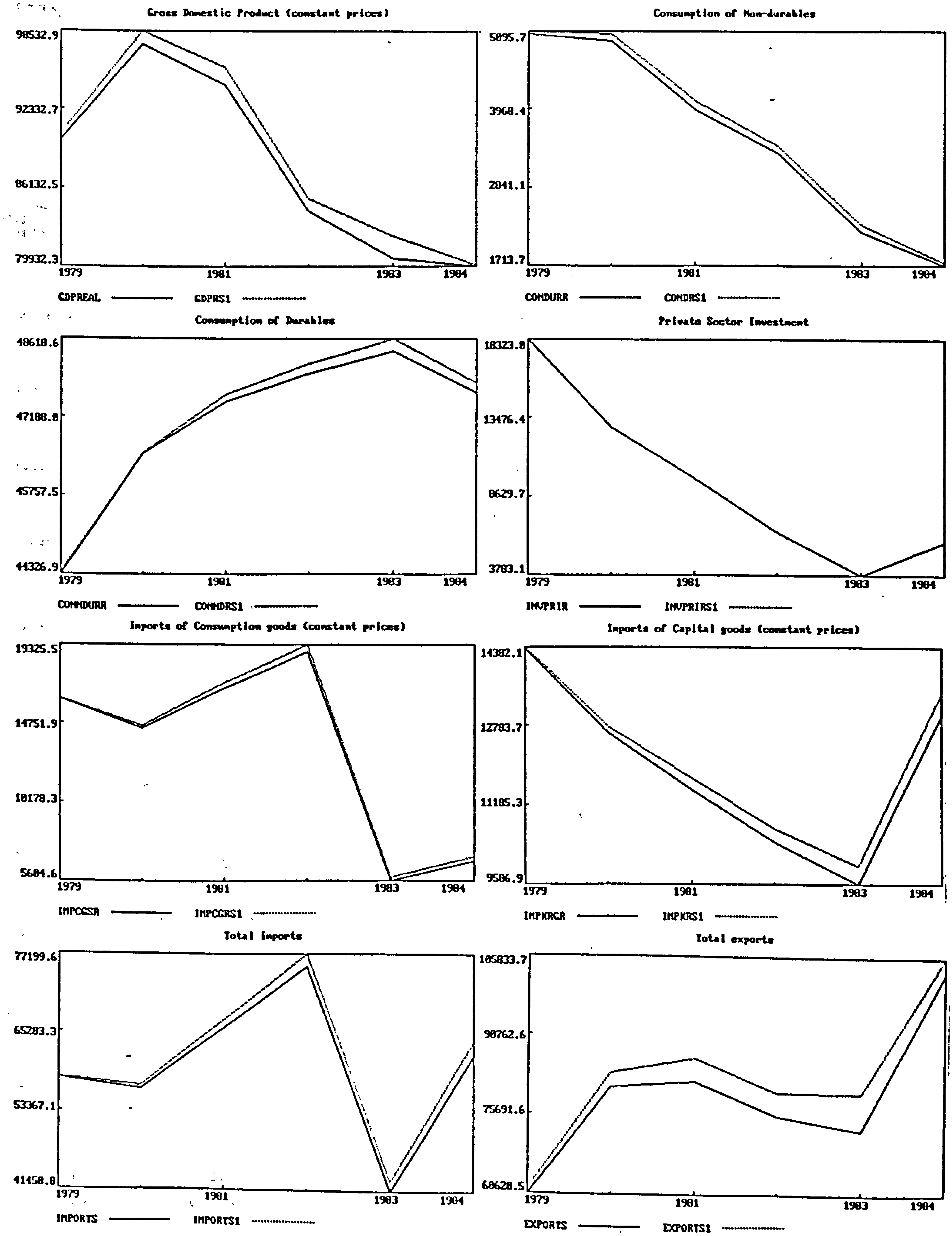
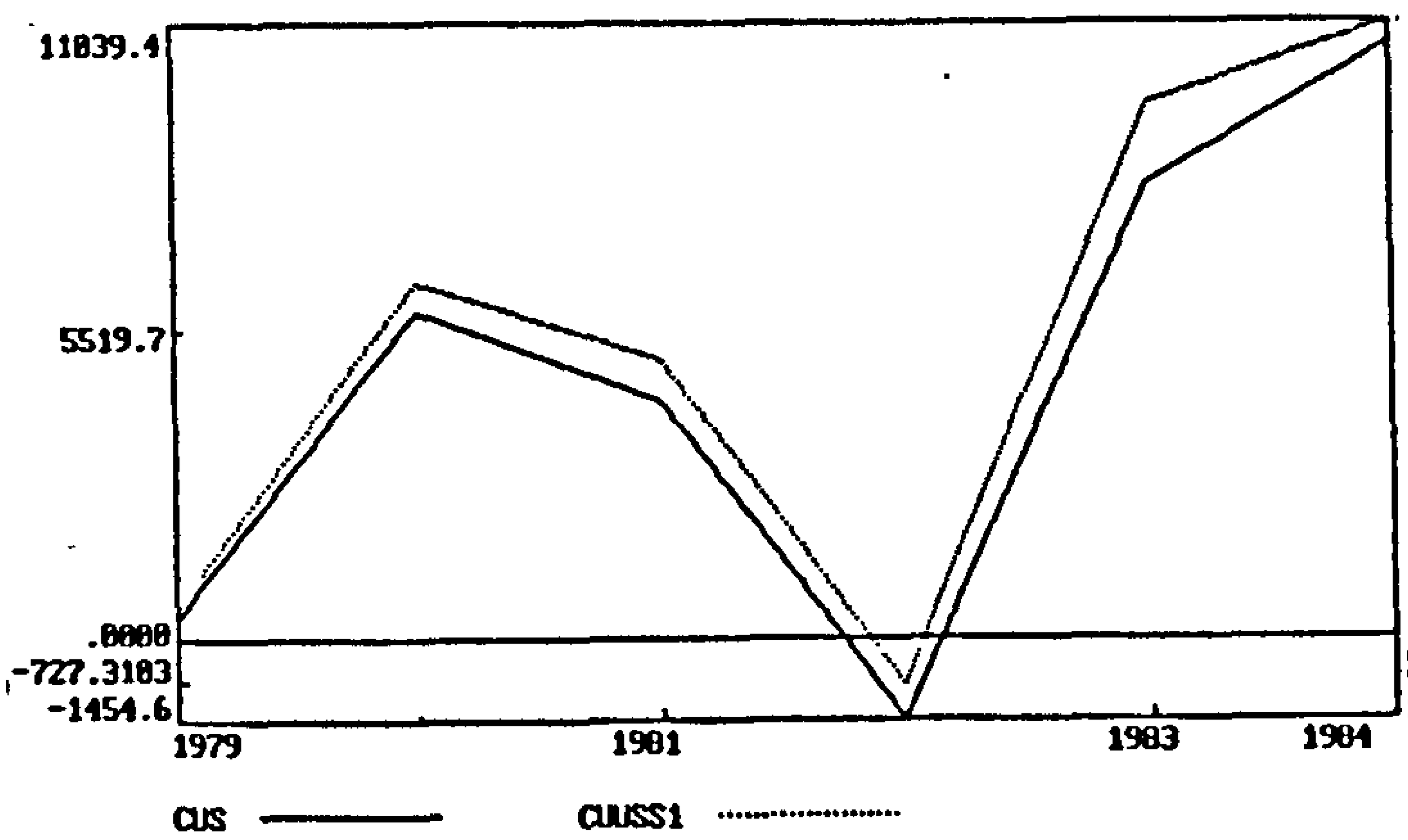


FIGURE 4.6

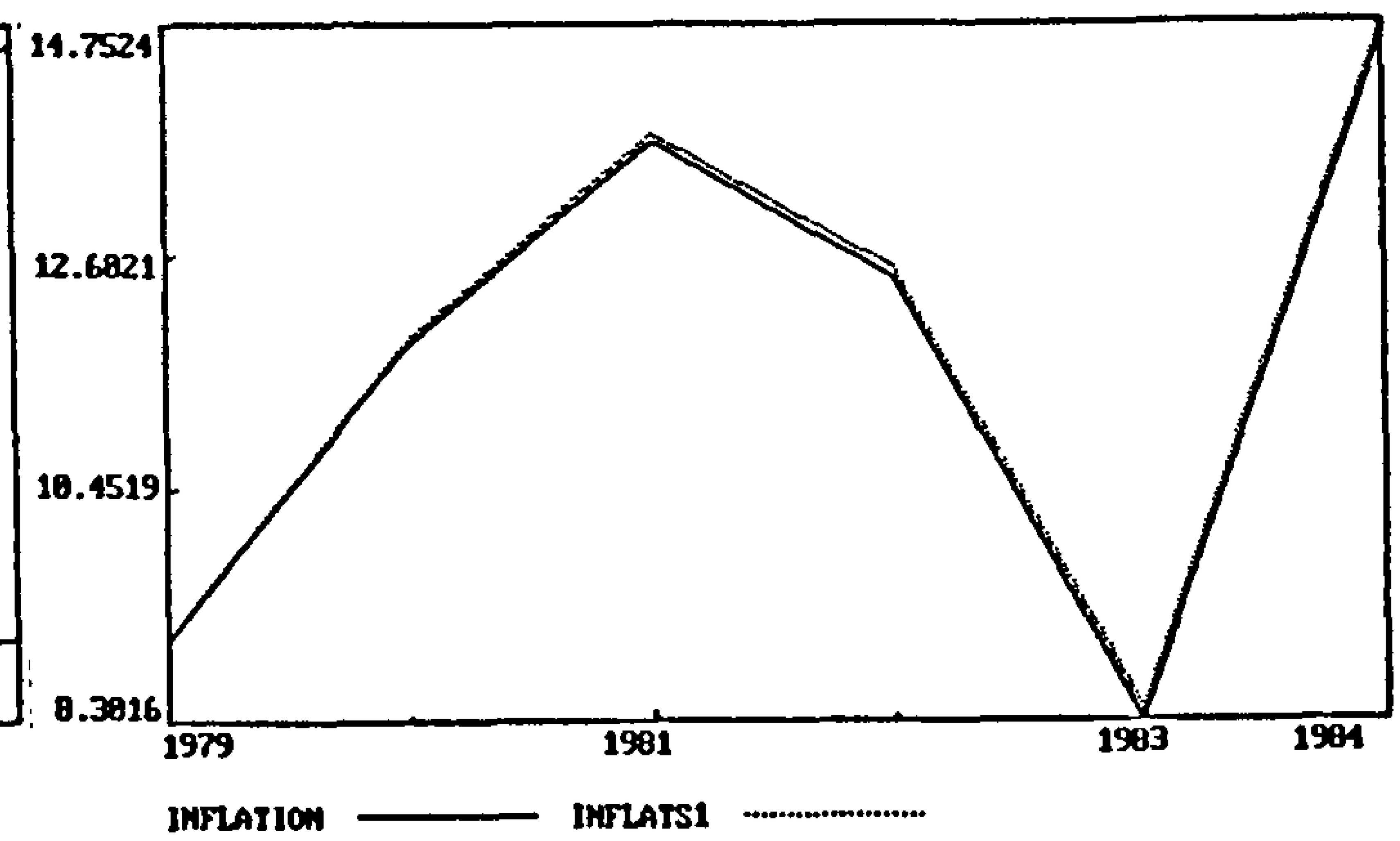
MONETARY POLICY. DOMESTIC CREDIT SHOCK



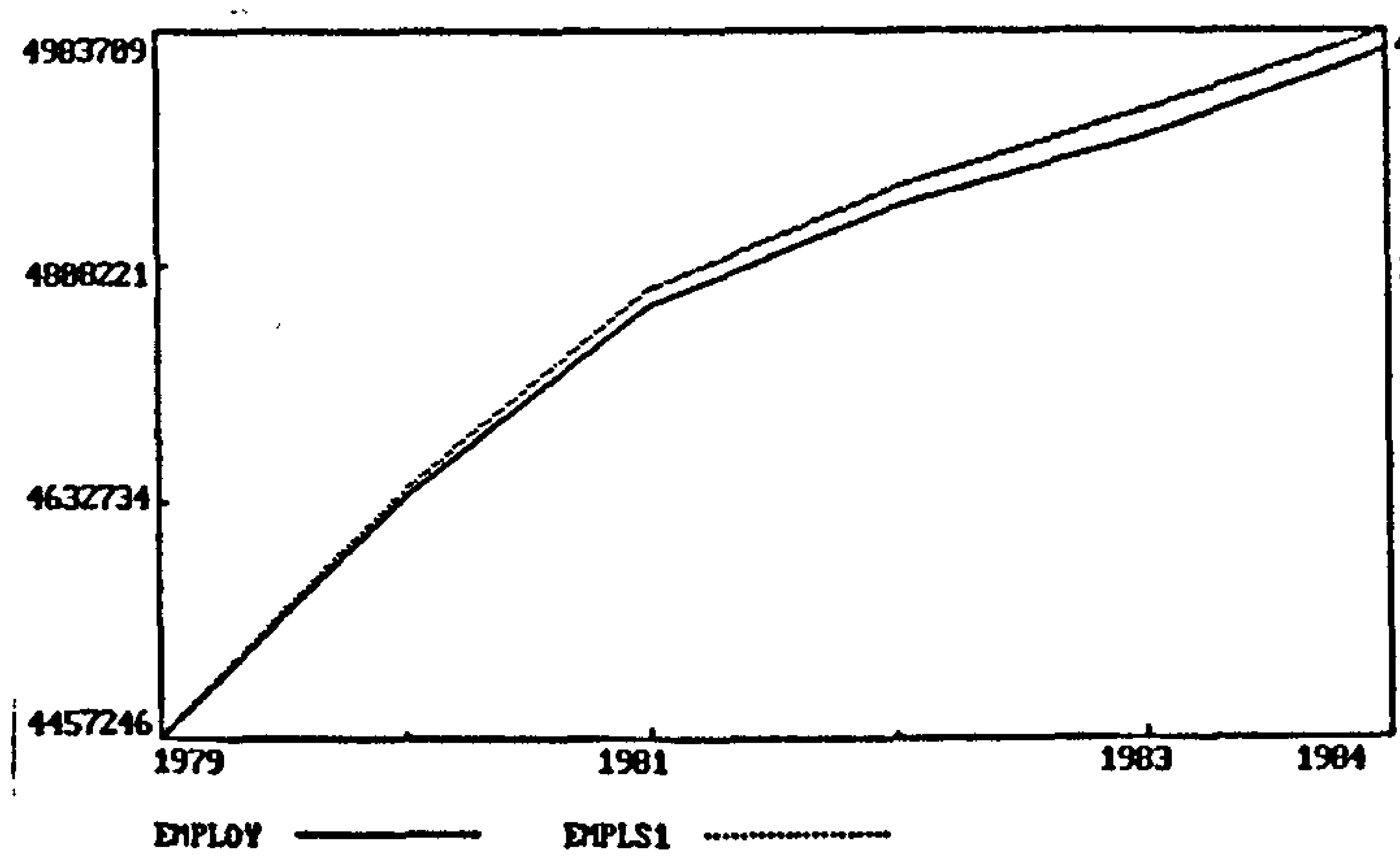
Current Account (millions US dollars)



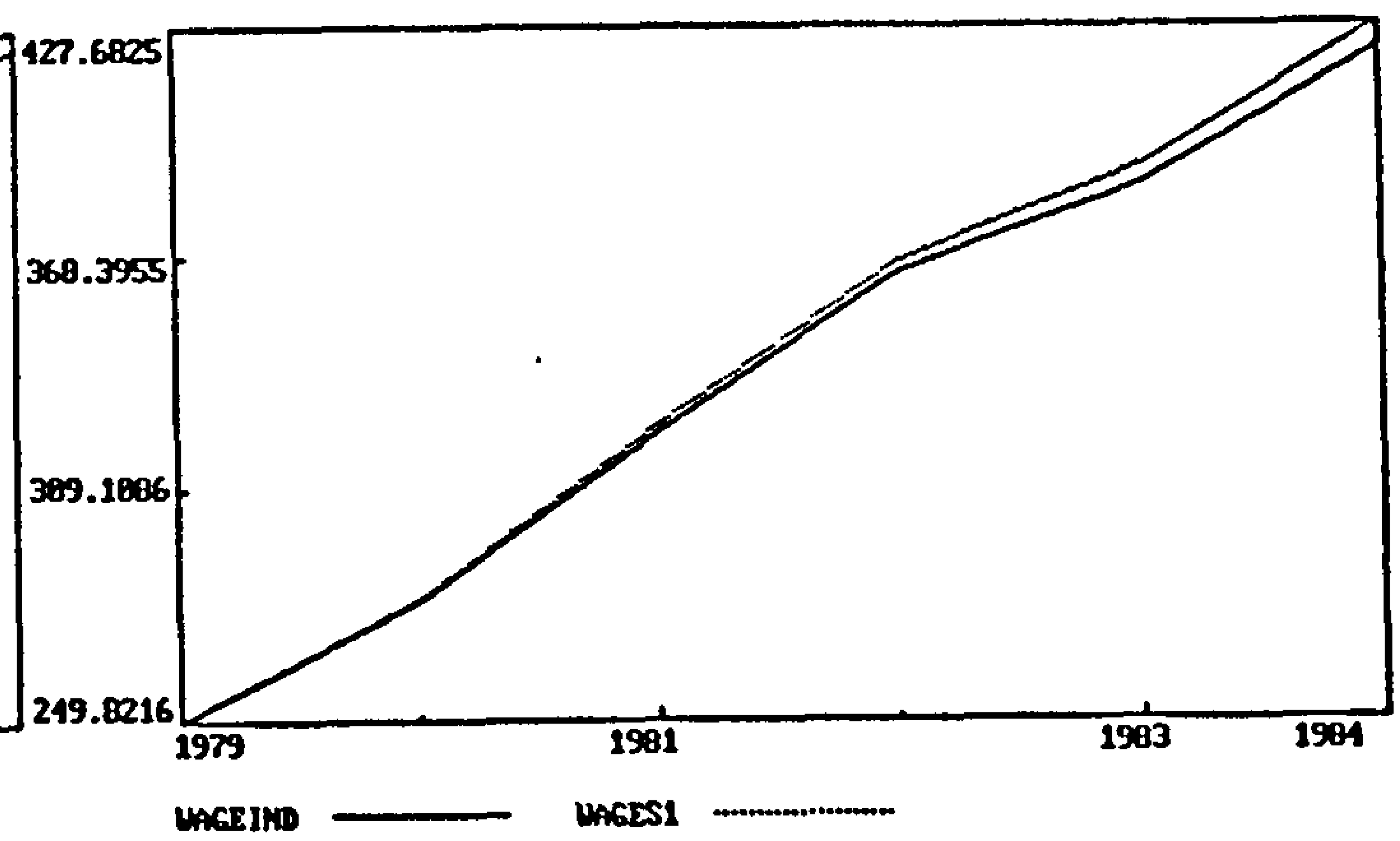
Inflation rate



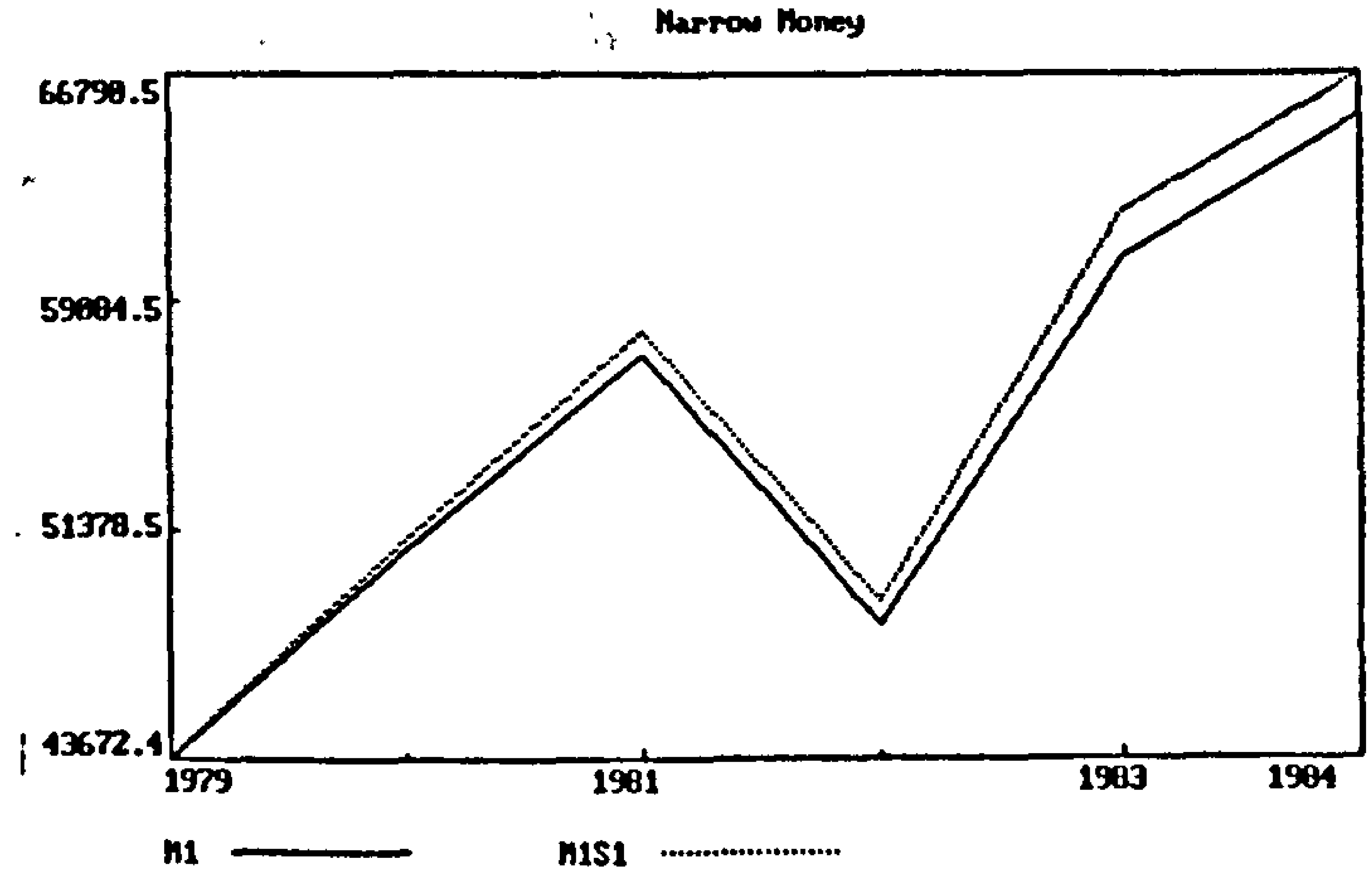
Employment (millions persons)



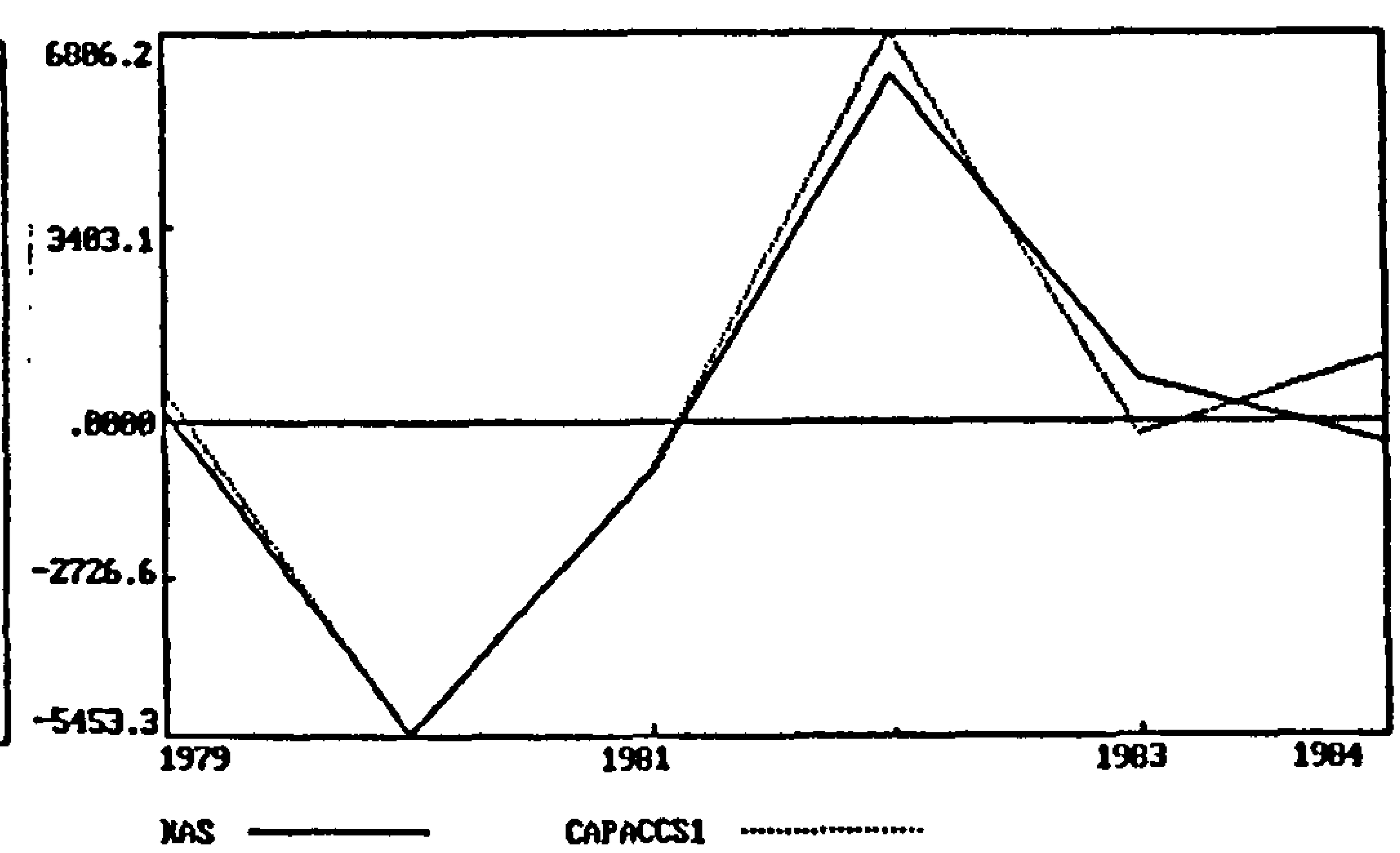
Money Wages



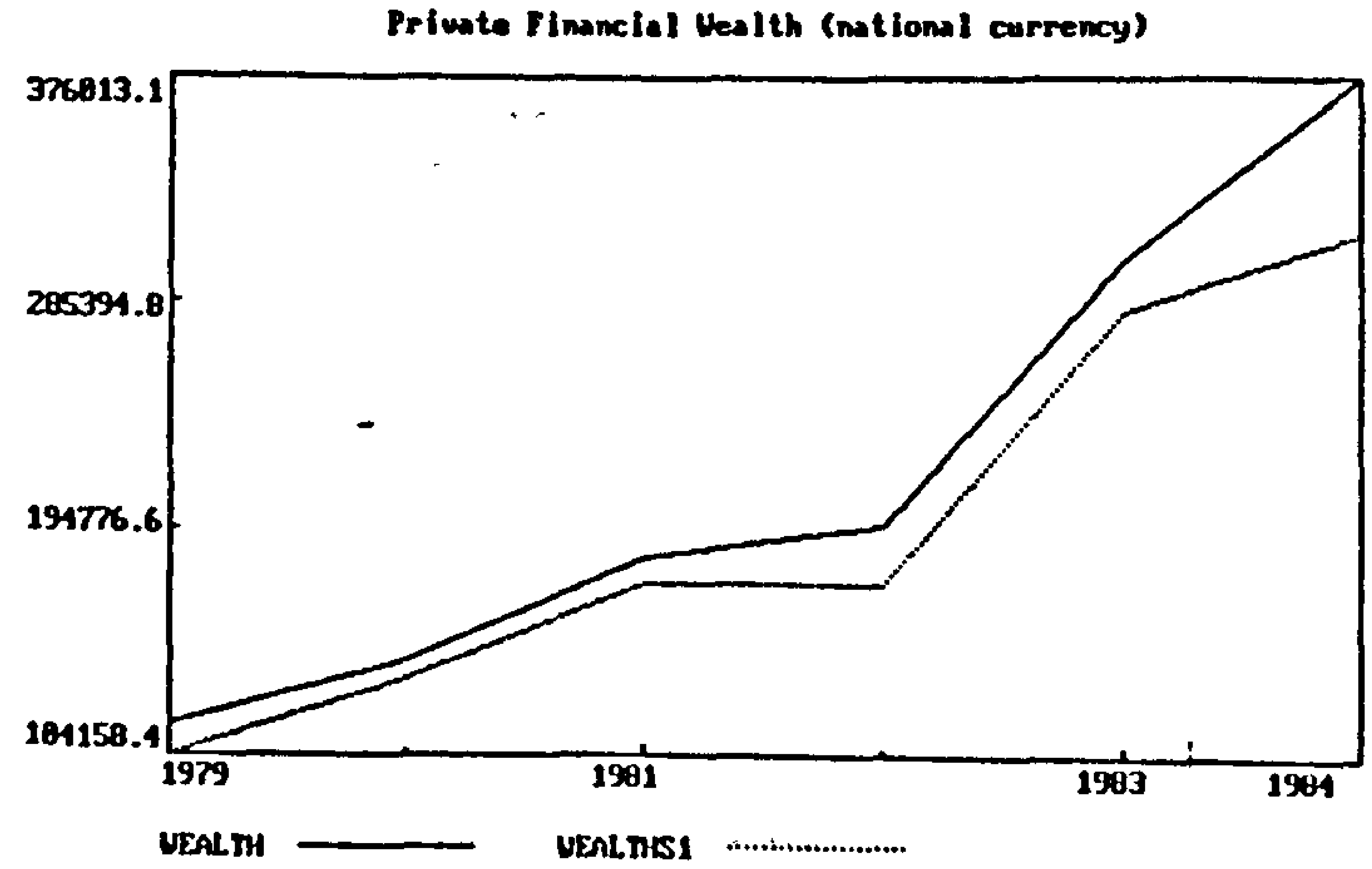
Narrow Money



Capital Account (millions US dollars)



Private Financial Wealth (national currency)



Money Multiplier

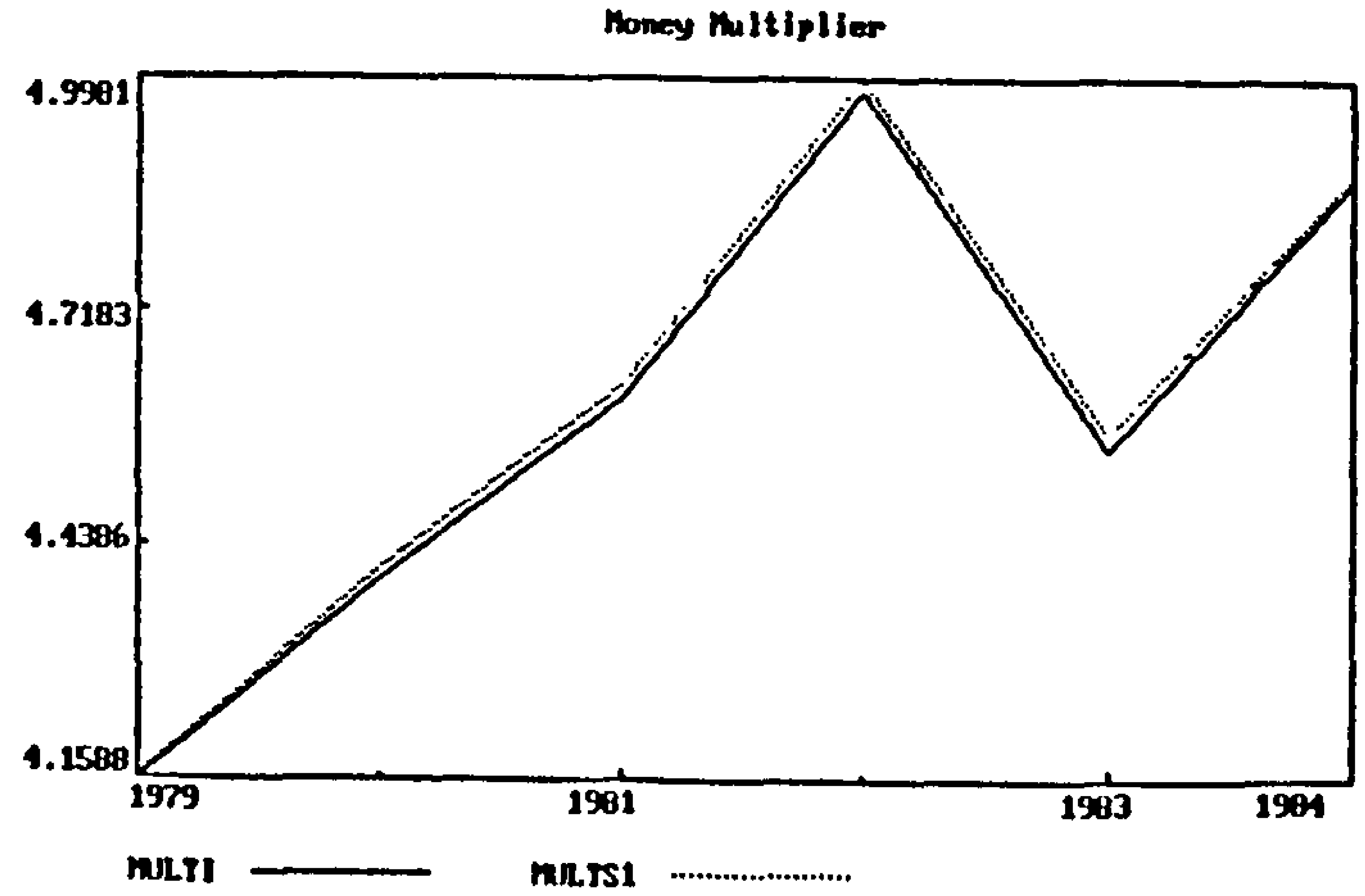
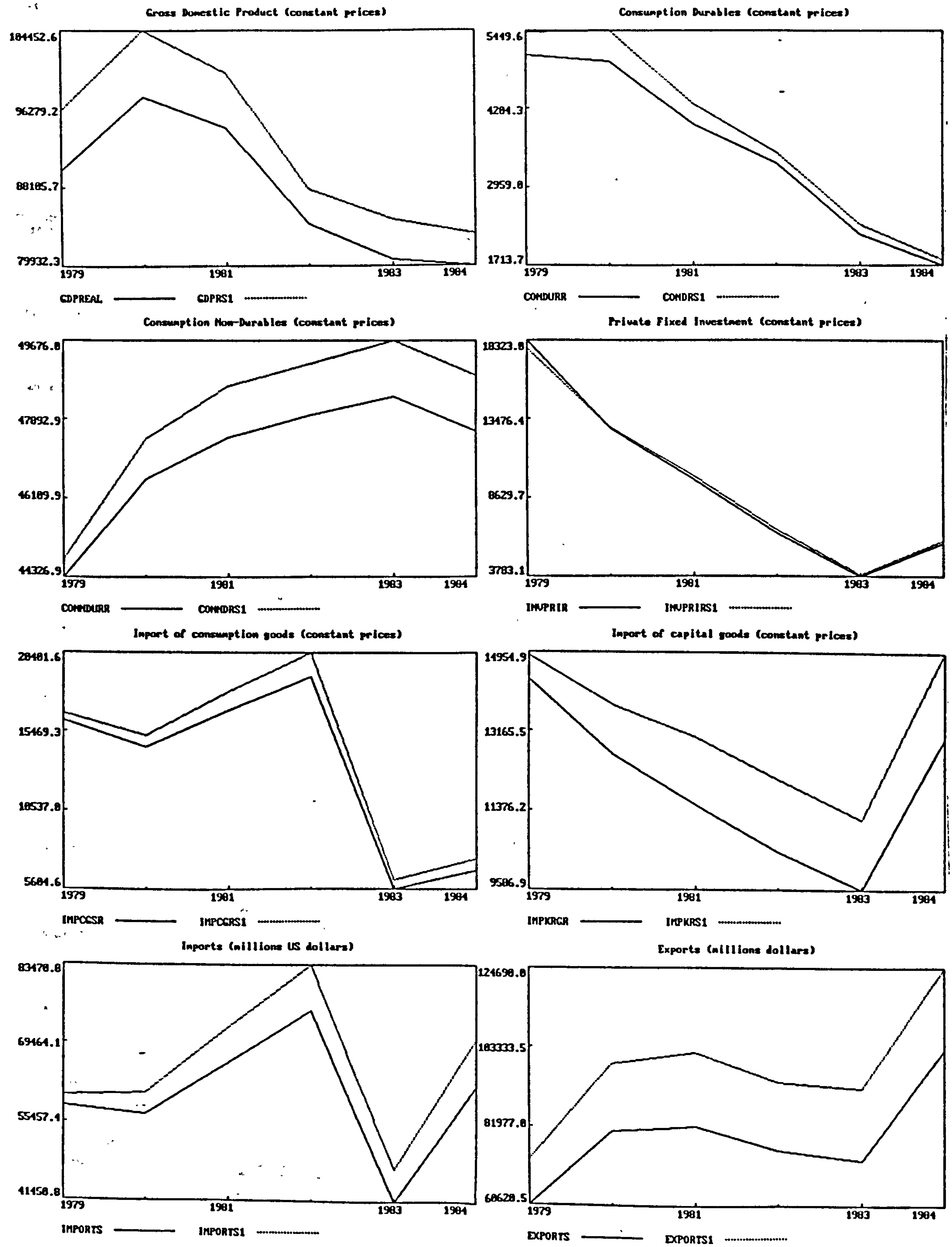
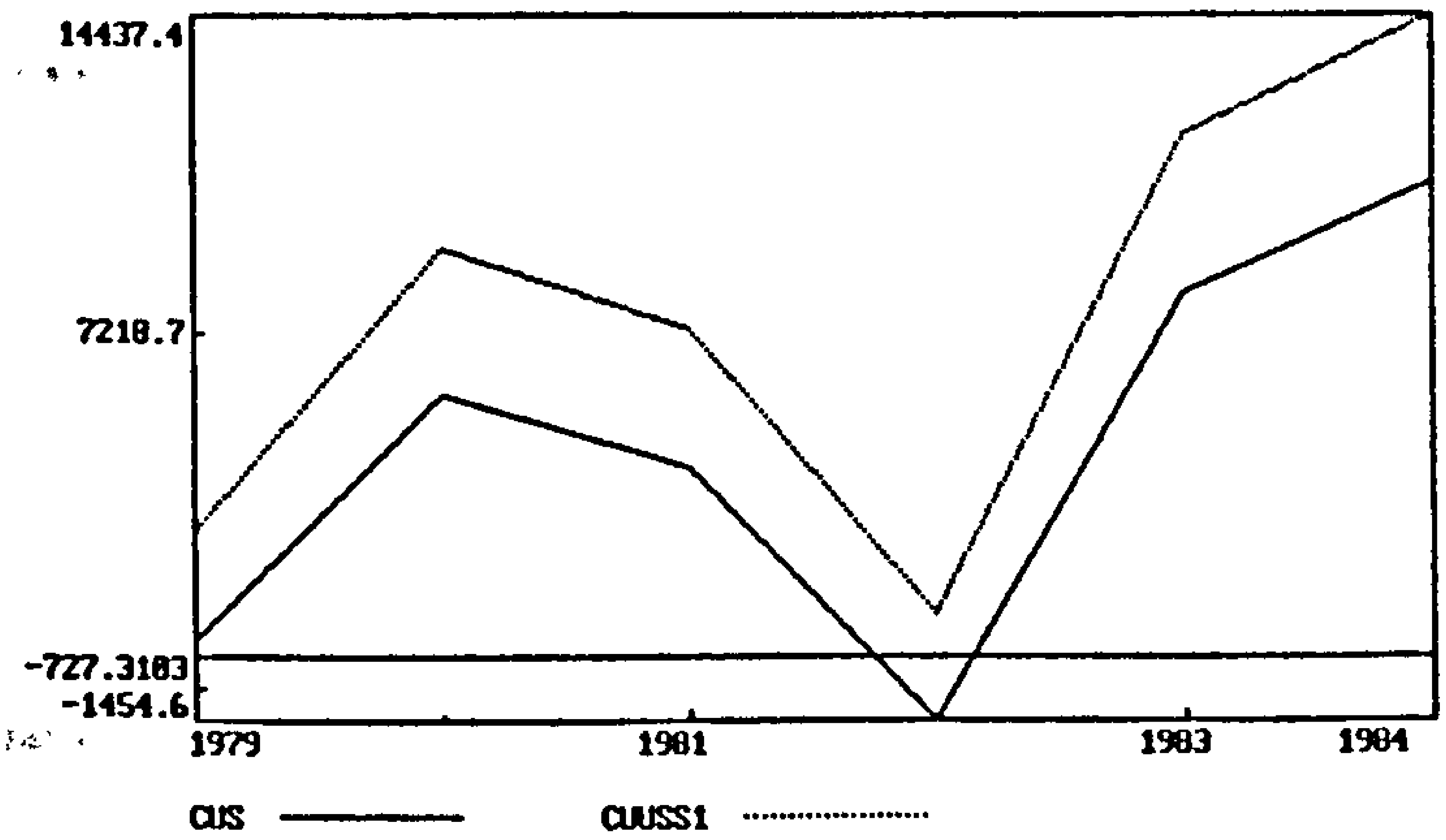


FIGURE 4.7

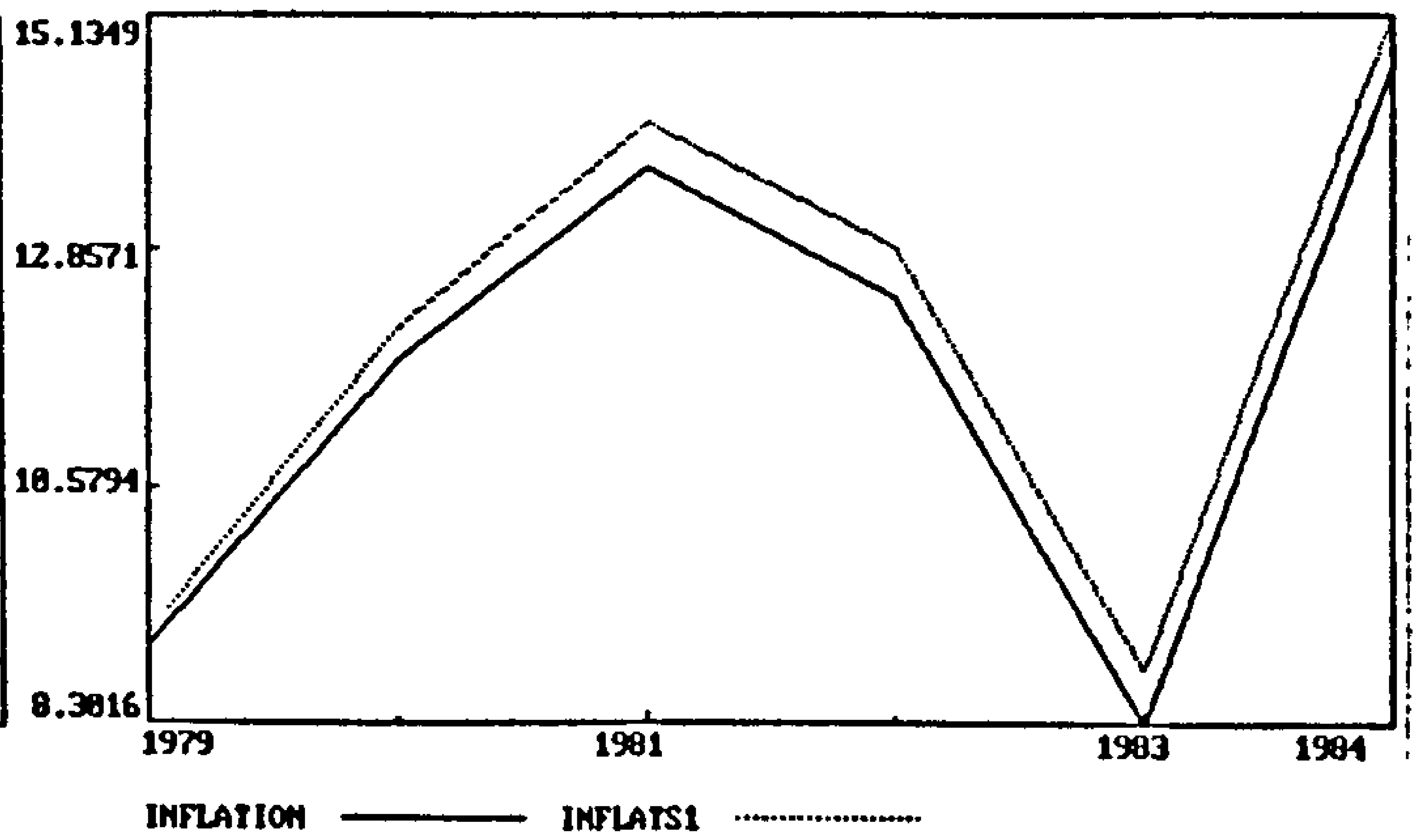
EXTERNAL SHOCK. OIL PRICE INCREASE



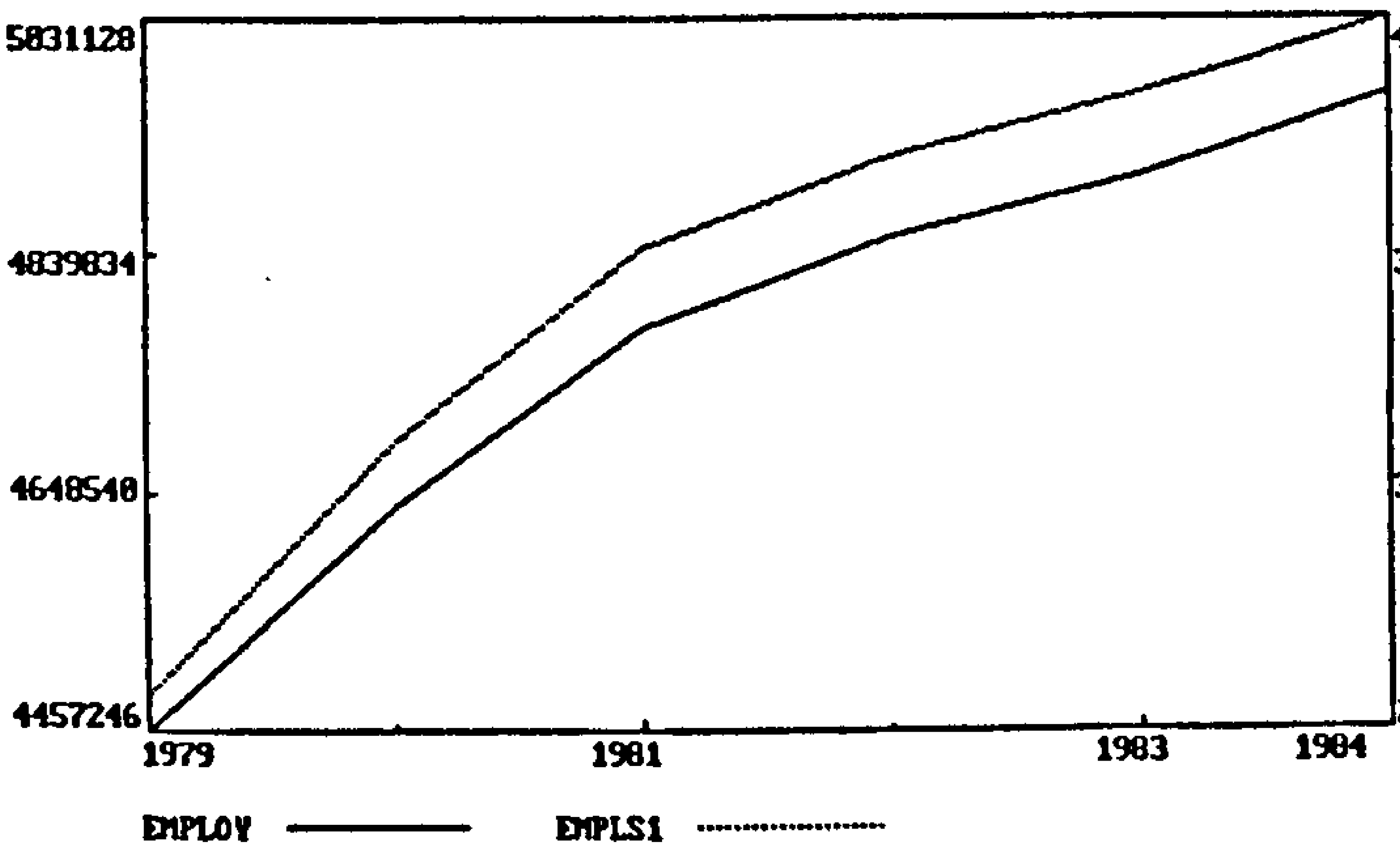
Current Account (millions US dollars)



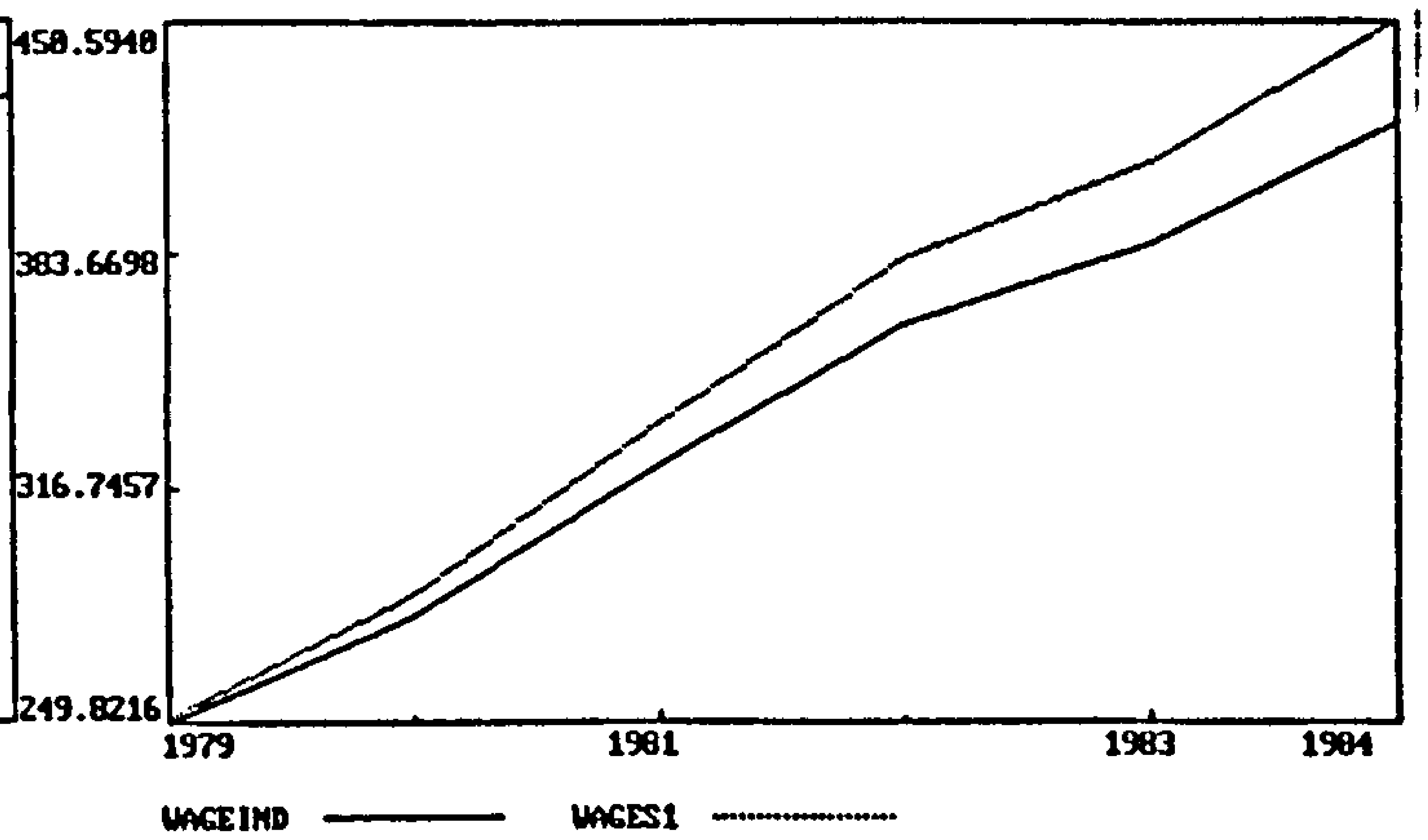
Inflation Rtae



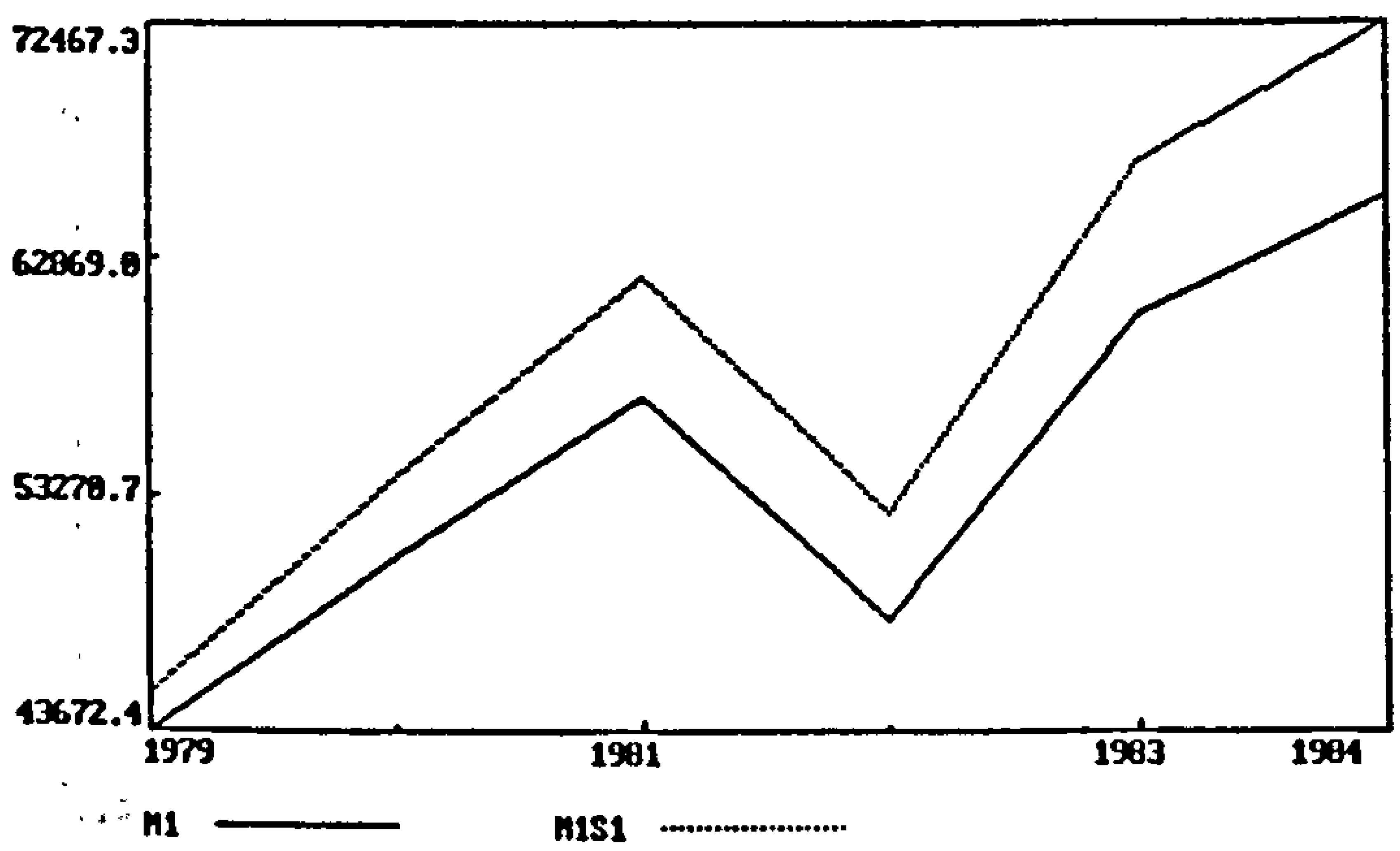
Employment (millions persons)



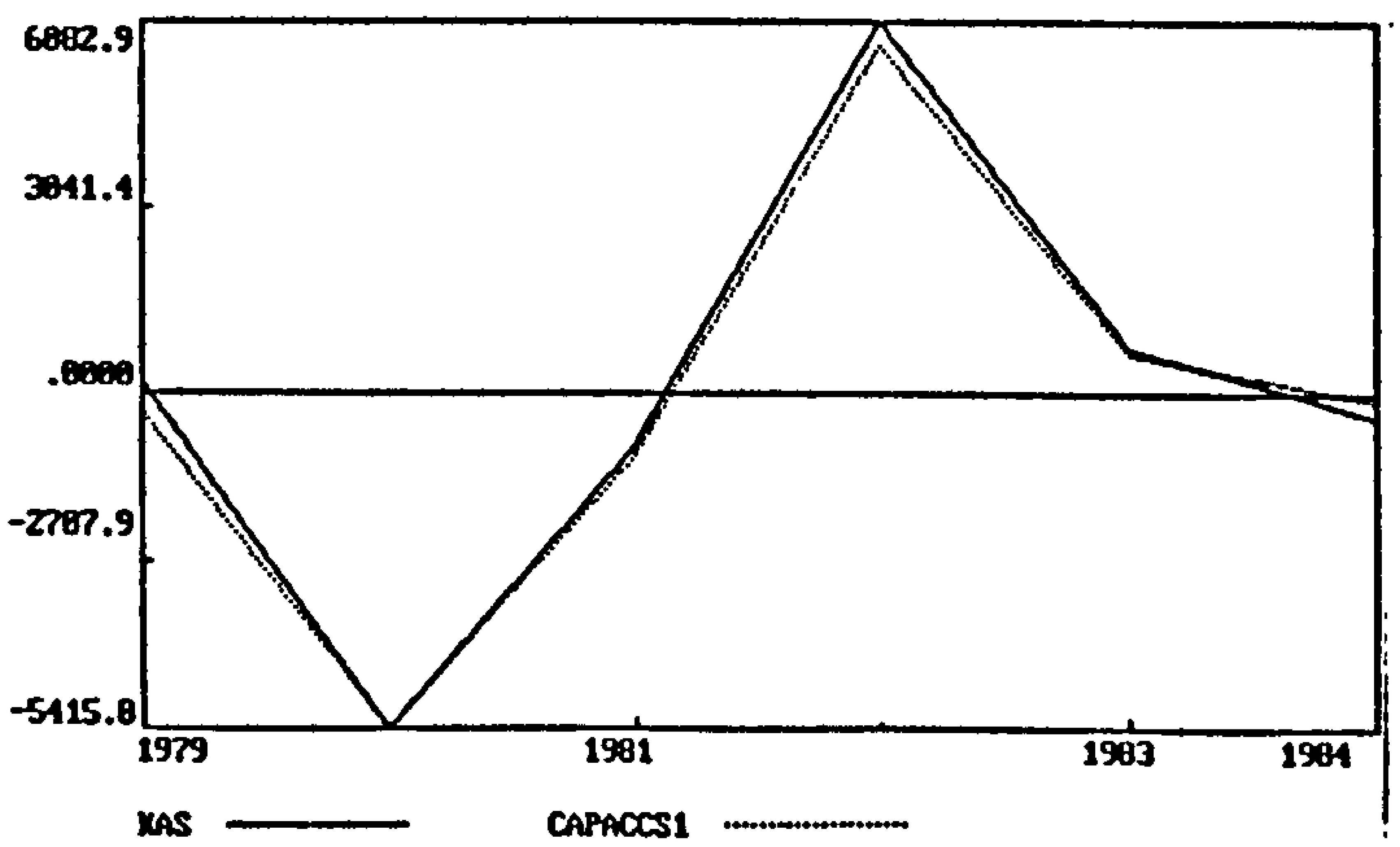
Money Wages



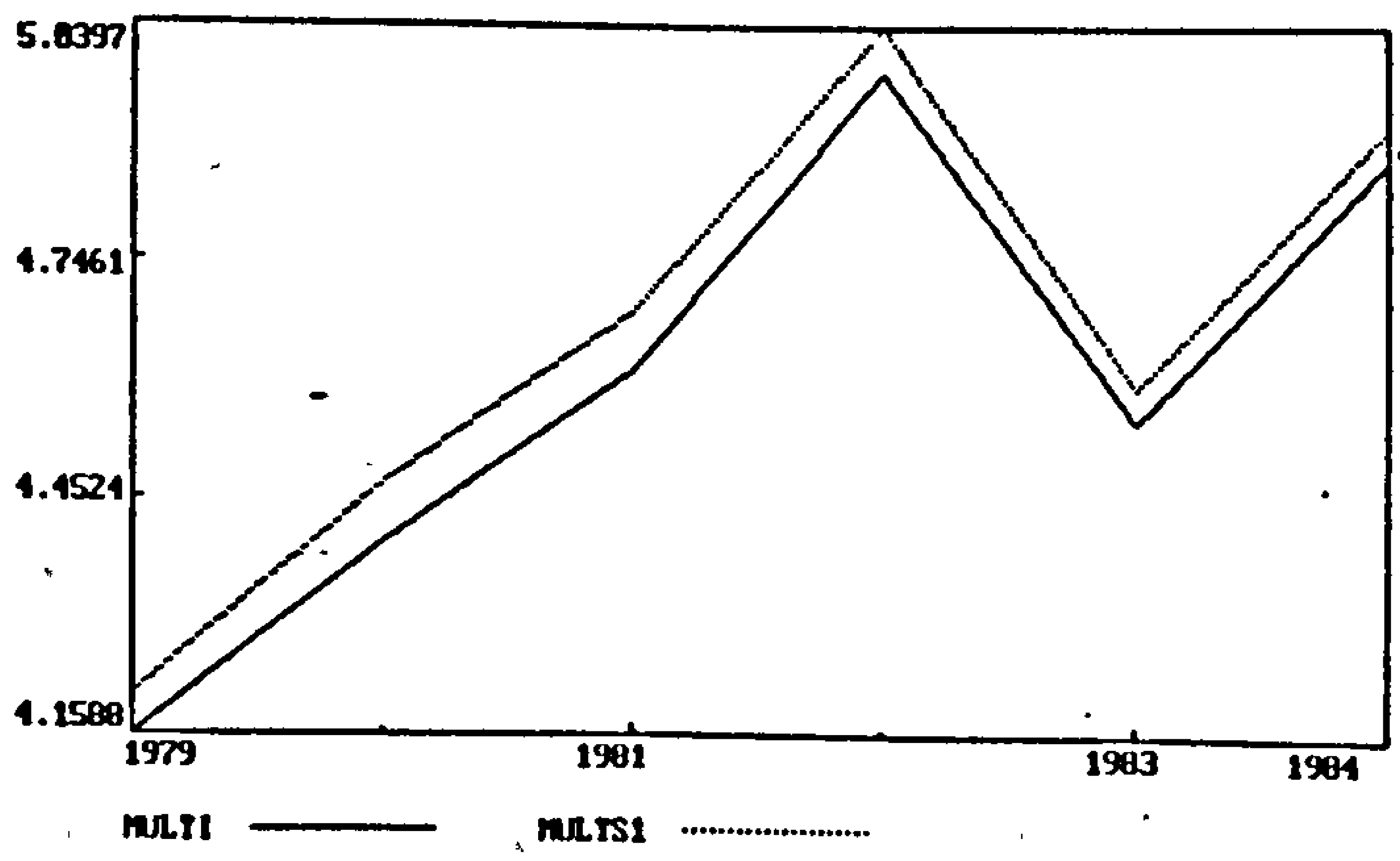
Narrow Money



Capital Account (millions US dollars)



Money Multiplier



Short Term Capital Flows (millions US dollars)

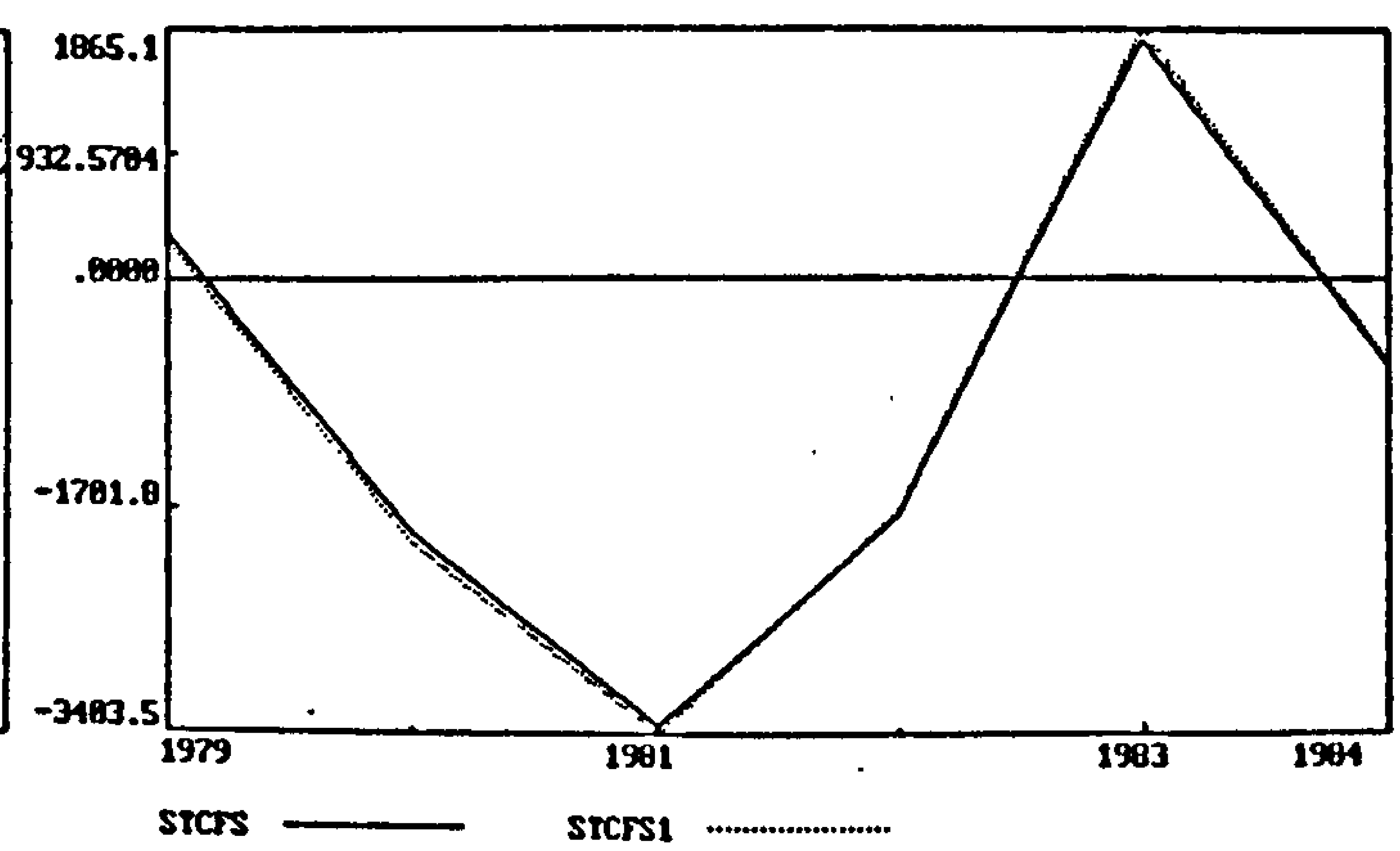
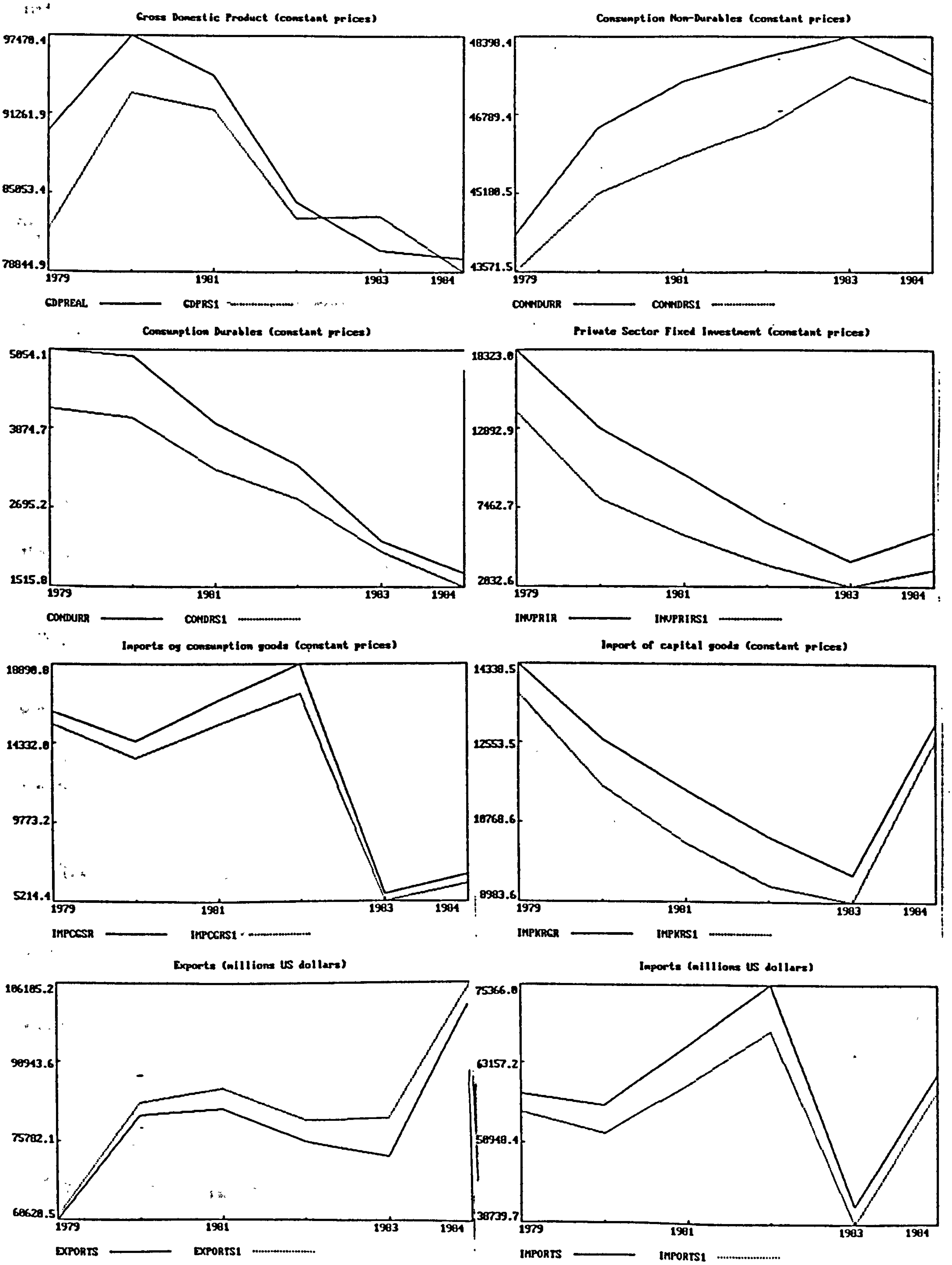
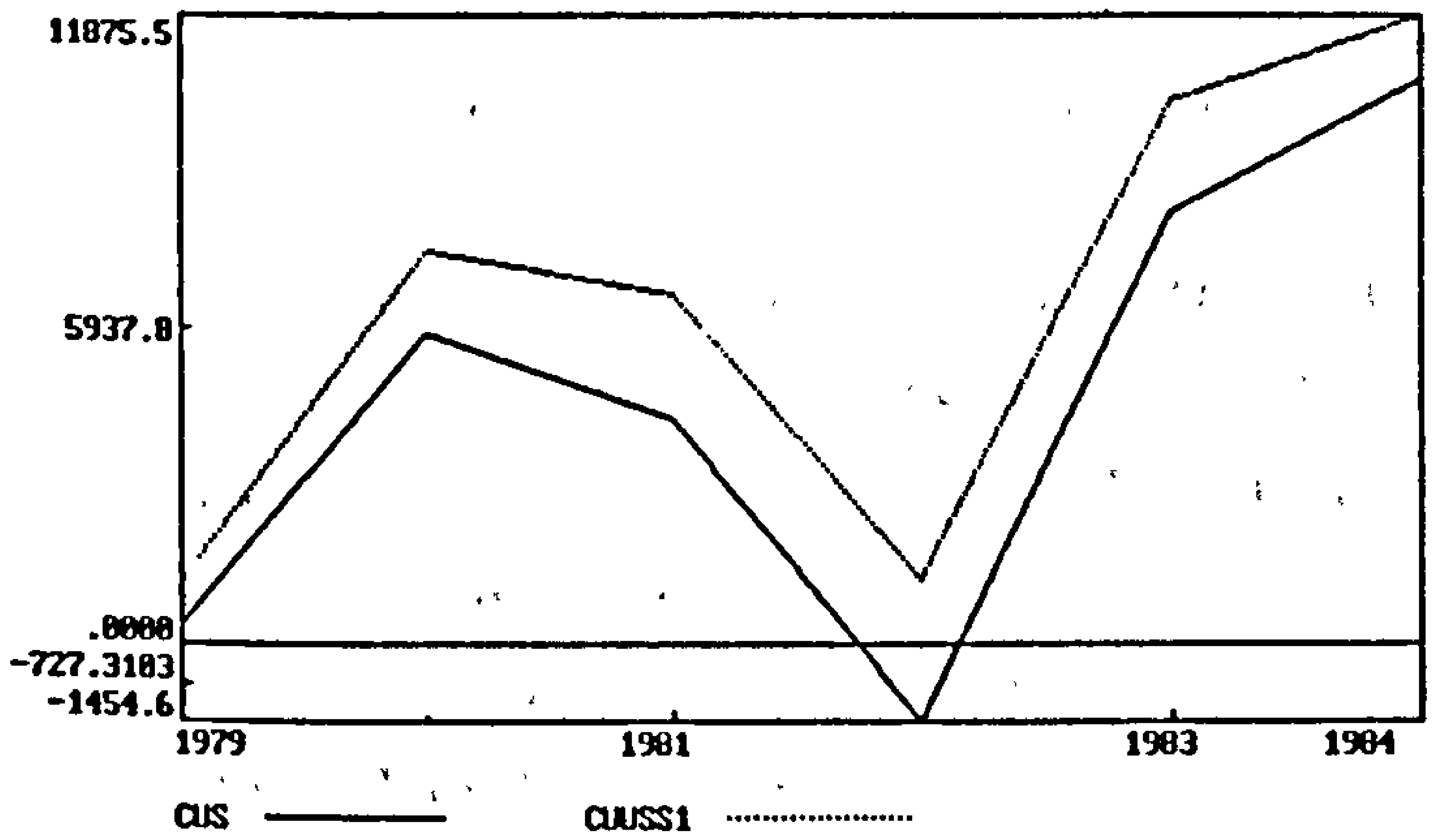


FIGURE 4.8

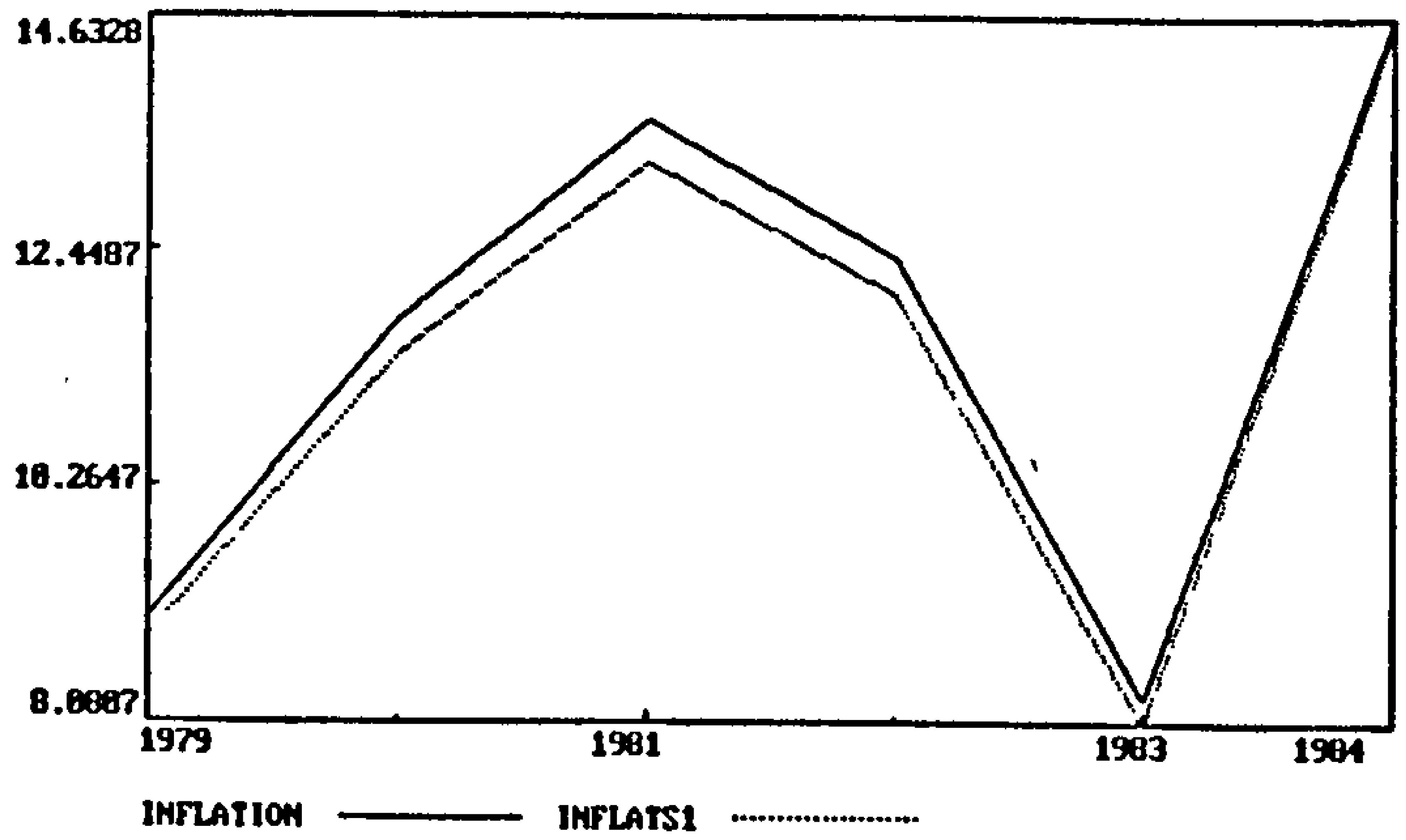
MONETARY POLICY. INTEREST RATE SHOCK



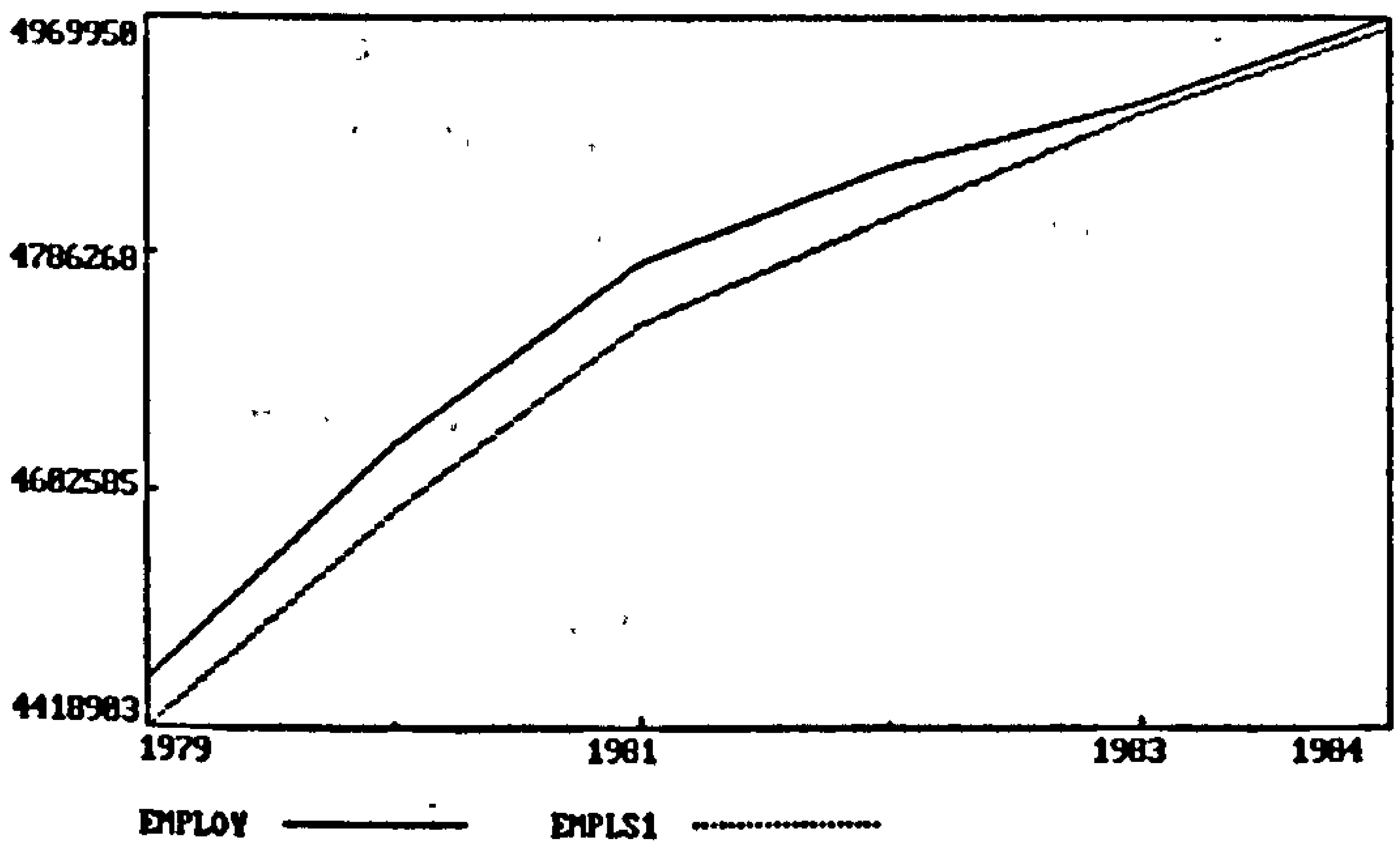
Current Account (millions US dollars)



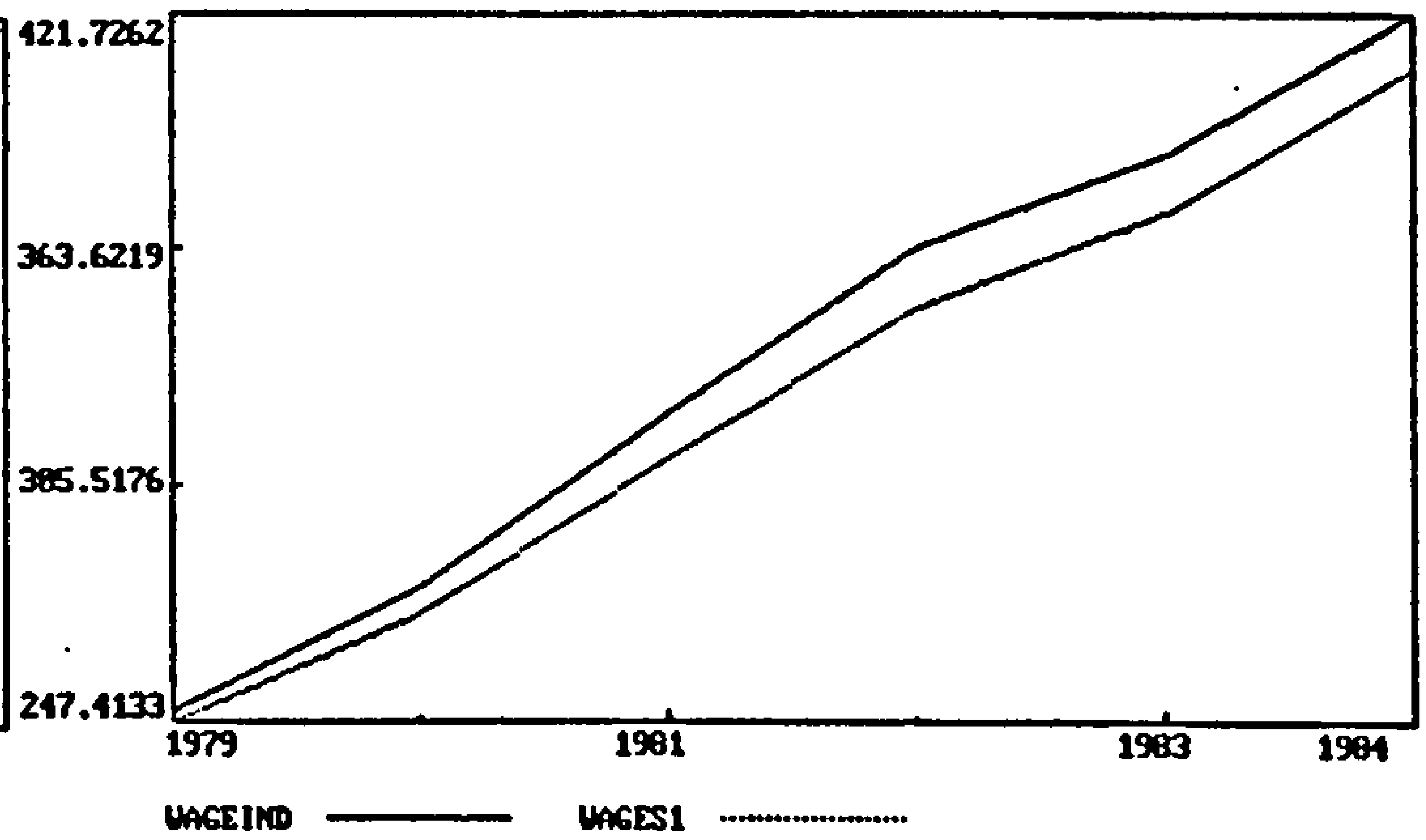
Inflation Rate



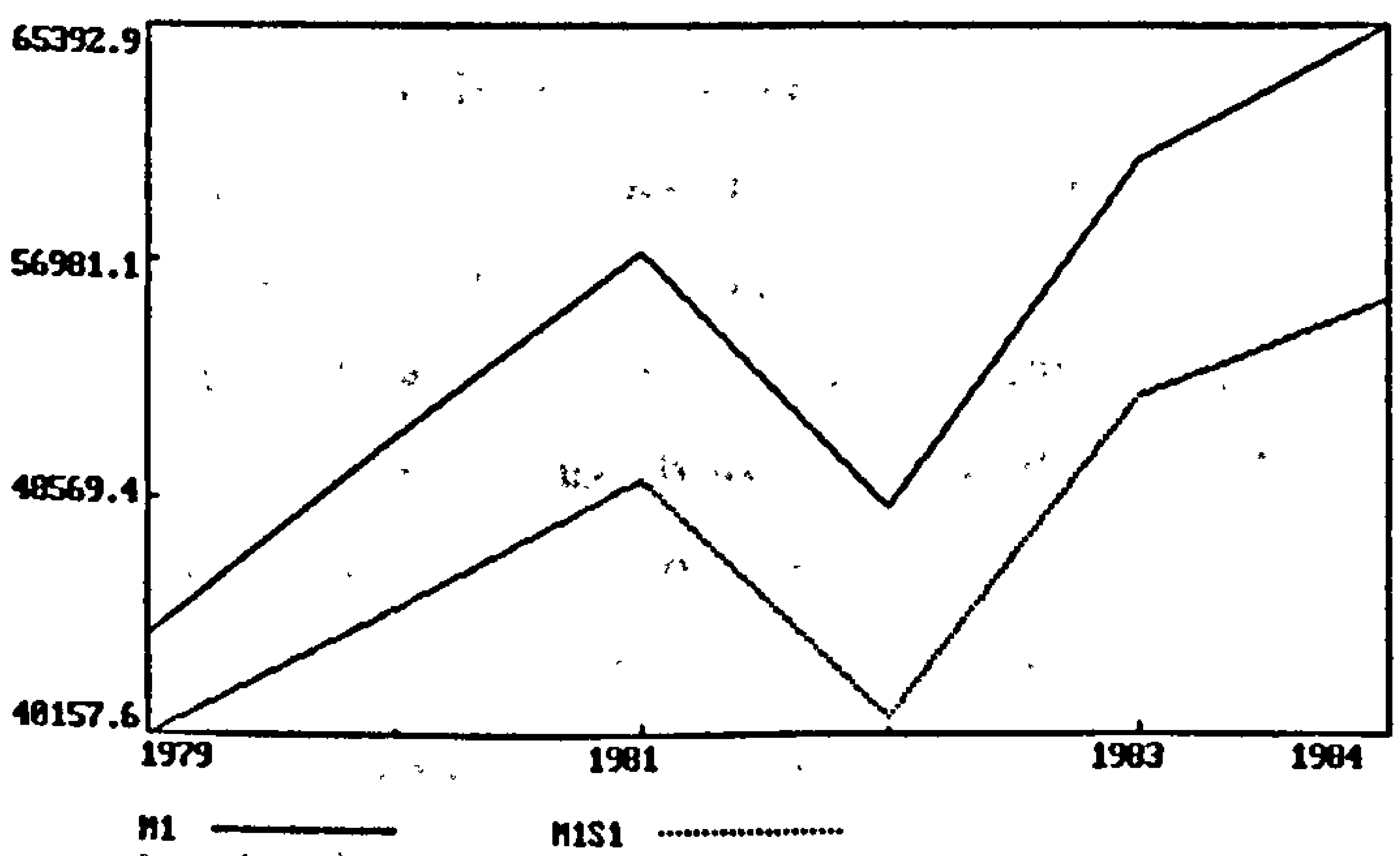
Employment (millions persons)



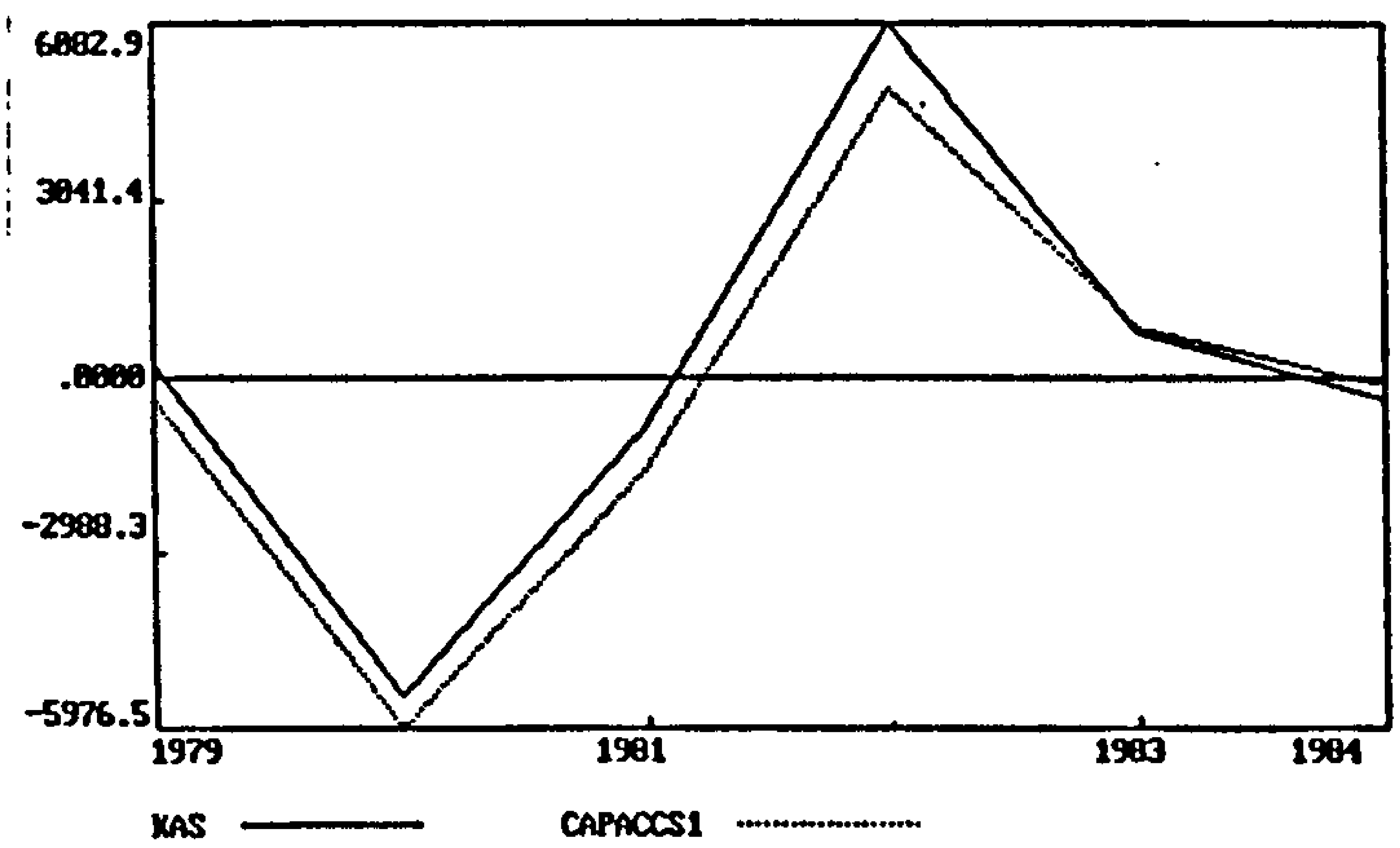
Money Wages



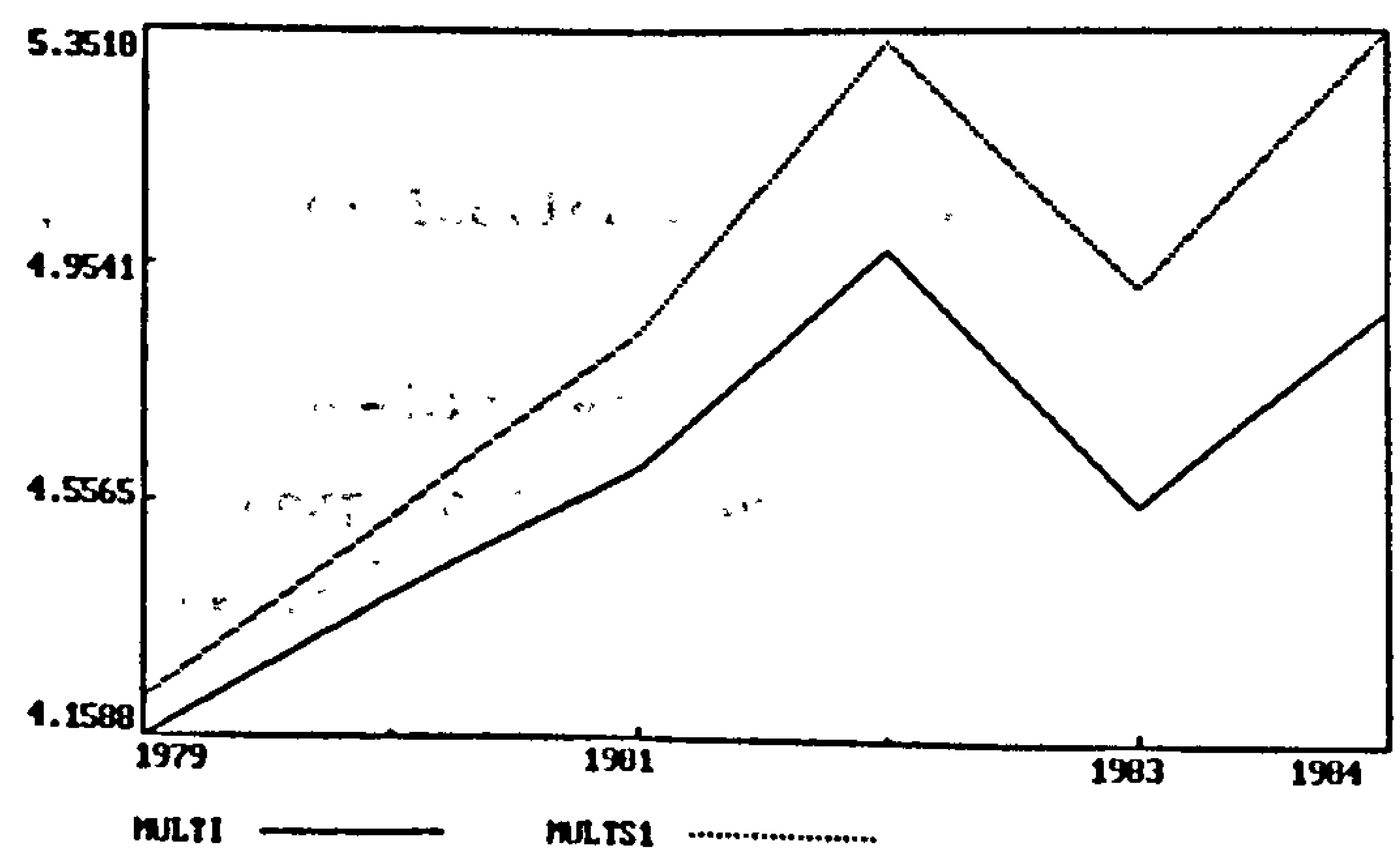
Narrow Money



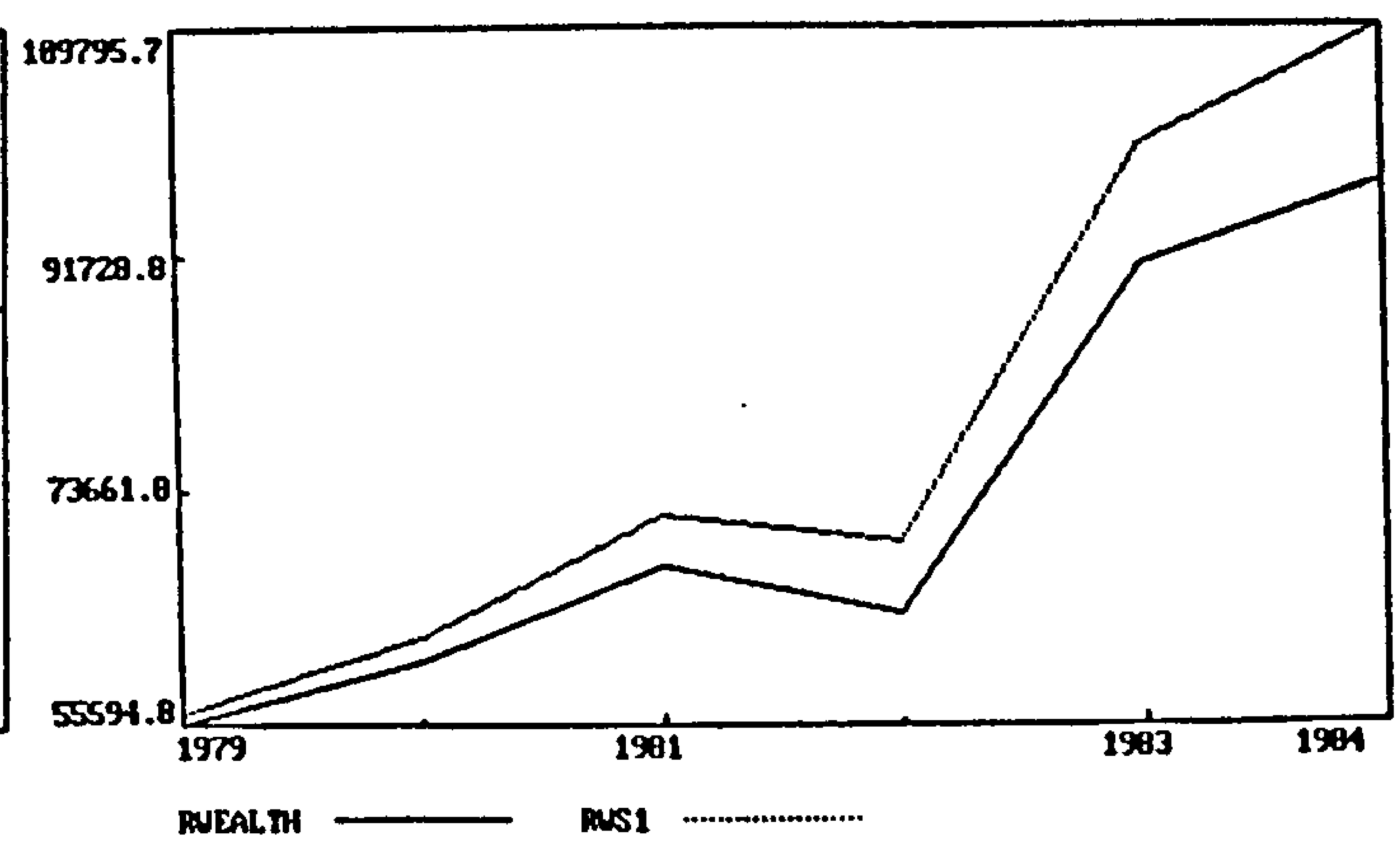
Capital Account (millions US dollars)



Money Multiplier



Private Sector Financial Wealth (constant prices)



APPENDIX 5

Data Source, Definition and Notation

In collecting the data for the empirical work we have relied upon primary as well as secondary published sources. The major sources of information have been the different publications of the Central Bank of Venezuela and that of the International Monetary Fund. However other sources such as Ministry of Finance's Annual Reports, World Debt Tables (World Bank) are used as well as indirect estimation of data. The basic Central Bank publication is the yearly Economic Report in addition to its statistical appendix, occasional publications such as The Economy in the Last Thirty Years published in 1971 and 1976. In these publications data for the main macroeconomic variables is available on an annual basis.

Data on the Venezuelan economy has been in the past collected by Central Bank, Oficina Central de Estadistica e Informatica and the Planning Ministry, CORDIPLAN. However, after the System of National Accounts was imposed in 1968, Central Bank has remained the most accurate sources of economic data.

Available data is of poor quality and incomplete. Disaggregation and length of the sample period units are the most important constraint for econometric modelling. On the one hand disaggregation of macroeconomic variables is insufficient and to get disaggregated data one has to rely on the indirect methods derived from the aggregates available on official publications. On the other hand the length of the period unit restricts to annual data any attempt to build macromodels. Quarterly data exists only for variables of financial and monetary sector which are also available on monthly and on weekly basis.

Data Collection and Compilation

In this section we indicate the sources and explain the method of compilation, where applicable, of variables used in this thesis.

Real Sector

This sector includes private consumption, both durables and non-durables, investment both public and private sector stockbuilding, balance of trade exports, wages, labour supply, labour demand and government consumption, taxes, prices. Data is in Bs millions (Bolivares) otherwise indicated.

Data in real terms reflects the base year 1968=100

CONS	Nominal private sector consumption. Central Bank Economic Report (CBER) various issues
CONREAL	Real private sector. Nominal private consumption deflated by GEPRUS general wholesale price index Central Bank Economic Report
CONDUR	Nominal private consumption of non-durables. CBER various issues
CONNDURR	Real private consumption. CONDUR deflected by GEPRWS, CBER various issues
INVPRI	Nominal private sector fixed investment. INVPRI deflated by GEPRWS
INVPUB	Nominal public sector investment. Derived from CBER various issues
INVPUBR	Real public sector investment, INVPUB deflated by GEPRWS
GOVCON	Government fuel expenditure CBER various issues
STOCKS	Accumulated inventories starting 1950 derived from CBER various issues
STOCKSR	STOCKS deflated using GEPRUS
INVENTORIES	Variation of inventories (STOCKSO CBER various issues
EXPORTS	Total Exports. CBER various issues
OILEXP	Oil exports CBER various issues
OILEXPBAR	Oil exports (000,000 barrels/year) Ministry of Energy Annual Report
NOOILX	Nominal non-oil exports. CBER various issues
RNOOILX-	Real non-oil exports. NOOILX deflated by GEPRWS
PRICEOILBS	Oil price (realisation) Ministry of Energy, Annual Report various issues
OILPROD	Oil production (000,000 barrels/year) Ministry of Energy, Annual Report various issues

WRESERV	New proved oil reserves (000,000 barrels) Ministry of Energy, Annual Report, various issues
DOOILCONOOO	Domestic oil consumption (000,000 barrels/year) Ministry of Energy, Annual Report, various issues
GDPOECDOECD	Gross Domestic Product IFS, various issues
IMPORTS	Total imports CBER, various issues
IMPOREAL	Real imports, derived by deflating IMPORTS by IMPRWS
IMPCGS	Nominal imports of consumption goods and services. CBER, various issues
IMPCGSR	Real imports of consumption goods and services. CBER, various issues
IMPERGR	Real imports of capital goods and raw materials. CBER, various issues
YDISPR	Real disposable income, derived by subtracting taxes and depreciation and adding transfers
GDPREAL	Gross Domestic Product at market prices at prices 1968=100. Derived by adding up all components in real terms at prices of 1968
GDPN	Gross Domestic Product. Nominal Terms CBER, various issues
WAGEIND	Money wages index. Derived averaging salaries and wages paid during the year
EMPLOY	Employment (000,000 employees) CBER, various issues
LABFOR	Economic active population (000,000 persons) CBER
UNEMPR	Unemployment rate. Derived by using the following expression UNEMPR = ((LABFOR-EMPLOY)/LABFOR) *100
GEPRWS	Wholesale prices. Their price index is the main deflator of nominal variables. <u>CBER</u>, various issues
IMPRWS	Import price index (domestic currency). CBER, various issues
USPRICES	United States retail price index IFS, various issues
INFLATION	Changes in general wholesale index, derived as log(GEPRWS/GEPRWS(-1))*100
DIRTAX -	Direct taxes (total) <u>CBER</u>, various issues
OILTAXDI	Oil income tax. <u>CBER</u>, various issues
INDTAX	Indirect taxes, <u>CBER</u>, various issues
TARIFFS	Tariffs and duties, <u>CBER</u>, various issues
OTHTAXIND	Other indirect taxes, <u>CBER</u>, various issues

DEPREC	Depreciation, <u>CBER</u>, various issues
TRANSF	Government transfers to private sector CBER, various issues

Financial Sector and Capital Account

KAS	Capital Account (000,000 US dollars), CBER, various issues
PBCFS	Public sector short and long term capital flows (000,000 US dollars), CBER, various issues
STCFS	Private sector short term capital flows. (000,000 US dollars), CBER, various issues
PORGFS	Private sector portfolio capital flows. (000,000 US dollars) CBER, various issues
OTHCFS	Other long term private sector capital flows (000,000 US dollars), CBER, various issues
DIRINVS	Foreign investment (000,000 US dollars) CBER, various issues
FAUS	Private Sector foreign assets holdings, including revaluations, (000,000 US dollars). Own calculations (See below for an explanation of the derivation)
FABS	FAUS converted to national currency (000,000 Bs)
DEBT	Public sector foreign debt (000,000 US dollars). Own calculations. (See below for an explanation of the derivation).
LIBORINT	Libor rate. IFS, various issues
/COR	Incremental Capital Output ratio. Derived from the following expression: /COR = ↑K/↑GDP
INTPAYS	Interest payments (Public Sector External Debt) CBER, various issues and World Debt Tables, various issues
INTERFOR	Foreign Interest rate (US Treasury Bill rate) IFS, various issues
EXRATE	Exchange rate (Bs/US dollars)
WEALTH -	Private Sector financial wealth (000,000 Bs), own calculations
M1	Narrow money. Demand Deposits plus currency in circulation. (000,000 Bs) CBER, various issues
TIMDEP	Time deposits (000,000 Bs) CBER, various issues

MORBOND	Mortgate bonds (000,000 Bs) CBER, various issues
INTEREST	Interest rate (short term) CBER, various issues
DEPORATE	Deposit rate (long term) CBER, various issues
M2	M1 plus time deposits. (000,000 Bs) CBER, various issues
MULTI	Money multiplier. Own calculations derived by the following expression: $MULTI - \frac{C + t + 1}{C + r(t+1)}$
BASE	Money base (000,000 Bs) CBER, various issues
C	Currency ratio. Calculated as the ratio CC/DD (currency in circulation and demand deposit)
t	Time deposit ratio. Calculated as the ratio TD/DD (time deposit over demand deposit)
R	Reserve ratio. Calculated as the ratio of required reserves (REQRES) over total deposits
REQRES	Required reserves at Central Bank by the banking sector, CBER, various issues
DISCOUNT	Base rate. CBER, various issues

TABLE 5.1

COMPOSITION OF EXPENDITURES, IMPORTS AND GDP

OBS.	GDPN	IMPORTS	CONS	INVEST	GCONS	EXPORTS
1955	.7812	.2188	.4090	.2258	.1000	.2649
1956	.7471	.2529	.4403	.1873	.0924	.2799
1957	.6970	.3030	.4491	.1789	.0859	.2860
1958	.7270	.2730	.4345	.2014	.1140	.2501
1959	.7524	.2476	.4581	.1989	.0982	.2447
1960	.7998	.2002	.4658	.1464	.1196	.2682
1961	.8128	.1872	.4594	.1443	.1132	.2830
1962	.8135	.1865	.4589	.1485	.1013	.2913
1963	.8325	.1675	.4537	.1457	.1100	.2907
1964	.8016	.1984	.4572	.1773	.0990	.2655
1965	.7891	.2109	.4723	.1721	.1020	.2537
1966	.8102	.1898	.4835	.1678	.1088	.2400
1967	.8072	.1928	.4792	.1702	.1094	.2412
1968	.8023	.1977	.4233	.2603	.1027	.2137
1969	.7997	.2003	.4470	.2409	.1062	.2059
1970	.8107	.1893	.4407	.2544	.1072	.1976
1971	.8082	.1918	.4217	.2511	.1140	.2132
1972	.7982	.2018	.4297	.2598	.1150	.1955
1973	.8065	.1935	.4023	.2554	.1097	.2426
1974	.8122	.1878	.3364	.2018	.0958	.3659
1975	.7472	.2528	.3804	.2463	.1078	.2655
1976	.7100	.2900	.3841	.2668	.1135	.2356
1977	.6433	.3567	.3792	.3061	.1087	.2060
1978	.6207	.3793	.4064	.3105	.1032	.1799
1979	.7111	.2889	.4120	.2452	.1037	.2391
1980	.7461	.2539	.4247	.1970	.1102	.2681
1981	.7441	.2559	.4482	.1826	.1190	.2502
1982	.7113	.2887	.4855	.2007	.1135	.2003
1983	.7716	.2284	.5501	.1024	.1240	.2235
1984	.8200	.1800	.5106	.1256	.1066	.2572

TABLE 5.2

NON OIL EXPORTS PRICE INDICES AND VALUES

OBS.	COFFPRIN	COCPRIN	OTHPRIN	IRPRIN
1961	94.0000	100.0000	112.0000	96.0000
1962	99.0000	115.0000	82.0000	93.0000
1963	100.0000	98.0000	80.0000	83.0000
1964	104.0000	101.0000	67.0000	106.0000
1965	105.0000	102.0000	76.0000	106.0000
1966	103.0000	102.0000	87.0000	106.0000
1967	107.0000	100.0000	84.0000	113.0000
1968	100.0000	100.0000	100.0000	100.0000
1969	103.0000	123.0000	103.0000	100.0000
1970	103.0000	98.0000	128.0000	106.0000
1971	103.0000	96.0000	84.0000	113.0000
1972	119.0000	93.0000	132.0000	113.0000
1973	119.0000	124.0000	77.0000	113.0000
1974	125.0000	214.0000	132.0000	146.0000
1975	192.0000	190.0000	371.0000	193.0000
1976	200.0000	279.0000	245.0000	220.0000
1977	346.0000	633.0000	238.0000	210.0000
1978	406.0000	607.0000	360.0000	166.0000
1979	406.0000	683.0000	357.0000	166.0000
1980	521.0000	530.0000	525.0000	206.0000
1981	429.0000	383.0000	489.0000	210.0000
1982	368.0000	360.0000	408.0000	200.0000
1983	475.0000	473.0000	585.0000	283.0000
1984	935.0000	792.0000	393.0000	256.0000

OBS.	COFFVAL	COCVAL	IRONVAL	OTHVAL
1955	124.0000	34.0000	163.0000	53.0000
1956	103.0000	38.0000	248.0000	62.0000
1957	115.0000	34.0000	383.0000	110.0000
1958	120.0000	39.0000	391.0000	137.0000
1959	81.0000	28.0000	424.0000	220.0000
1960	73.0000	31.0000	554.0000	383.0000
1961	75.0000	26.0000	422.0000	92.0000
1962	62.0000	32.0000	378.0000	132.0000
1963	77.0000	32.0000	310.0000	209.0000
1964	67.0000	32.0000	472.0000	143.0000
1965	61.0000	32.0000	543.0000	144.0000
1966	61.0000	31.0000	548.0000	171.0000
1967	62.0000	32.0000	528.0000	265.0000
1968	33.0000	37.0000	464.0000	270.0000
1969	64.0000	33.0000	578.0000	288.0000
1970	57.0000	30.0000	672.0000	382.0000
1971	66.0000	29.0000	634.0000	279.0000
1972	69.0000	29.0000	570.0000	515.0000
1973	58.0000	41.0000	740.0000	573.0000
1974	71.0000	68.0000	1173.0	926.0000
1975	82.0000	71.0000	1143.0	755.0000
1976	118.0000	56.0000	1151.0	977.0000
1977	121.0000	154.0000	758.0000	858.0000
1978	181.0000	121.0000	647.0000	972.0000
1979	106.0000	141.0000	646.0000	2044.0
1980	34.0000	123.0000	727.0000	3295.0
1981	14.0000	79.0000	782.0000	3790.0
1982	12.0000	65.0000	399.0000	3056.0
1983	31.0000	110.0000	532.0000	7588.0
1984	183.0000	143.0000	607.0000	7454.0

TABLE 5.3

SHARE OF IMPORTS OF CONSUMPTION AND CAPITAL GOODS

OBS.	IMPCGS	IMPCGSPC	IMPKRG	IMPKRGPC	IMPORTS
1960	3518.0	.6844	1622.0	.3156	5140.0
1961	3362.0	.6652	1692.0	.3348	5054.0
1962	3572.0	.6489	1933.0	.3511	5505.0
1963	3469.0	.6435	1922.0	.3565	5391.0
1964	4408.0	.6234	2663.0	.3766	7071.0
1965	4814.0	.6021	3182.0	.3979	7996.0
1966	4335.0	.5778	3167.0	.4222	7502.0
1967	4773.0	.5948	3251.0	.4052	8024.0
1968	5016.0	.5618	3912.0	.4382	8928.0
1969	5160.0	.5566	4111.0	.4434	9271.0
1970	5315.0	.5398	4531.0	.4602	9846.0
1971	5672.0	.5177	5285.0	.4823	10957.0
1972	6384.0	.5143	6030.0	.4857	12414.0
1973	7392.0	.5216	6781.0	.4784	14173.0
1974	11509.0	.5459	9572.0	.4541	21081.0
1975	15847.0	.5308	14006.0	.4692	29853.0
1976	20596.0	.5257	18583.0	.4743	39179.0
1977	29923.0	.5388	25614.0	.4612	55537.0
1978	35348.1	.5532	28554.0	.4468	63902.1
1979	33737.0	.5620	26288.0	.4380	60025.0
1980	36621.5	.5662	28053.0	.4338	64674.5
1981	42865.0	.5873	30126.0	.4127	72991.0
1982	55276.0	.6573	28816.0	.3427	84092.0
1983	16717.0	.3934	25781.0	.6066	42498.0
1984	23632.0	.3789	38741.0	.6211	62373.0

TABLE 5.4

SHARE OF OIL EXPORTS AND NON OIL EXPORTS

OBS.	OILEXP	OILEXPPC	NOOILX	NOOILXPC	EXPORTS
1960	7331.0	.8870	934.0000	.1130	8265.0
1961	8353.0	.9208	718.0000	.0792	9071.0
1962	9552.0	.9361	652.0000	.0639	10204.0
1963	10238.0	.9374	684.0000	.0626	10922.0
1964	10507.0	.9231	875.0000	.0769	11382.0
1965	10787.0	.9261	861.0000	.0739	11648.0
1966	10470.0	.9280	812.0000	.0720	11282.0
1967	11087.0	.9258	889.0000	.0742	11976.0
1968	10349.0	.8953	1210.0	.1047	11559.0
1969	9970.0	.8718	1466.0	.1282	11436.0
1970	10565.0	.8641	1661.0	.1359	12226.0
1971	12853.0	.8852	1667.0	.1148	14520.0
1972	12660.0	.8759	1793.0	.1241	14453.0
1973	18860.0	.8891	2352.0	.1109	21212.0
1974	45355.0	.9297	3430.0	.0703	48785.0
1975	35838.0	.9124	3440.0	.0876	39278.0
1976	37410.0	.9112	3647.0	.0888	41057.0
1977	39581.0	.9098	3925.0	.0902	43506.0
1978	37544.0	.8948	4413.0	.1052	41957.0
1979	58756.0	.9177	5268.0	.0823	64024.0
1980	78610.0	.9198	6853.0	.0802	85463.0
1981	81893.0	.9138	7721.0	.0862	89614.0
1982	67351.0	.8957	7846.0	.1043	75197.0
1983	59218.0	.7947	15299.0	.2053	74517.0
1984	95109.0	.9044	10050.0	.0956	105159.0

TABLE 5.5

DATABASE FOR VENMODEL

OBS.	RNOOILX	RWEALTH	STCFS	STOCKAPP	STOCKS	STOCKSR	TARIFFS	TIMDEP	TIMDEPR	TRANSFR	UNEMPR	USAPRICE
1960	1153.1	7887.4	-22.0000	10.3657	1102.0	1360.5	419.0000	1748.0	2158.0	470.3704	11.7690	55.0000
1961	872.4180	8934.1	-254.0000	17.6864	1442.0	1752.1	347.0000	1723.0	2093.6	426.4885	13.2676	55.6000
1962	756.3805	9884.3	-222.0000	68.3329	2009.0	2330.6	317.0000	1893.0	2196.1	461.7169	13.5843	56.2000
1963	769.4038	11780.7	-184.0000	62.9269	2485.0	2795.3	299.0000	2312.0	2600.7	376.8279	13.4564	56.9000
1964	942.8879	12520.3	26.0000	109.0157	3785.0	4078.7	348.0000	2720.0	2931.0	419.1810	10.1840	57.7000
1965	899.6865	13130.7	-1.0000	118.2813	4713.0	4924.8	312.0000	3011.0	3146.3	464.9948	8.1511	58.6000
1966	837.1134	13529.6	-65.0000	64.0219	5171.0	5330.9	327.0000	3003.0	3095.9	491.7526	8.3178	60.3000
1967	904.3744	15100.1	-4.0000	69.3021	5690.0	5788.4	332.0000	3586.0	3648.0	544.2523	7.9606	62.0000
1968	1210.0	16594.7	4.0000	98.4028	9409.0	9409.0	497.0000	4066.0	4066.0	620.0000	6.1418	64.6000
1969	1442.9	17511.3	169.0000	150.5440	11433.0	11253.0	536.0000	4751.0	4676.2	685.0394	7.3185	68.1000
1970	1611.1	19268.6	-18.0000	168.7943	15639.0	15168.8	607.0000	5517.0	5351.1	405.4316	6.1793	72.2000
1971	1562.3	21399.6	61.0000	546.0757	19423.0	18203.4	634.0000	6653.0	6235.2	412.3711	6.3006	75.3000
1972	1624.1	23722.4	82.0000	673.5248	22783.0	20636.8	687.0000	8224.0	7449.3	597.8261	6.1899	77.7000
1973	1996.6	26238.5	144.0000	1527.1	25621.0	21749.6	691.0000	10276.0	8723.3	628.1834	6.1861	82.6000
1974	2494.5	28901.2	-159.0000	4284.7	31543.0	22940.4	839.0000	12487.0	9081.5	658.1818	6.1148	91.6000
1975	2200.9	35477.7	-244.0000	4312.8	37389.0	23921.3	1110.0	17418.0	11144.0	955.8541	6.0222	100.0000
1976	2177.3	44066.1	-818.0000	2679.2	41124.0	24551.6	1374.0	24204.0	14450.1	1121.8	5.2088	105.8000
1977	2121.6	49182.5	-160.0000	4296.5	45308.0	24490.8	1973.0	29535.0	15964.9	1104.3	4.3068	112.6000
1978	2228.8	53294.0	-341.0000	3183.8	45884.0	23173.7	2438.0	32046.0	16184.8	1142.4	4.0724	121.2000
1979	2423.2	53794.9	-256.0000	4495.7	45982.0	21150.9	2583.0	40157.0	18471.5	1107.6	5.1869	134.9000
1980	2616.6	54282.2	-1369.0	9412.1	44628.0	17040.1	3207.0	53829.0	20553.3	1400.5	5.3181	153.1000
1981	2584.0	58382.9	-2651.0	6287.8	40254.0	13471.9	4016.0	71209.0	23831.7	1295.5	6.0537	169.1000
1982	2427.6	61367.5	-4121.0	3287.1	45421.0	14053.5	5214.0	80123.0	24790.5	1110.5	7.2676	179.3000
1983	4421.7	96326.5	-804.0000	3204.2	24224.0	7001.2	2517.0	98978.0	28606.4	1780.1	10.0727	185.1000
1984	2481.5	107681.0	-1313.0	4130.7	25975.0	6413.6	2803.0	108467.0	26782.0	1897.0	13.4545	193.0000

OBS.	USPRICES	WAGEIND	WAGES	WEALTH	XPOREAL	EXPORTS	IMPORTS	IMPCGS	IMPKRG	EXPORTS	OILEXP	NOOILX
1960	35.0000	80.0000	5272.6	6388.8	10203.7	8265.0	5140.0	3518.0	1622.0	8265.0	7331.0	934.0000
1961	35.0000	83.0000	5420.7	7352.8	11021.9	9071.0	5054.0	3362.0	1692.0	9071.0	8353.0	718.0000
1962	35.0000	82.0000	5383.4	8520.2	11837.6	10204.0	5505.0	3572.0	1933.0	10204.0	9552.0	652.0000
1963	35.0000	89.0000	5831.8	10473.0	12285.7	10922.0	5391.0	3469.0	1922.0	10922.0	10238.0	684.0000
1964	35.0000	91.0000	5992.3	11618.8	12265.1	11382.0	7071.0	4408.0	2663.0	11382.0	10507.0	875.0000
1965	36.0000	92.0000	6021.3	12566.1	12171.4	11648.0	7996.0	4814.0	3182.0	11648.0	10787.0	861.0000
1966	37.0000	95.0000	6233.5	13123.7	11630.9	11282.0	7502.0	4335.0	3167.0	11282.0	10470.0	812.0000
1967	37.0000	98.0000	6461.8	14843.4	12183.1	11976.0	8024.0	4773.0	3251.0	11976.0	11087.0	889.0000
1968	38.0000	100.0000	6573.7	16594.7	11559.0	11559.0	8928.0	5016.0	3912.0	11559.0	10349.0	1210.0
1969	40.0000	107.0000	7034.7	17791.5	11255.9	11436.0	9271.0	5160.0	4111.0	11436.0	9970.0	1466.0
1970	41.0000	98.0000	6439.4	19865.9	11858.4	12226.0	9846.0	5315.0	4531.0	12226.0	10565.0	1661.0
1971	42.0000	105.0000	6877.0	22833.4	13608.2	14520.0	10957.0	5672.0	5285.0	14520.0	12853.0	1667.0
1972	44.0000	112.0000	7344.8	26189.5	13091.5	14453.0	12414.0	6384.0	6030.0	14453.0	12660.0	1793.0
1973	50.0000	121.0000	7947.0	30908.9	18006.8	21212.0	14173.0	7392.0	6781.0	21212.0	18860.0	2352.0
1974	60.0000	149.0000	9803.8	39739.2	35480.0	48785.0	21081.0	11509.0	9572.0	48785.0	45355.0	3430.0
1975	65.0000	182.0000	11951.9	55451.7	25129.9	39278.0	29853.0	15847.0	14006.0	39278.0	35838.0	3440.0
1976	68.0000	202.0000	13309.2	73810.8	24511.6	41057.0	39179.0	20596.0	18583.0	41057.0	37410.0	3647.0
1977	72.0000	230.0000	15095.7	90987.7	23516.8	43506.0	55537.0	29923.0	25614.0	43506.0	39581.0	3925.0
1978	78.0000	263.0000	17310.8	105522.2	21190.4	41957.0	63902.1	35348.1	28554.0	41957.0	37544.0	4413.0
1979	88.0000	294.0000	19337.7	116950.2	29449.9	64024.0	60025.0	33737.0	26288.0	64024.0	58756.0	5268.0
1980	100.0000	346.0000	22714.0	142165.1	32631.9	85463.0	64674.5	36621.5	28053.0	85463.0	78610.0	6853.0
1981	109.0000	383.0000	25194.2	174448.0	29991.3	89614.0	72991.0	42865.0	30126.0	89614.0	81893.0	7721.0
1982	111.0000	391.0000	25683.0	198339.7	23266.4	75197.0	84092.0	55276.0	28816.0	75197.0	67351.0	7846.0
1983	113.0000	390.0000	25643.0	333289.7	21536.7	74517.0	42498.0	16717.0	25781.0	74517.0	59218.0	15299.0
1984	115.0000	394.0000	25923.3	436107.9	25965.2	105159.0	62373.0	23632.0	38741.0	105159.0	95109.0	10050.0

OBS.	GDPN	GDPREAL	GEPRWS	GOVBONDS	GOVCON	IMPCGSR	IMPKRGR	IMPPRWS	INDEXRATE	INDTAXR	INFLATION	INTEREST
1960	25671.0	30479.4	81.0000	796.0000	3684.0	5173.5	2385.3	68.0000	78.0000	1549.4	.7435	8.5000
1961	26997.0	31713.8	82.3000	832.0000	3629.0	4809.7	2420.6	69.9000	78.0000	1976.9	1.5922	8.4500
1962	29525.0	33525.6	86.2000	870.0000	3550.0	4615.0	2497.4	77.4000	88.1400	2172.9	4.6299	8.3500
1963	32186.0	35750.1	88.9000	936.0000	4134.0	4194.7	2324.1	82.7000	98.8400	2402.7	3.0842	9.0500
1964	35637.0	37543.1	92.8000	845.0000	4228.0	5285.4	3193.0	83.4000	104.6500	1119.6	4.2934	8.9000
1965	37922.0	39242.4	95.7000	884.0000	4682.0	5261.2	3477.6	91.5000	104.6500	1134.8	3.0772	8.8500
1966	39516.0	40616.7	97.0000	773.0000	5116.0	4539.3	3316.2	95.5000	104.6500	1237.1	1.3493	8.8500
1967	41625.0	42328.2	98.3000	998.0000	5431.0	4865.4	3314.0	98.1000	104.6500	1244.2	1.3313	8.8000
1968	45162.0	45162.0	100.0000	1261.0	5557.0	5016.0	3912.0	100.0000	104.6500	1181.0	1.7146	9.3000
1969	46283.0	45598.8	101.6000	1406.0	5901.0	5053.9	4026.4	102.1000	104.6500	1244.1	1.5873	9.6000
1970	52025.0	50651.4	103.1000	1869.0	6635.0	5052.3	4307.0	105.2000	104.6500	1406.4	1.4656	10.2500
1971	57141.0	53897.1	106.7000	1704.0	7762.0	5137.7	4787.1	110.4000	104.6500	1435.8	3.4322	10.0500
1972	61502.0	56195.5	110.4000	1673.0	8498.0	5532.1	5225.3	115.4000	102.3200	1494.6	3.4089	10.0500
1973	73253.0	62636.4	117.8000	1851.0	9590.0	6039.2	5540.0	122.4000	100.0000	1455.0	6.4878	10.0500
1974	112234.0	82193.8	137.5000	1824.0	12772.0	8059.5	6703.1	142.8000	100.0000	1643.6	15.4636	10.2500
1975	118098.0	76127.6	156.3000	2081.0	15943.0	9836.7	8694.0	161.1000	100.0000	2010.9	12.8153	10.0500
1976	135104.0	81124.4	167.5000	2240.0	19785.0	12051.5	10873.6	170.9000	100.0000	1816.7	6.9206	9.9000
1977	155706.0	83920.0	185.0000	3141.0	22959.0	16306.8	13958.6	183.5000	100.0000	1875.7	9.9372	10.0500
1978	169060.0	85136.6	198.0000	4219.0	24056.0	17988.8	14531.3	196.5000	100.0000	2168.2	6.7911	10.0100
1979	207737.0	94771.6	217.4000	2647.0	27758.0	15958.8	12435.2	211.4000	100.0000	2226.3	9.3472	11.5500
1980	254210.0	95277.3	261.9000	3092.0	35123.0	14996.5	11487.7	244.2000	100.0000	2302.8	18.6224	13.4100
1981	285208.0	93152.3	298.8000	3000.0	42643.0	15695.7	11031.1	273.1000	100.0000	2361.8	13.1812	14.5600
1982	291268.0	87516.4	323.2000	3352.0	42594.0	18814.2	9808.0	293.8000	100.0000	2929.1	7.8497	16.6900
1983	271438.0	76427.2	346.0000	3966.0	41339.0	5377.0	8292.4	310.9000	174.4000	4985.0	6.8167	16.2700
1984	346422.0	83997.1	405.0000	6822.0	43565.0	6418.3	10521.7	368.2000	174.4000	5413.6	15.7448	15.5000

OBS.	INTERFOR	INTPAYS	INVENTV	INVENTVR	INVPRIR	INVPUBR	INVREAL	KAPITALR	LABFOR	LIBORINT	M1	M2
1960	2.2500	7.0000	-287.0000	-354.3210	4364.2	1558.0	5567.9	69363.5	2503180	5.7500	3585.0	5284.0
1961	2.6000	17.0000	340.0000	413.1227	3703.5	1504.3	5620.9	71893.3	2584500	4.8900	3633.0	5356.0
1962	2.8700	12.0000	567.0000	657.7726	3881.7	1495.4	6034.8	74616.0	2680300	2.4100	3698.0	5391.0
1963	3.5200	10.0000	476.0000	535.4331	4139.5	1482.6	6157.5	77486.7	2730300	5.5200	3733.0	6045.0
1964	3.8400	9.0000	1300.0	1400.9	5177.8	1580.8	8159.5	82358.4	2847600	5.5300	4234.0	6954.0
1965	4.3700	7.6000	928.0000	969.6970	5651.0	1636.4	8257.1	87260.2	2944400	4.8400	4632.0	7643.0
1966	4.9600	12.0000	458.0000	472.1649	5696.9	1963.9	8133.0	91789.1	3053700	6.2100	4745.0	7748.0
1967	4.9600	15.0000	519.0000	527.9756	5605.3	2461.9	8595.1	96469.6	3165600	5.7000	5274.0	8860.0
1968	5.9400	18.0000	3719.0	3719.0	6872.0	3488.0	14079.0	106440.6	3256400	6.8500	5804.0	9870.0
1969	7.8100	20.0000	2024.0	1992.1	7894.7	3284.4	13171.3	115145.4	3350400	7.3100	6342.0	11093.0
1970	6.3800	40.0000	4206.0	4079.5	8584.9	2605.2	15269.6	125736.0	3463200	7.3000	6604.0	12121.0
1971	3.7200	43.0000	3784.0	3546.4	9574.5	2907.2	16028.1	136815.7	3571100	7.3600	7918.0	14571.0
1972	4.2000	54.0000	3360.0	3043.5	8923.0	5426.6	17393.1	149285.8	3699600	7.1600	8980.0	17204.0
1973	7.4200	65.0000	2838.0	2409.2	10209.7	5593.4	18212.2	162483.6	3831200	9.2400	11009.0	21284.0
1974	8.0100	64.0000	5922.0	4306.9	10302.5	4958.5	19568.0	177312.7	3957600	11.0100	15560.0	28047.0
1975	5.8300	55.0000	5846.0	3740.2	12719.8	6856.7	23316.7	195816.2	4068250	8.3000	23988.0	41406.0
1976	5.0400	146.0000	3735.0	2229.9	15028.7	10505.7	27764.2	218495.6	4262000	7.2500	26983.0	51187.0
1977	6.3300	293.0000	4184.0	2261.6	19941.6	12752.4	34955.7	247764.8	4411600	8.1000	34000.0	63535.0
1978	9.4200	514.0000	576.0000	290.9091	20896.5	15384.8	36572.2	278031.5	4542800	9.3000	41134.0	73180.0
1979	12.3900	713.0000	98.0000	45.0782	17319.7	12833.5	30198.3	301370.5	4723400	11.7000	43886.0	84043.0
1980	14.8700	1107.0	-1354.0	-516.9912	12597.2	11898.4	23978.6	318818.4	4889000	13.4400	49915.0	103744.0
1981	11.9000	1986.0	-4374.0	-1463.9	9354.4	14000.0	21890.6	334059.3	5054800	16.1000	53482.0	124691.0
1982	8.1500	2981.0	5167.0	1598.7	6897.9	14811.0	23307.5	350663.3	5228700	13.5900	49013.0	129136.0
1983	9.2800	2975.0	-21197.0	-6126.3	3934.4	12061.6	9869.7	352837.0	5361000	10.1700	64294.0	163272.0
1984	7.9900	3454.0	1751.0	432.3457	5367.2	6878.3	12677.8	358111.8	5723000	11.8200	69100.0	177567.0

OBS.	IMPCGS	IMPKRG	IMPORTS	CONDURR	CONNDURR	CUS	DISCOUNT	DLNUSAPR	DOMCRER	EMPLOY	ERINDEX	EXRATE
1960	3518.0	1622.0	5140.0	914.8148	16803.7	306.8657	4.5000	1.8349	4967.9	2208580	74.0000	3.3500
1961	3362.0	1692.0	5054.0	1019.4	16872.4	505.9701	4.5000	1.0850	4862.7	2241600	74.0000	3.3500
1962	3572.0	1933.0	5505.0	1062.6	17584.7	520.8443	4.5000	1.0734	4872.4	2316200	84.0000	3.7900
1963	3469.0	1922.0	5391.0	996.6254	18178.9	630.1176	4.5000	1.2379	8538.8	2362900	94.0000	4.2500
1964	4408.0	2663.0	7071.0	1367.5	19673.5	241.7778	4.5000	1.3962	9515.1	2557600	100.0000	4.5000
1965	4814.0	3182.0	7996.0	1700.1	20960.3	35.5556	4.5000	1.5478	10463.9	2704400	100.0000	4.5000
1966	4335.0	3167.0	7502.0	1734.0	21700.0	86.0000	4.5000	2.8597	11130.9	2799700	100.0000	4.5000
1967	4773.0	3251.0	8024.0	1718.2	22486.3	151.1111	4.5000	2.7802	12116.0	2913600	100.0000	4.5000
1968	5016.0	3912.0	8928.0	2068.0	20827.0	-132.2222	4.5000	4.1080	13593.0	3056400	100.0000	4.5000
1969	5160.0	4111.0	9271.0	2228.3	22215.6	-153.5556	5.5000	5.2763	15564.0	3105200	100.0000	4.5000
1970	5315.0	4531.0	9846.0	2363.7	24083.4	-34.0909	5.0000	5.8463	17387.0	3249200	98.0000	4.4000
1971	5672.0	5285.0	10957.0	2286.8	24624.2	39.7727	5.0000	4.2040	18388.0	3346100	98.0000	4.4000
1972	6384.0	6030.0	12414.0	2403.1	26367.8	-22.5000	5.0000	3.1375	20512.7	3470600	98.0000	4.4000
1973	7392.0	6781.0	14173.0	2684.2	27171.5	949.5349	5.0000	6.1154	26203.7	3594200	96.0000	4.3000
1974	11509.0	9572.0	21081.0	3539.6	29080.0	5804.9	5.0000	10.3422	28956.4	3715600	96.0000	4.3000
1975	15847.0	14006.0	29853.0	3684.6	32326.9	2271.9	7.0000	8.7739	30145.2	3823250	96.0000	4.3000
1976	20596.0	18583.0	39179.0	4574.3	35387.5	479.3023	7.0000	5.6380	38374.9	4040000	96.0000	4.3000
1977	29923.0	25614.0	55537.0	4801.6	38501.1	-2882.6	7.0000	6.2291	43702.2	4221600	96.0000	4.3000
1978	35348.1	28554.0	63902.1	5553.0	42306.6	-5303.3	7.0000	7.3600	51182.3	4357800	96.0000	4.3000
1979	33737.0	26288.0	60025.0	5283.8	45465.5	753.4884	11.0000	10.7092	53885.9	4478400	96.0000	4.3000
1980	36621.5	28053.0	64674.5	4961.8	46727.8	5143.0	13.0000	12.6558	55180.6	4629000	96.0000	4.3000
1981	42865.0	30126.0	72991.0	4277.8	49448.1	4388.4	14.0000	9.9399	55100.7	4748800	96.0000	4.3000
1982	55276.0	28816.0	84092.0	4070.2	52315.6	-3592.6	13.0000	5.8570	58185.3	4848700	96.0000	4.3000
1983	16717.0	25781.0	42498.0	2225.4	50790.5	5163.9	14.5000	3.1836	56972.5	4821000	117.0000	4.3000
1984	23632.0	38741.0	62373.0	2090.4	49446.9	11120.5	15.8700	4.1794	53398.0	4953000	167.0000	4.3000

OBS.	DEBT	DEBTN	DEPORATE	DEPRECR	DIRINVS	DIRTAXR	EXRATE1	EXRATE2	EXRATE3	FABS	FAUS	GCONREAL
1960	5668.0	18987.8	4.2500	2990.1	-213.0000	2244.4	3.3500	3.3500	3.3500	271.8190	81.1400	4548.1
1961	5877.0	19688.0	4.2500	3091.1	-241.0000	2854.2	3.3500	3.3500	3.3500	1129.8	337.2500	4409.5
1962	5985.0	22683.2	4.2500	3312.1	-248.0000	2548.7	3.7900	3.7900	3.7900	2156.2	568.9300	4118.3
1963	6284.0	26707.0	4.2500	3286.8	-53.0000	2816.6	4.2500	4.2500	4.2500	3285.0	772.9500	4650.2
1964	6616.0	29772.0	4.2500	3287.7	-51.0000	3213.4	4.5000	4.5000	4.5000	3494.8	776.6300	4556.0
1965	6985.0	31432.5	4.2500	3355.3	-11.0000	3390.8	4.5000	4.5000	4.5000	3652.1	811.5700	4892.4
1966	7466.0	33597.0	4.2500	3604.1	-49.0000	3785.6	4.5000	4.5000	4.5000	4125.7	916.8300	5274.2
1967	7929.0	35680.5	4.2500	3914.5	-87.0000	4263.5	4.5000	4.5000	4.5000	4348.4	966.3000	5524.9
1968	9532.0	38394.0	4.2500	4108.0	184.0000	4364.0	4.5000	4.5000	4.5000	4588.6	1019.7	5557.0
1969	9244.0	41598.0	5.1000	4466.5	224.0000	4046.3	4.5000	4.5000	4.5000	4186.5	930.3400	5808.1
1970	10010.0	44044.0	6.0000	4679.0	-23.0000	4447.1	4.4000	4.4000	4.4000	4433.9	1007.7	6435.5
1971	10889.0	47911.6	6.5000	4948.5	211.0000	6199.6	4.4000	4.4000	4.4000	4330.4	984.1800	7274.6
1972	11732.0	51620.8	6.5000	4923.0	-376.0000	6416.7	4.4000	4.4000	4.4000	4151.5	943.5200	7697.5
1973	12840.0	55212.0	6.8500	5014.4	-84.0000	8645.2	4.3000	4.3000	4.3000	3738.9	869.5200	8140.9
1974	13615.0	58544.5	7.1000	4738.9	-430.0000	21421.1	4.3000	4.3000	4.3000	4722.2	1098.2	9288.7
1975	14321.0	61580.3	6.8500	4813.2	418.0000	16723.6	4.3000	4.3000	4.3000	4498.7	1046.2	10200.3
1976	13932.0	59907.6	7.1000	5084.8	-889.0000	15167.8	4.3000	4.3000	4.3000	9997.8	2325.1	11811.9
1977	14756.0	63450.8	7.2500	5686.5	-3.0000	14104.3	4.3000	4.3000	4.3000	11318.7	2632.3	12410.3
1978	17030.0	73229.0	7.2500	6305.6	67.0000	12067.2	4.3000	4.3000	4.3000	13851.2	3221.2	12149.5
1979	18065.0	77679.5	9.5000	6859.2	88.0000	14687.7	4.3000	4.3000	4.3000	16668.2	3876.3	12768.2
1980	16520.0	71036.0	14.1000	6530.7	55.0000	17223.0	4.3000	4.3000	4.3000	25005.1	5815.1	13410.8
1981	19942.0	85750.6	14.7000	6649.6	184.0000	24520.4	4.3000	4.3000	4.3000	39380.0	9158.1	14271.4
1982	27489.0	118202.7	15.1400	6703.6	253.0000	16125.6	4.3000	4.3000	4.3000	60309.7	14025.5	13178.8
1983	27007.0	116130.1	14.8600	7696.0	86.0000	12371.7	10.5800	6.0900	5.2500	162160.7	15327.1	11947.7
1984	25639.0	110247.7	12.9600	7403.0	42.0000	15258.8	13.2500	6.3000	7.5000	248211.9	18733.0	10756.8

OBS.	M3	MORBOND	MULTI	NFP	NOILGDPR	NOOILX	NOXPR	OILEXP	OILEXPBAR	OILPROD	OTHCFS	PBCFS	BASE
1960	5321.0	37.0000	2.1567	-2097.0	20275.7	934.0000	381.4851	7331.0	993.6946	1040.3	1.0000	139.0000	2450.0
1961	5391.0	35.0000	1.9932	-2322.0	20691.9	718.0000	100.3405	8353.0	1019.3	1065.8	-27.0000	-51.0000	2662.0
1962	5494.0	103.0000	2.2901	-2725.0	21688.1	652.0000	90.2915	9552.0	1112.7	1168.0	16.0000	-21.0000	2354.0
1963	6252.0	207.0000	2.3073	-2853.0	23464.4	684.0000	83.0850	10238.0	1129.1	1186.3	1.0000	-21.0000	2620.0
1964	7279.0	325.0000	2.6163	-3223.0	25278.0	875.0000	91.1744	10507.0	1176.9	1237.3	-1.0000	-7.0000	2658.0
1965	8030.0	387.0000	2.7074	-3492.0	27071.0	861.0000	94.5994	10787.0	1202.4	1266.5	10.0000	56.0000	2823.0
1966	8225.0	477.0000	2.5983	-3393.0	28985.7	812.0000	98.5107	10470.0	1164.5	1230.0	7.0000	59.0000	2982.0
1967	9497.0	637.0000	2.6996	-3272.0	30145.1	889.0000	101.1915	11087.0	1225.2	1292.1	11.0000	53.0000	3282.0
1968	10745.0	875.0000	2.7531	-3226.0	33603.0	1210.0	100.0001	10349.0	1243.3	1314.0	14.0000	78.0000	3585.0
1969	12199.0	1106.0	2.7698	-2856.0	34342.9	1466.0	101.1825	9970.0	1240.1	1310.3	-15.0000	108.0000	4005.0
1970	13563.0	1442.0	2.9179	-2530.0	38793.0	1661.0	111.2617	10565.0	1280.3	1353.4	-2.0000	132.0000	4154.0
1971	16799.0	2228.0	2.9877	-3388.0	40288.9	1667.0	98.6974	12853.0	1218.4	1295.4	60.0000	185.0000	4877.0
1972	20365.0	3161.0	3.1895	-2138.0	43104.0	1793.0	118.3303	12660.0	1092.0	1175.3	12.0000	117.0000	5394.0
1973	25319.0	4035.0	3.1993	-2956.0	44629.6	2352.0	100.5676	18860.0	1136.1	1228.6	-164.0000	89.0000	6653.0
1974	33193.0	5146.0	3.2861	-2743.0	46713.8	3430.0	143.0460	45355.0	995.4152	1086.2	54.0000	-576.0000	8535.0
1975	48872.0	7466.0	4.1506	344.0000	50997.7	3440.0	251.9345	35838.0	766.5785	856.2900	346.0000	-369.0000	9976.0
1976	61573.0	10386.0	3.6416	183.0000	56612.8	3647.0	228.0333	37410.0	743.6974	837.3100	1212.0	-1263.0	14056.0
1977	76528.0	12993.0	3.5694	-364.0000	60403.3	3925.0	242.1575	39581.0	724.1600	816.8700	1032.0	-12.0000	17800.0
1978	87452.0	14272.0	3.8284	-633.0000	63946.2	4413.0	260.1652	37544.0	687.2950	790.5900	1746.0	1416.0	19115.0
1979	97635.0	13592.0	4.1484	-759.0000	65321.7	5268.0	261.5088	58756.0	744.2350	859.9400	652.0000	-244.0000	20259.0
1980	114068.0	10324.0	4.4539	1203.0	62645.4	6853.0	338.6527	78610.0	661.7450	791.3200	920.0000	-2866.0	23293.0
1981	132068.0	7377.0	4.4636	2247.0	63161.0	7721.0	317.7823	81893.0	634.3700	769.0550	537.0000	2658.0	27935.0
1982	134678.0	5542.0	4.8652	-6553.0	64250.0	7846.0	282.6233	67351.0	551.8800	690.9450	-260.0000	7817.0	26543.0
1983	167163.0	3891.0	4.4829	-8534.0	54890.5	15299.0	397.6528	59218.0	523.7750	655.5400	-2090.0	-302.0000	36421.0
1984	181074.0	3507.0	4.7710	-14769.0	58031.9	10050.0	350.8404	95109.0	533.6300	656.6350	-1571.0	-1107.0	37218.0

OBS.	POP	PORCFS	PRCFS	PRIOILBS	R	C	T	RATEINT	REALINT	RELPRICE	RINTDOM	RINTFOR	YDISPR
1960	7350000	-5.0000	25.6825	6.6841	.2530	.7283	.8543	8.1000	7.7565	.8395	3.5065	.4151	24165.9
1961	7610000	-6.0000	253.9600	6.7073	.3323	.6017	.7702	8.3000	6.8578	.8493	2.6578	1.5150	24218.0
1962	7860000	2.0000	202.8104	6.5067	.2547	.6031	.8676	8.2000	3.7201	.8979	-.3799	1.7966	25953.7
1963	8120000	-1.0000	186.6032	6.3928	.2683	.5758	.9759	9.1000	5.9658	.9303	1.1658	2.2821	27620.7
1964	8400000	-6.0000	-21.2688	8.6127	.2229	.5078	.9687	8.4000	4.6066	.8987	-.0434	2.4438	30341.6
1965	8710000	-18.0000	8.8892	8.4366	.2071	.5098	.9814	8.3000	5.7728	.9561	1.1728	2.8222	31826.5
1966	9030000	-17.0000	75.0896	8.3694	.2165	.5406	.9750	8.6000	7.5007	.9845	2.9007	2.1003	32481.6
1967	9310000	-21.0000	14.0464	8.3787	.2097	.5190	1.0328	8.7000	7.4687	.9980	2.9187	2.1798	33450.3
1968	9620000	5.0000	-23.7926	8.3238	.2054	.5099	1.0578	9.0000	7.5854	1.0000	2.5354	1.8320	36129.0
1969	9940000	-1.0000	-179.7869	8.0394	.2151	.4821	1.1103	9.6000	8.0127	1.0049	3.5127	2.5337	36527.0
1970	1.03E+07	-11.0000	29.0476	8.2521	.1976	.4968	1.2505	10.3000	8.7844	1.0204	4.5344	.5337	40524.3
1971	1.06E+07	-9.0000	-111.3188	10.5488	.2060	.4251	1.1974	10.1000	6.6178	1.0347	3.0678	-.4840	41725.6
1972	1.09E+07	1.0000	-95.6440	11.5929	.1908	.4097	1.2911	10.1000	6.6411	1.0453	3.0911	1.0625	43959.1
1973	1.13E+07	-11.0000	-136.9494	16.6014	.2050	.3541	1.2640	10.1000	3.5622	1.0390	.3622	1.3046	48150.0
1974	1.16E+07	-14.0000	118.3957	45.5639	.1941	.3273	1.0652	10.1000	-5.2136	1.0385	-8.3636	-2.3322	55048.3
1975	1.27E+07	-63.0000	-58.3619	46.7506	.1442	.2423	.9021	10.1000	-2.7653	1.0307	-5.9653	-2.9439	53535.8
1976	1.31E+07	-111.0000	252.9720	50.3027	.1824	.2720	1.1410	10.0000	2.9794	1.0203	.1794	-.5980	60177.0
1977	1.36E+07	-112.0000	-746.3368	54.6578	.1865	.2740	1.1067	9.8000	.1128	.9919	-2.6872	.1009	63357.8
1978	1.41E+07	-239.0000	-1166.7	54.6237	.1584	.2776	.9953	10.1000	3.2189	.9889	.4589	2.0600	65738.1
1979	1.45E+07	6.0000	-401.2432	78.9482	.1401	.2900	1.1804	11.6000	2.2028	.9724	.1528	1.6808	72106.0
1980	1.50E+07	-264.0000	766.6836	118.7920	.1222	.3197	1.4231	12.9000	-5.2124	.9324	-4.5224	2.2142	70621.3
1981	1.55E+07	-118.0000	2316.9	129.0934	.1313	.3312	1.7725	14.7000	1.3788	.9140	1.5188	1.9601	60916.1
1982	1.59E+07	222.0000	3926.3	122.0392	.1173	.3578	2.2196	16.6900	8.8403	.9090	7.2903	2.2930	62868.5
1983	1.64E+07	34.0000	967.0144	112.2008	.1466	.2947	1.9931	14.8600	9.4533	.8986	8.0433	6.0964	53154.7
1984	1.68E+07	546.0000	1630.0	178.2300	.1264	.4401	3.1813	14.9200	-.2448	.9089	-2.7848	3.8106	57818.8