A STUDY OF KUWAIT'S MONETARY SECTOR

By

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THE UNIVERSITY OF SHEFFIELD

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SUMMARY

This study is concerned with the structure, development and working of the monetary sector in the State of Kuwait. Initially, the characteristics of the Kuwaiti economy are examined in order to put the monetary sector into perspective. It is shown that the Kuwaiti economy possesses the general characteristics of less developed economies together with some distinguishing properties. It is argued that since there exists no one-to-one relationship between government revenue and expenditure, the money supply, in the short run, tends to be insulated from the effect of the external balance.

The working of Kuwait's monetary sector is studied through the balance sheets of the Central Bank and commercial banks, and that leads on to an analysis of the money supply process. The definition of money is discussed, and it is argued on the basis of empirical evidence that the broad money supply is the most appropriate for the purpose of monetary control. Causality testing reveals a unidirectional effect from money to income, and the estimation of velocity equations indicates that financing economic development by monetary injections is inflationary in the short run.

A multiplier reduced-form model reveals the viability of short-run monetary control in Kuwait, but it is argued that monetary policy has been ineffective in this respect. It is also postulated that the combination of interest and exchange rate policies gives rise to the recurring problem of capital outflows.

A structural econometric model of the monetary sector shows that the equilibrium stock of money is determined by supply and demand factors, and that the control of banks' reserves can (in part) accomplish the objective of

monetary control. The model also reveals that both monetary and fiscal actions affect real output and prices, but the former tend to be more powerful.

It is recommended on the basis of this study that the Central Bank should be given greater autonomy in formulating and executing monetary policy, and that its research capabilities need to be improved. Urgent attention must be paid to developing financial markets and upgrading tools of monetary policy. Finally, it is argued that the Ministry of Finance should take part in the control of money and credit by manipulating its deposits and, perhaps, adopting a simple constant change rule in government expenditure.

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CHAPTER 1

INTRODUCTION

1.1. The Motivating Problem

The study of money and monetary policy was neglected to a considerable extent following the publication of Keynes' General Theory until it was revived by the monetarists with the advent of inflation as a major problem. This tendency was evident in much of the theoretical and empirical work during that period. On the theoretical side, Keynesian economic theory was dominant, and the academic literature was flooded with articles addressing the issue of fiscal stabilisation policies and the theories behind them. On the empirical side, early econometric models of the U.S. and the U.K. had, at best, a Keynesian liquidity preference function as the only concession to the monetary sector. As a result, economic stabilisation policies used in practice were primarily Keynesian, concentrating on the manipulation of government revenue and expenditure, whereas policies directed at interest rates and the money supply were ignored or relegated to a secondary role.

There was once a vaild reason for this neglect, namely that fiscal policy is an effective cure of unemployment in an environment of stable prices. However, the advent of inflation, and more importantly stagflation, prompted a re-examination of the importance of money such that monetary policy emerged from its general neglect. This development on the policy side followed the challenge posed by the monetarists to Keynesian economics and, as a result, the importance of money has been officially recognised since the early 1970s. This was demonstrated by the support given to the recommendation that the central bank should specify a target time path for the money supply, and then direct its efforts at the objective of making the actual stock follow this target closely. It must be mentioned, however, that money, as such, is neither an actual instrument of the central bank, nor an ultimate objective of monetary policy. More recently, extensive theoretical and empirical research has tended to reject the extreme views that "money does not matter" and "only money matters."

In less developed countries (LDCs), the story was much the same. Following World War 2, as LDCs began to obtain independence from the colonial powers, attention was focused on economic growth in a Keynesian framework. This was logical, given the need to develop the necessary infrastructure and raise the standard of living. Thus, a policy of "cheap money" was thought to be appropriate until it induced inflation that consequently started to retard growth. Again, attention shifted to the other extreme of the quantity theory, and when this failed, the view emerged that economic concepts applied to developed countries should not be applied to LDCs and hence new and more appropriate concepts must be tailored for the latter. This view was particularly based on the proposition that monetary policy plays a limited role in LDCs because they do not have developed banking systems and financial markets. In general, it is believed that the scope for active monetary policy is limited by the effect of capital flows on the money supply. However, a growing body of empirical and theoretical work on money and monetary policy in LDCs, as well as improved knowledge of monetary and credit management, has revealed that the old concepts can work, provided that they are looked at within the framework of the unique characteristics of LDCs (see Coats and Khatkhate (1980) for a comprehensive survey).

In oil-exporting LDCs, the problem of capital deficiency is not generally present, at least for some time in some of them. The principal objective in these countries has been to achieve rapid economic growth in an environment of price stability. Traditionally, the realisation of this objective is believed to be related to the development of the infrastructure, linked to high employment, and constrained by the availability of skilled manpower. Moreover, literature on oil-exporting LDCs contains a diversified menu of objectives, most of which do not pertain, at least directly, to the role of money and monetary policy. The following are examples:

(i) Diversification of the production base, given that oil reserves are finite.

(ii) Convertion of oil into a productive economic base and a skilled labour force. This objective pertains to the optimum rate of oil extraction (see Samii (1979)).

(iii) Spreading the benefits of oil revenue to the largest segment of the population without reducing incentives.

Obviously, the fulfilment of these objectives requires massive government spending financed by oil revenues. By the mid-1970s, expansionary fiscal policies in oil-exporting countries had pushed the inflation rate to the double digit arena, forcing them to review their development strategies and cut back expenditure. The result was not only a lower inflation rate but also slower economic activity, implying the inadequacy of government expenditure as the sole tool of demand management.

Moreover, it is traditionally believed that the scope of an active monetary policy in oil-exporting LDCs is limited, not only by the openness of their economies but also by the large size of the public sector. Both of these factors take the money supply out of the control of the monetary authorities. However, research has shown that there is scope for short-run manipulation of the money supply (see for example Aghevli and Khan (1976)).

In Kuwait, which is a major oil-exporting country, policy makers have similarly been preoccupied with the major problems facing oil-exporting countries with the general neglect of the role of money and monetary policy. Indicative of this tendency is the following two interesting numbers: in 1981, a year of heightened activity in the stock market (which eventually collapsed in the second half of 1982), the rate of growth of M1 was 81 percent, whereas in 1984, a year of recession, the growth rate was -18 percent. These two numbers serve to illustrate the absence of "monetary discipline", and similar implications can be derived from figures on the growth rates and sectoral distribution of bank credit to the private sector. Thus, in the 1980s it became apparent that monetary developments in Kuwait, specifically the behaviour of commercial banks operating with few constraints, contributed significantly to the emergence of inflationary pressures in the 1970s, intensive speculation and volatility in the stock and real estate markets -both of which ended up in the doldrums from 1983 onwards- and the general recession of the 1980s.

A prominent economist has recently asserted that a strong central bank could have prevented the collapse of the stock market in 1982. In this respect, it is noteworthy that the January 1982 ban imposed by the Central Bank of Kuwait preventing commercial banks from discounting post-dated cheques, was crucial in shielding the banks from the worst of the fallout from the crash of August 1982 (see Muehring (1985)). A similar belief arose regarding the ability of Kuwait's banking system to contribute to reviving the economy, this fact was particularly recognised by officials of the Central Bank of Kuwait. On May 7th 1985, the Governor of the Central Bank of Kuwait addressing a conference on banking control and supervision in London said: "there is a great need for Kuwait's banking system to tune itself towards the new course of the country's economy, where emphasis will be placed on sustaining a renewable and ever-enlarging productive base." He stressed that "the banking system should closely supervise the end use of its funds, and give more attention to helping the economy respond effectively to the demands of rapid change." Since his appointment in 1983, the present Governor has strived to exert more control over the activities of commercial banks, even via "moral suasion" conducted through regular monthly meetings of the Governor with the banks' general managers. As such he has become an "unpopular" man.

The comparative neglect of the role of money and monetary policy in Kuwait might have been due to, or encouraged by, the lack of knowledge of the behaviour of the monetary sector and its effect on the real sector. Until 1981, the "best" published model of the Kuwaiti economy (Khouja and Sadler (1979)) only contained a badly-specified money supply function. Some fragmented efforts were later made to shed some light on the monetary sector, but some of the more critical issues in monetary economics still remain a mystery, or at least disputed, in the case of Kuwait. These issues include the theoretical and empirical definition of money, the appropriate specification of the demand for and supply of money functions, the effect of the monetary sector on the real sector and the role these macroeconomic relationships play in the conduct of monetary policy. This study addresses these and other issues using theoretical, descriptive and empirical methods. The ultimate objective is to use the findings of this study to upgrade monetary policy and make it more effective. Naturally, the satisfaction derived from shedding some light on the mysterious or debated issues has its own purely academic reward.

1.2. An Outline of the Study

This study deals with the structure and development of Kuwait's monetary sector and its influence/interaction with the real sector in the period

1969-82. The year 1969 is significant in that it was the year the Central Bank of Kuwait started its operations. Prior to that, monetary developments were of little importance and detailed data for the period are scarce. When work on this study started in early 1984, some time series were only available till the end of 1982 (e.g. GDP and imports). Therefore, the descriptive work is based on annual data for the period 1969-82. Much of the empirical work uses quarterly data for the period 1975-82, but the major part (including the model presented in Chapter 6) is restricted to the period 1977-82 because it was not possible to obtain quarterly data on domestic interest rates before 1977. Nevertheless, it is arguable that this period is the most critical and representative in Kuwait's modern economic history. It encompasses periods of boom and slump in the oil market (1979-80 and 1981-82 respectively); periods of boom in the stock market (1981-82) and the two crashes of 1977 and 1982; periods of expansionary and less-expansionary fiscal policy; periods of extremely high U.S. interest rates together with sharp downturns; and the breakout of the Iraq-Iran war. Moreover, the major tools of monetary policy now in use were developed in this period, in particular the liquidity and reserve ratios (1977 and 1980 respectively). Finally, the choice of this period to estimate the model allows us to conduct out-of-sample simulations for 1983.

Apart from this introductory chapter, there are seven other chapters and a statistical appendix. In Chapter 2 an overview of the Kuwaiti economy is presented. Topics covered in Chapter 2 include economic and sectoral growth, public finance and foreign trade, all of which are highly relevant to the monetary sector and important for the purpose of specifying the model. The treatment is generally descriptive, although some elementary empirical work is presented and reference is made to previous empirical studies on the real sector of the Kuwaiti economy.

Chapter 3 is entirely descriptive and focuses on the monetary sector. It begins with a brief historical survey and then looks at the behaviour of the Central Bank and commercial banks through an analysis of their balance sheets. The critical issue of Central Bank independence is discussed. Subsequently, the money supply process is studied through the consolidated balance sheet of the monetary sector, leading to an exposition of monetary phenomena in Kuwait in the period 1969-82. Chapter 3 ends with a brief outline of other financial institutions and financial markets.

Chapter 4 contains some analytical and empirical work on a variety of topics in monetary economics as applied to Kuwait. The first issue concerns the most appropriate definition of money, this is treated both theoretically and empirically using tests of correlation, stability and predictability. The controversial Granger-Sims causality testing is evaluated and applied to Kuwait to resolve the "chicken and egg" problem in the money-income relationship. Another important issue discussed in Chapter 4 is that of the velocity of circulation, this is handled from a theoretical point of view, and empirical evidence is presented for Kuwait. The final two sections of Chapter 4 deal with the debate of time-series versus econometric models of forecasting, and a time-series model is presented to forecast the money supply in Kuwait.

Chapter 5 is devoted to the discussion of monetary policy. It starts with the theoretical background to the viability of controlling the money supply using the multiplier framework, this is subsequently applied to Kuwait, together with the estimation of two behavioural equations for the currency-deposits ratio and the reserve-deposits ratio. Then a thorough elucidation of monetary policy in Kuwait is undertaken with a review of the historical development of tools and an assessment of their efficacy in the light of their achievements. Interest rate and exchange rate policies are evaluated -particularly in relation to the recurring liquidity crisis. Policy alternatives are then presented, including the possibility of using a monetary rule.

In Chapter 6 a quarterly econometric model of Kuwait's monetary sector is presented. It starts with a review of the pros and cons of macroeconometric model building -including the famous Lucas critique. This is followed by a survey of previous econometric work on Kuwait and a discussion of some econometric issues. The specification of the model is presented after a thorough discussion of each function with reference to existing empirical evidence. The model is then estimated and validated by looking at the significance of the estimated coefficients. Chapter 6 has three appendices: the first contains selected empirical results from previous econometric studies of the Kuwaiti economy, the second presents different estimates of the price equation to test the effect of the exchange rate, and the third tests for money illusion and presents alternative estimates of the demand for money function.

As a natural extension to Chapter 6, Chapter 7 is devoted to model validation mainly by testing its predictive power. The concept of validation is discussed, then various measures of predictive power are evaluated. Both within and out of sample predictions are then calculated for six endogenous variables. Some further validation procedures are applied to the model including dynamic stability, symmetry, and stochastic simulations. The concept of dynamic elasticity as applied to the demand for money is also considered.

Finally, Chapter 8 contains a summary of the main findings of the study, recommendations based on these findings, and suggestions for further research. A statistical appendix is enclosed that contains all of the basic data used throughout the study.

1.3. Economic and Monetary Developments since 1982

Since the analysis and estimation period do not go beyond 1982, for reasons mentioned earlier, it would be beneficial to give a brief account of the economic and monetary developments since the end of 1982.

In the post-1982 period, the Kuwaiti economy has experienced some difficult times, due mainly to a combination of depressed oil markets (both lower exports and lower prices), and the aftermath of the collapse of the stock market in the second half of 1982. Some would also argue that the Iraq-Iran war has been a significant negative factor, but I would not give it the same weight as the other two factors. While the war made an initial impact, people gradually learnt to live with the situation, and its effect paled into insignificance, this will be confirmed by empirical evidence with respect to imports in Chapter 6. However, it must be mentioned that the war became a more significant factor in 1984-85 when the "tankers war" started as Iraq aimed at blocking the Iranian oil terminal at Kharg Island.

Depressed oil markets resulted in lower oil revenue, forcing the government to cut back expenditure on "non essential" items, in particular, consumption expenditure. Although expenditure did not decline in absolute value, its growth decelerated, adversely affecting activity in the non-oil sectors. Similarly, the stock market crisis resulted in a staggering gross debt of about $100 billion, and as long as the debt situation was unsolved, resources could not be released and channelled to real economic activity. A further ramification of the stock market crisis was government intervention to support stock prices in a multi-billion dollar operation lasting between early 1983 and April 1984. The operation had to be financed by withdrawals from the general reserves, resulting in a sharply lower investment income in the fiscal year 1983/84 (International Herald Tribune, April 18th 1985). These developments have resulted in a combination of slower activity in non-oil sectors, wider budget deficit (excluding investment income), and narrower trade surplus.

In view of this state of affairs, an eminent economist described the Kuwaiti economy as "passing through an adjustment period towards a lower level of equilibrium" (Kuwait Times, March 7th 1985). This process of adjustment is believed to have started in 1983 and continued throughout 1984, signalling that the economic boom as experienced during the period 1973-82 was over, and that the economy has been adjusting to a normal level of activity. This also seems to have been the view of the Economic Reactivation Committee formed by the Council of Ministers to study the economic situation. In its report to the government, the Committee emphasised the "process of normalisation to moderate and sustainable levels of growth after the hectic developments of the 1970s." It must be mentioned, however, that Kuwait is still accumulating reserves and is the only Gulf state to have substantially reduced its dependence on oil by continuing to expand its investments overseas. Lastly, at the current rate of extraction, oil reserves are sufficient for 180 years -and perhaps half as much again- if new finds are proven (International Herald Tribune, April 18th 1985).

Monetary developments since 1982 have largely been determined by two factors: (i) the stock market crisis (and government measures to solve it) and (ii) high U.S. interest rates (coupled with a strong dollar). The result has been a slow, or negative, monetary growth, high demand for foreign-currency deposits, slower rate of domestic credit expansion and capital outflows. In 1981, the growth rate of M1 (currency and demand deposits) was a staggering 81.4 percent, but it declined to -5.6 and -17.9 percent in 1983 and 1984 respectively. Demand deposits, in particular, fell by 23.8 percent in 1984. The growth rate of the broad money supply M2 declined from 35.4 percent in 1981 to 4.5 and 3 percent in 1983 and 1984 respectively. Against this, foreign-currency deposits, which fell by 44 percent in 1982, increased by 79.4 and 20.1 percent in 1983 and 1984 respectively, reflecting the switch away from demand deposits as the domestic economy was slowing down and the stock market effectively "dead." Outstanding domestic bank credit increased by KD 460.2 million and KD 287.1 million in 1983 and 1984 respectively, compared with KD 838.9 million in 1982. Finally, the private sector's net transactions with the outside world, which may be taken as a measure of capital outflows, increased from KD 2522.1 million in 1982 to KD 3349.4 million in 1983, then declined to KD 2937.1 million in 1984.

To counter these developments, the Central Bank resorted to its traditional tools whereby it injects liquidity into the banking system (see Chapter 5 for details). The pace of these operations started to accelerate in September 1983, and in June 1984 the swap operations reached KD 515 million -the highest level ever. Discounts also reached a record level of KD 455 million in July 1984. In 1984, the Central Bank injected liquidity by directly lending KD 188 million to banks with Central Bank bills as collateral. The liquidity situation worsened, as implied by the net position of commercial banks with the Central Bank (see Chapters 5,6), which changed from a positive figure of KD 412.7 million to negative figures of KD 198 million and KD 153.2 million in 1983 and 1984 respectively. By the end of the first quarter of 1985, the net position improved to a negative figure of KD 86 million. Yet, interest rates were lower in 1983 and 1984, on average, than in 1982.

With the appointment of a new governor in 1983, the Central Bank started being more restrictive. New measures included: more detailed reporting and disclosure requirements; closure of the leaks in the monetary flows opened by the activities of the 150 or so exchange houses (money changers) -many of which were accepting deposits or extending loans on behalf of foreign financial institutions; and a more active involvement of the Bank in the determination of the level of provisions against loan losses and dividend distribution. In August 1984, the Central Bank issued a directive to banks and investment companies instructing them not to issue bonds or manage syndicated loans for foreign borrowers except those who have business in Kuwait.

The most critical measure was taken in the first half of 1984 when capital outflows were accelerating, threatening the emergence of a real problem (Moosa (1985b)). Capital outflows were encouraged by the rising differential between U.S. and domestic interest rates, as well as stagnation in domestic economic activity and the stock market. Firstly, the money changers were instructed to halt all activities other than direct foreign exchange dealing, submit detailed monthly reports to the Central Bank and report daily all transactions exceeding KD 25,000. Secondly, in April 1984, the commercial banks were informed that all foreign exchange purchases from the Central Bank were to be limited to a daily quota, within which dollars were to be provided at the cheaper commercial rate only if the purchase request was supported with documentation such as a letter of credit. Dollars requested in excess of the quota would be perceived by the Central Bank to be for speculative purposes, and would only be available at the more expensive free-market rate.

The presentation of economic and monetary developments since the end of 1982 is meant to be informative since our study concentrates on the period 1969-82. It may be useful to mention at the conclusion of this chapter that the unit of currency used throughout this study is the Kuwaiti Dinar (KD). The determination of the KD exchange rate is explained in Chapter 5 and detailed exchange rates against major currencies are found in the statistical appendix.

CHAPTER 2

STRUCTURE AND CHARACTERISTICS OF THE KUWAITI ECONOMY

2.1. Introduction

The objective of this chapter is to present an overview of the structure of the Kuwaiti economy. This may seem irrelevant to this study which is primarily concerned with the monetary sector, but this is not true because a model for optimal monetary policy must incorporate the behaviour of all sectors of the economy. The model of the monetary sector presented in Chapter 6 traces out the effect of money and credit on output, prices and the external sector. Moreover, such concepts as oil and non-oil GDP will frequently be referred to or employed as explanatory variables; it is the objective of this chapter to shed some light on these concepts. Finally, since one of the objectives of monetary policy is, or should be, to ensure that bank credit is distributed among various sectors in a manner consistent with development priorities, the pattern of overall and sectoral growth must be evaluated.

While Kuwait is essentially a developing or less developed country, it enjoys some of the benefits associated with a healthy developed economy. It can be described as developing or less developed because it depends almost entirely on the production (or rather extraction) and export of a single primary commodity (oil) for which it is a price-taker; this is a common feature of LDCs. But, since oil is considered as the single most important primary commodity in this technological era, and since Kuwait holds substantial oil reserves, the State has become a capital surplus country boasting a high standard of living and persistent surplus on the internal and external balances (see Amuzegar (1983) for the characteristics of oil that make oil exporting countries different from other raw-material or commodity exporting LDCs). It is no wonder, then, that Kuwait's economic history revolves around the history of its oil industry.

Kuwait's modern economic history goes back to 1946 when the first oil shipment was exported. Since then, the Kuwaiti economy has passed through several stages: from being dependent on royalties paid by oil companies which had concessions to extract oil, via the transitional stages when Kuwait first gained control over its oil resources, to the complete ownership of these resources. The present stage was finally reached when Kuwait graduated to formulating and executing policies, not only regarding development, but also economic and monetary stabilisation programmes. In three decades during which natural wealth was transformed into disposable funds, there has been a remarkably rapid development of infrastructure, institutions and welfare system. Indeed, the population suddenly found themselves enjoying a standard of living surpassing even that of the most advanced of developed countries. Kuwait can now be described as a combination of welfare state and free enterprise system, and in one sense this is unique for a developing country (Khouja and Sadler (1979)).

The extent of Kuwait's dependence on oil can be seen through the following ratios:

(i) ratio of oil GDP to total GDP;

(ii) ratio of oil revenue to government's total revenue;

(iii) ratio of oil exports to total exports.

Table 2.1 shows the high, low and average values of the three ratios in the period 1970-1982, and Figure 2.1 illustrates the ups and downs of the three ratios during the same period. All of the ratios are very high and indicate considerable dependence on oil. The highs of the ratios were registered in 1974 (fiscal year 1974/75 for the second ratio) following the oil price hike of 1973/74, whereas the lows were registered in 1982 (fiscal year 1981/82 for

Figure 2.1

Measures of Dependence on Oil

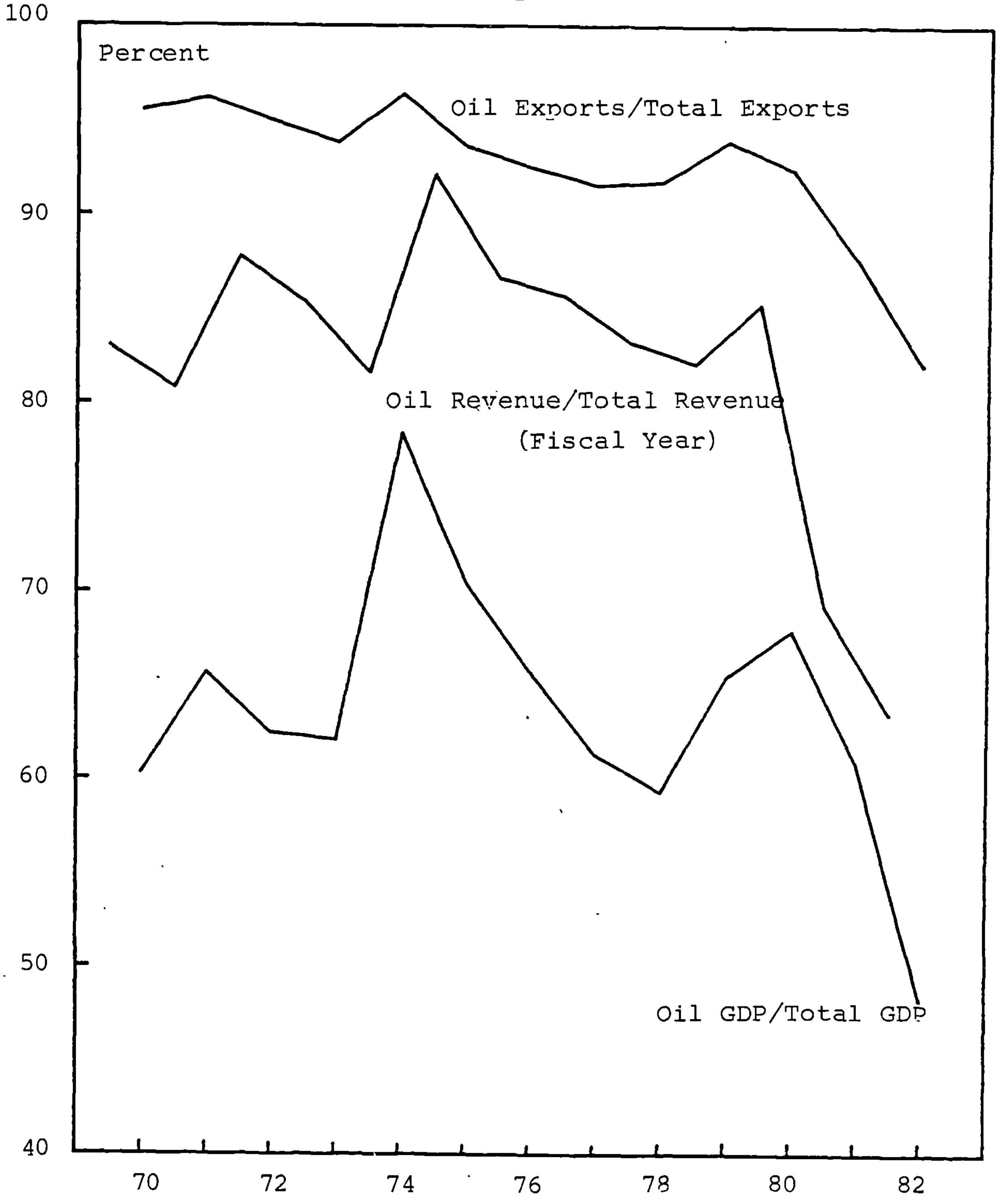


Table 2.1: Measures of Dependence on Oil

Ratio (%)	High	Low	Average
Oil GDP/Total GDP	78.5	48.3	63.7
Oil Revenue/Total Revenue	92.2	63.6	82.0
Oil Exports/Total Exports	96.4	80.2	92.5

the second ratio) when conditions in the oil market turned against producers. The ratios indicate that for Kuwait, oil has become the main source of economic growth, government revenue and foreign exchange earnings.

Dependence upon oil -and how to lessen it- has preoccupied the thinking of economic planners in Kuwait. Fahmi (1980) expresses the issue very clearly by stating that "Kuwait's immediate and overriding concerns lie in lessening her potentially crippling dependence on a semi-unique depletable source of income. As things stand, it is a well known fact that without oil not only the current prosperous economic conditions cannot be maintained, but the whole fabric of the State could disintegrate." An important incentive for diversification away from oil is found in Amuzegar (1983) who recognises the oil sector's inability to generate production and consumption linkages with the other sectors of the economy and, thus, to create employment opportunities. This is due to the fact that oil technology is highly capital and skill intensive and has certain input requirements that are vastly different from the oil exporting countries' domestic factor supplies.

Achieving less dependence on oil has not been an easy task. The declining share of oil in total GDP between 1970 and 1982 is not indicative of less dependence on oil, as much as it is a reflection of depressed oil markets in the 1980s. It must be mentioned, however, that advancement in this direction has been made in two respects: lessening the dependence on crude oil by diversifying into refined products -which shows an element of industrialisation- and developing the foreign investment portfolio as a major source of income.

2.2. Economic and Sectoral Growth

In 1982 Kuwait's gross domestic product (GDP) at current prices* was estimated at KD 5727.5 million, up from KD 1026.3 million in 1970. This indicates a compound annual growth rate of 15.4 percent in the period 1970-82. The growth pattern was highly volatile and vulnerable to conditions in the oil market: in 1974 and 1979 nominal growth rates were 140.2 and 58.1 percent respectively, because of higher oil prices; in 1975, 1981 and 1982 GDP registered nominal growth rates of -9.5, -9.1 and -15.4 percent respectively, due to lower oil prices and unfavourable conditions in the oil market (see Figure 2.2).

The volatile pattern of Kuwait's GDP growth is mainly due to fluctuations in the oil sector which are triggered by exogenous factors. Annual growth rates of oil GDP exceeded in absolute values those of total GDP in most years. In the years of prosperity (1974 and 1979) growth rates of oil GDP were 203.3 and 74.7 percent respectively, whereas in the years of recession (1975, 1981 and 1982) growth rates were -18.6, -18.5, and -32.9 percent respectively.

On the other hand, growth of non-oil sectors has been more smooth; the highest growth rate of 33.9 percent was registered in 1979. Table 2.2 shows average annual compound growth rates and the contribution to total GDP of various sectors.

* GDP and growth rates are reported at current prices due to the unavailability of a reliable deflator.

Figure 2.2

Nominal Growth Rates

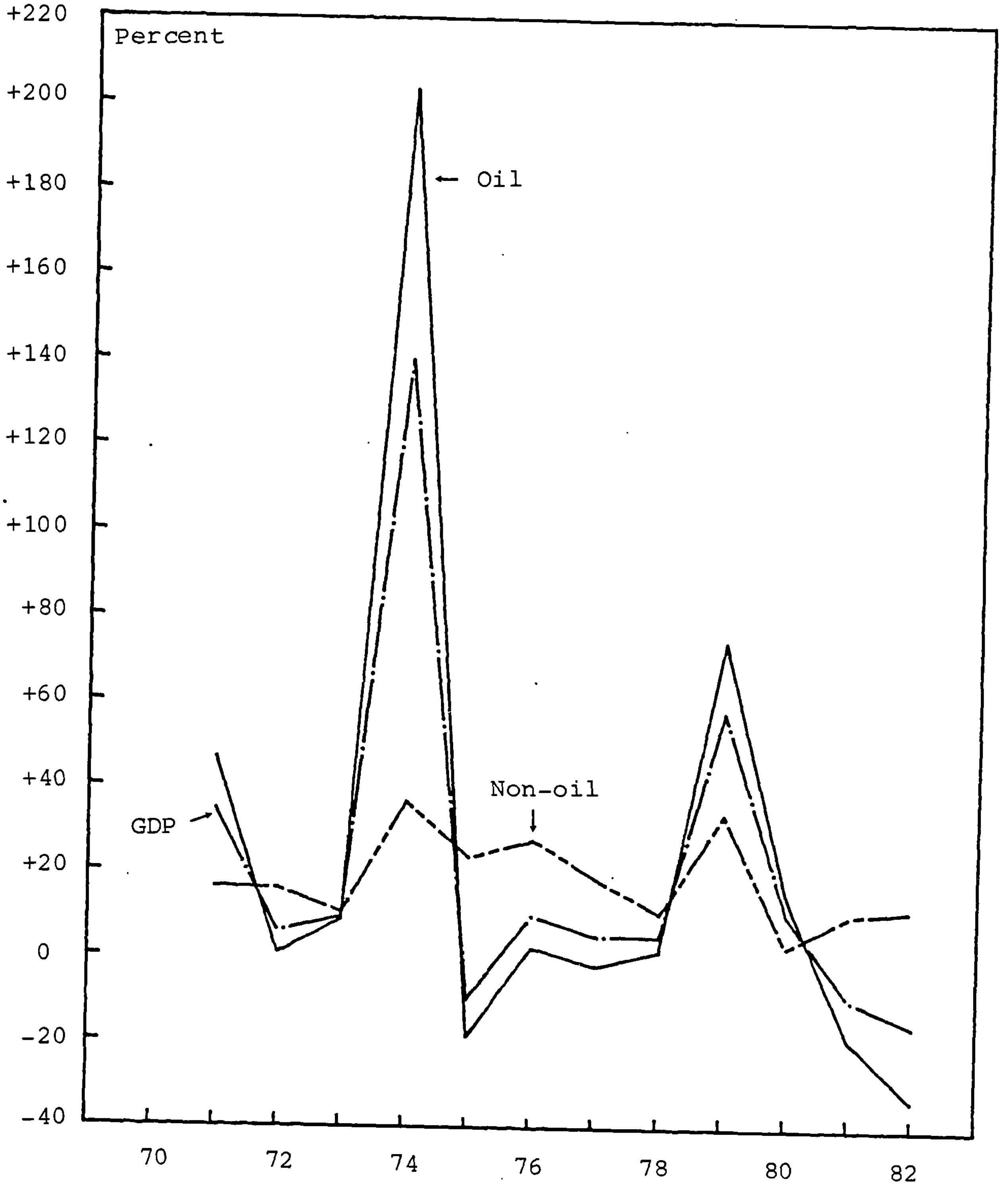


Table 2.2: Contribution to GDP and Average Growth Rates of Various Sectors

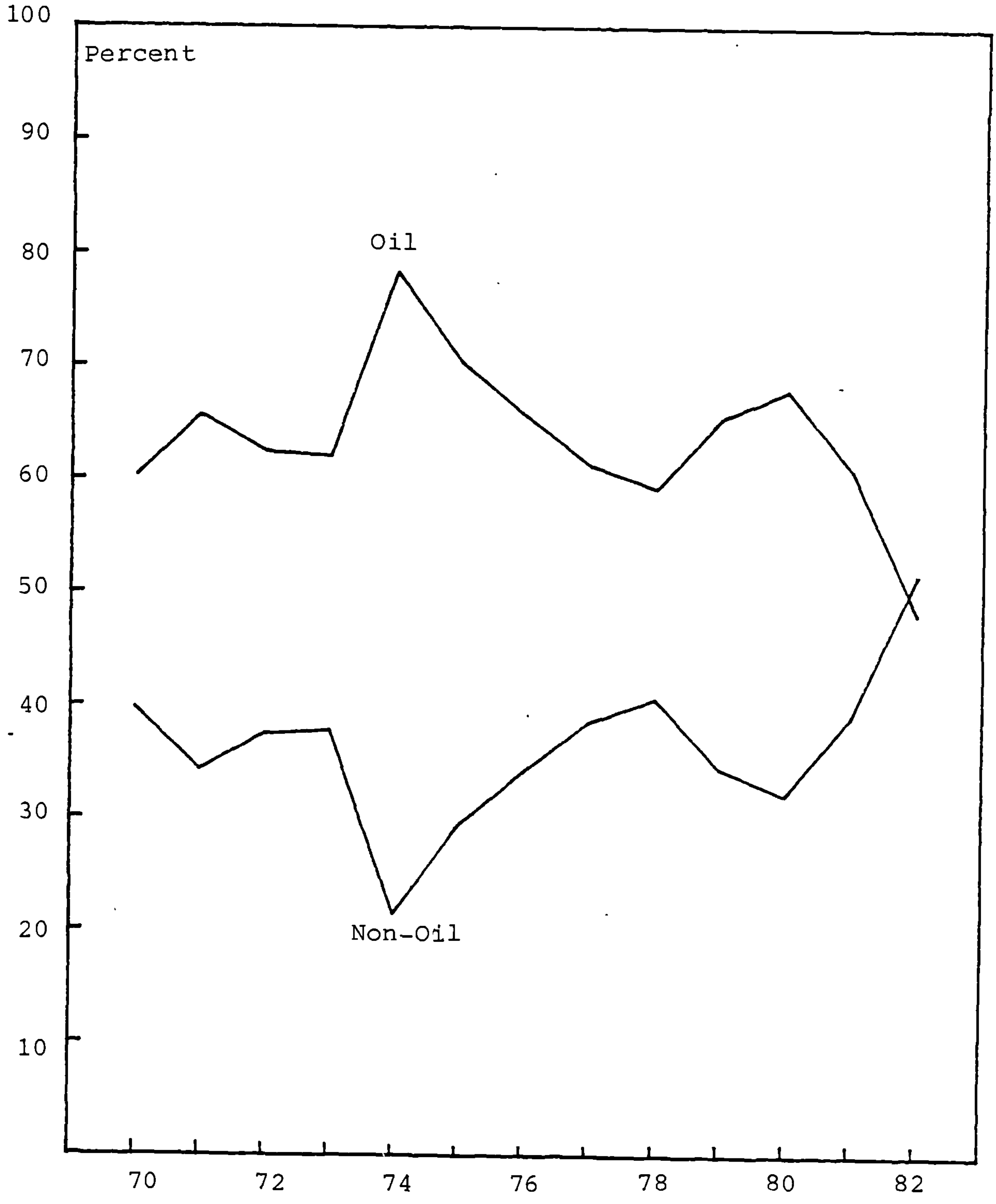
Sector	% of GDP (1970)	% of GDP (1982)	Growth Rate(%)
Total GDP	100.0	100.0	15.4
Oil	60.3	48.3	13.3
Total Non-oil	39.7	51.7	18.0
Agriculture	0.3	1.0	21.8
Manufacturing Industry	4.2	6.5	19.8
Electricity, Gas and Water	0.7	0.5	12.7
Construction	2.7	4.9	21.2
Wholesale and Retail Trade	7.9	9.1	16.8
Transport and Communications	2.9	3.0	15.9
Financial Services	2.0	5.0	24.4
Other	19.0	21.7	16.8

The table shows that the oil sector had a lower average compound growth rate than non-oil sectors because of the negative growth rates at times of unfavourable conditions in the oil market. As a result, the contribution of oil sector to total GDP declined from 60.3 percent in 1970 to 48.3 percent in 1982. Correspondingly, the contribution of non-oil sectors increased from 39.7 to 51.7 percent. Of non-oil sectors, the fastest growing was the financial sector which registered a growth rate of 24.4 percent, thus increasing its contribution to GDP from 2 to 5 percent. Figure 2.3 illustrates the changing contributions of oil and non-oil sectors to GDP.

Needless to say, non-oil sectors have benefitted from growth in the oil sector. As El-Mallakh and Atta (1981) point out, the oil sector has positively influenced the rest of the economy through financial linkages, increased

Figure 2.3

Contribution of Oil and Non-Oil Sectors to GDP



aggregate demand and expanded imports. Indeed, other sectors would not have flourished if it were not for the growth of the oil sector. However, the relationship between growth of the oil sector and non-oil sectors is long-term rather than short-term. A drop in oil GDP in one year does not necessarily imply or result in a drop in non-oil GDP. For example, in 1975 oil GDP declined by 18.6 percent, when at the same time non-oil GDP increased by 30.1 percent. Therefore, a simple regression of the growth rate of non-oil GDP on the growth rate of oil GDP does not produce significant results. The following equation was estimated for the period 1970-1982 (t-statistics in parentheses).

$$Yn = \underset{(5.60)}{15.6} + \underset{(1.74)}{0.077}\, Yo$$

$$R^2 = 0.215 \qquad SE = 9.38 \qquad DW = 1.80$$

where

Yn = growth rate of non-oil GDP

Yo = growth rate of oil GDP

Growth of oil GDP, however, remains the main determinant of overall economic growth as can be seen from the following simple regression:

$$Y = \underset{(5.83)}{4.44} + \underset{(55.34)}{0.67}\, Yo$$

$$R^2 = 0.996 \qquad SE = 0.996 \qquad DW = 2.36$$

where Y is the growth rate of total GDP.

Activity in the oil sector is not limited to the production of crude oil and/or changes in its price; this is particularly true for recent years as government emphasis has been placed on increasing the proportion of refined products. Oil GDP, therefore, depends on the monetary value of the production of: (i) crude oil, (ii) refined products, (iii) liquified petroleum gas, and (iv) natural gas. The author (Moosa (1983a), (1983f)) has formally shown that oil GDP can be estimated and accurately predicted from a linear combination of the monetary value of the four categories. The linear combination can either be a simple average in the form of an index, or a weighted average such that weights are estimated by the method of principal components.

Non-oil GDP, on the other hand, depends on government expenditure because:

(i) The government is the largest builder in the country and, therefore, the major part of output in the construction sector originates from public works.

(ii) Wholesale and retail trade activity consists almost entirely of imports financed by oil revenue.

(iii) Government activity accounts for about one third of total consumption and over half of gross capital formation.

Attempts were made by the Claremont Economics Institute (1983) to model oil and non-oil GDP. In a study of the Kuwaiti economy, the Institute suggested that "it is inappropriate to model oil GDP using the production function approach." Instead, a log-log function was estimated in which the dependent variable was oil GDP and the two explanatory variables were the price and production of crude oil. The statistical fit turned out to be good with R^2 of 0.98, but the estimated equation was conceptually weak because, as stated above, oil GDP does not only depend on crude oil but also on refined oil products, liquified petroleum gas and natural gas.

An attempt was made by the Institute to use the production function approach to estimate real non-oil GDP. A labour force series was estimated using

Central Bank estimates of population and the participation rate in the 1975 census year. Similarly, a capital stock series was estimated using 1972 as a base year and cumulating the capital stock on the basis of annual investment data and assuming a 10 percent depreciation rate. The statistical results were "very disappointing", and that was attributed to "measurement errors in the labour and capital estimates and to the dominant role played by government expenditure." A similar attempt was made by Al-Qudsi (1980) who estimated a classical production function for Kuwait. He found the output elasticity with respect to capital to be 0.63 and the elasticity with respect to labour to be 0.37.

Another approach was used by the Claremont Economics Institute (1983) to estimate real growth of non-oil GDP. It was hypothesised to consist of two parts: a trend which is related to the growth of anticipated real government expenditure, and deviations from the trend caused by exogenous shocks, namely the unanticipated components* of government expenditure and the rate of change

* The terms "anticipated" and "unanticipated" here refer to the decomposition of exogenous and policy variables into two components in order to incorporate the rational expectations hypothesis. Decomposition is done as follows: if X is an exogenous or policy variable following the autoregressive process

$$X_t = \sum_{i=1}^{m} a_i X_{t-i} + u_t$$

where m is the maximum lag, then

$$\text{Anticipated Component} = \sum_{i=1}^{m} a_i X_{t-i}$$

$$\text{Unanticipated Component} = X_t - \sum_{i=1}^{m} a_i X_{t-i} = u_t$$

of the KD/dollar exchange rate. The equation was estimated using the Almon distributed lags procedure and the following results were found:

(i) the trend rate of growth of non-oil GDP is 0.59 times the trend growth rate in government expenditure;

(ii) the effect of the unanticipated component of government expenditure is significantly positive;

(iii) the unanticipated component of exchange rate changes have strong and persistent impact on real growth.

Although the statistical results turned out to be good, they were overshadowed by the lack of theoretical reasoning to justify the specification of the equation. For example, there was no explanation for the effect of the exchange rate on the growth of non-oil GDP.

In this study a measure of economic activity or economic growth is frequently required, posing the following question: what income concept is most appropriate for this purpose? Is it non-oil GDP only or total GDP (including oil GDP)? In other words, considering economic activity or economic growth in an oil-based economy like that of Kuwait, is it more plausible to include or exclude the oil sector?

It would seem that non-oil GDP is a better measure of economic activity and real production, since the monetary value of output in the oil sector is highly influenced by conditions in the international oil market; these affect activity in non-oil sectors in the long run only. As El-Beblawi and Fahmi (1981) point out, "the oil sector is not integrated in the domestic economy as much as it is an extension of the world economy attached geographically and geopolitically to the national economy." They further add that "growth of the oil sector reflects changes in the world economy and in particular the balance of power between the oil exporting and consuming countries." As Ghuloum (1984) also points out, "a recession in the rest of the world is reflected initially in the oil sector only, and does not generally affect the other sectors of the economy except after a long period."

Interestingly enough, the oil sector -in which more than half of total GDP originates- employs less than 1 percent of the labour force, whereas the construction sector, for example, employs about 12 percent of the labour force. Furthermore, production in the oil sector actually represents capital depletion; indeed, it is essentially extraction rather than production. These arguments suggest, therefore, that non-oil GDP is a better measure of economic activity, real production and growth. However, total GDP -including the oil sector- is a better measure of income when talking about wealth, income per capita or standard of living.

Mansour (1983) argues that this proposition was valid prior to the government's full ownership of the oil sector in 1975 because the oil sector then looked more like "an isolated external sector." Now, he believes, this is no longer the case and total GDP is a valid proxy for economic activity for the following reasons:

(i) the oil sector is now more closely integrated with non-oil sectors;

(ii) many industries use oil as a raw material;

(iii) a major portion of crude oil is processed and converted into refined products;

(iv) non-oil sectors are propelled by government expenditure which is financed by oil revenue;

(v) oil is the source of wealth.

Thomas Stauffer (1981) of Harvard's Center for Middle Eastern Studies argues that growth in the oil-exporting countries must consist of two components, one being pure expansion, reflecting the consumption of oil reserves, and a second component which is the result of investment, i.e. the transformation of oil assets into different assets which yield more enduring income. He defines success in reducing oil dependency as contingent upon the relative size of "transformation income" versus the "depletable component" but, he argues, even non-oil GDP does not truly reflect the transformation income because a large component of oil revenue is embedded in the non-oil sectors, simply because non-oil activity is financed by government expenditure. So, to arrive at the "actual" size of non-oil GDP, the contribution of the oil sector to non-oil sectors must be deducted. His estimates show that more than two thirds of what is regarded as Kuwait's non-oil GDP in conventional national income accounting is derived from the spending of oil income; the remainder represents a measure of GDP which might be expected to persist if oil revenue were to cease over night. He concludes that Kuwait's real dependence on current oil revenue is almost 90 percent rather than the average 63.7 percent derived from conventional national income accounts.

2.3. Public Finance

The Kuwaiti government is a big spender on social services and economic participation, e.g. full or partial ownership of companies. The government aims at using its revenue in such a manner as to enhance the welfare state, distribute income, support the private sector, and achieve sustainable non-inflationary growth.

Revenue accrues to the government from three sources: (i) oil sales, (ii) foreign investment and (iii) other sources, mainly some minor customs duties and fees for some services. There is no income tax or any other major types of tax. Oil and gas sales have historically been the major source of government revenue, but investment income has continuously assumed increasing importance (see Figure 2.4). This income is obtained by employing the accumulated budget surplus in real and financial assets abroad, which, in Amuzegar's (1983) view, permits oil exporting countries to take advantage of the current known price of oil, while deferring the absorption of real goods and services*. Other sources of revenue are of domestic origin, accounting for about 5 percent of total revenue in 1982.

On the expenditure side, there are four outlets:

(i) Current expenditure, which includes payments of wages and salaries to government employees, purchases of goods and services (consumption) and transfer payments.

(ii) Investment expenditure, which includes spending on construction and capital equipment.

(iii) Expenditure on land acquisition, which comprises payments made by the government to citizens in return for their houses or lands. The government buys private property at higher prices than the market value to erect public projects or re-sell them cheap to encourage modern housing construction. This category of expenditure is a means of income distribution.

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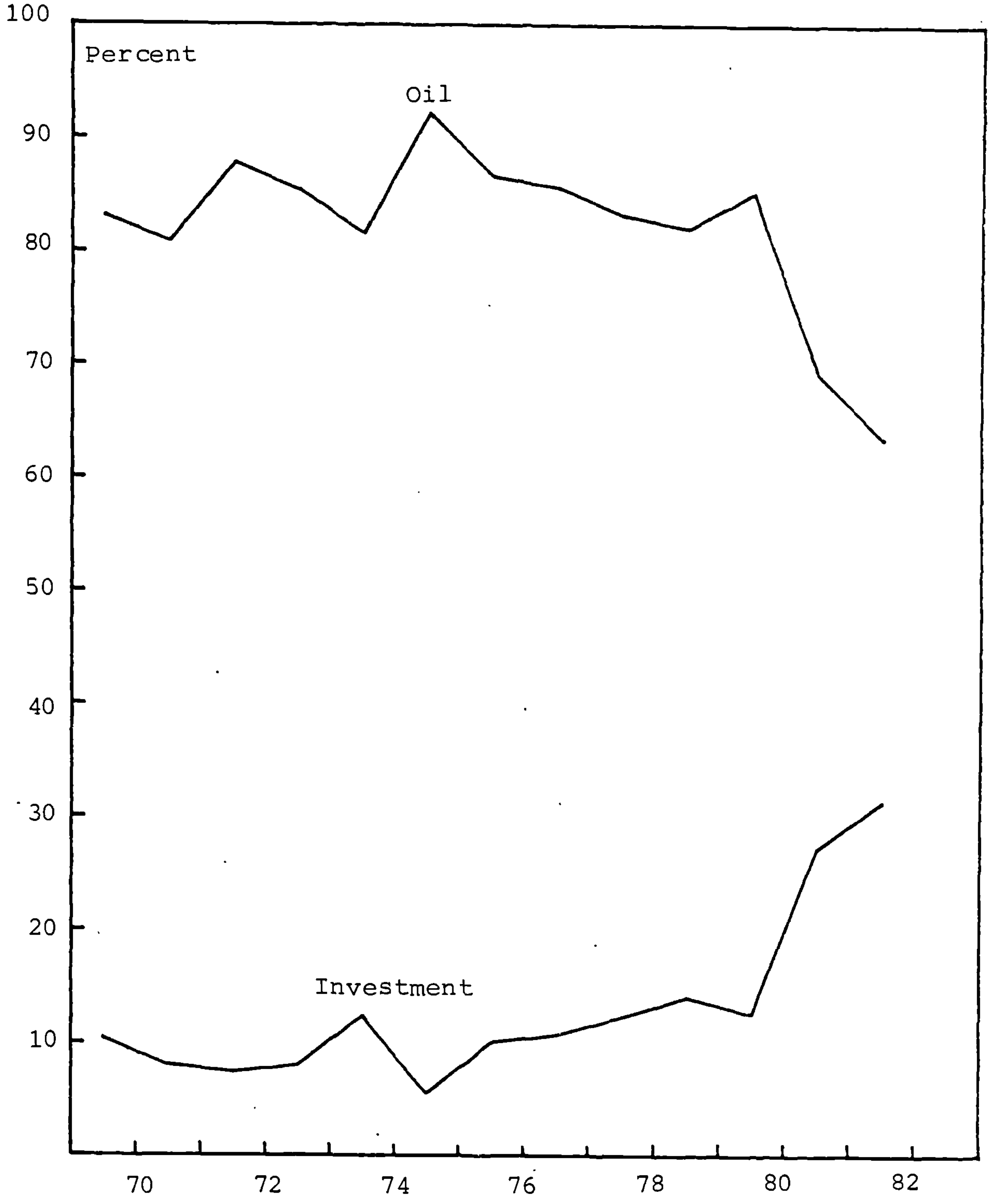
* The following are the advantages of foreign investment cited by Amuzegar (1983): (i) foreign investment, even when real yield is low, may be superior to domestic capital formation that has gross returns that fall short of depreciation costs, particularly where infrastructure is insufficiently developed, (ii) it avoids some of the incidental costs involved in a rapid increase in domestic expenditure, and (iii) it helps to insulate the domestic money supply from the effect of the balance of payments.

Figure 2.4

Contribution of Oil and Investment to Government Revenue



(iv) Foreign expenditure, which mostly takes the form of economic aid to other countries.

Figure 2.5 roughly demonstrates that there is no one-to-one relationship between total revenue and total expenditure, this is due to two factors. Firstly, investment income is not touched but transferred to the accumulated reserves which are reinvested. If the sum of oil revenue and other revenue falls short of total expenditure, the shortfall is financed out of the reserves. Secondly, dollars earned from oil sales are not automatically and immediately exchanged for local currency to finance domestic expenditure; instead, this tends to be done in a rather discretionary manner as the need arises.

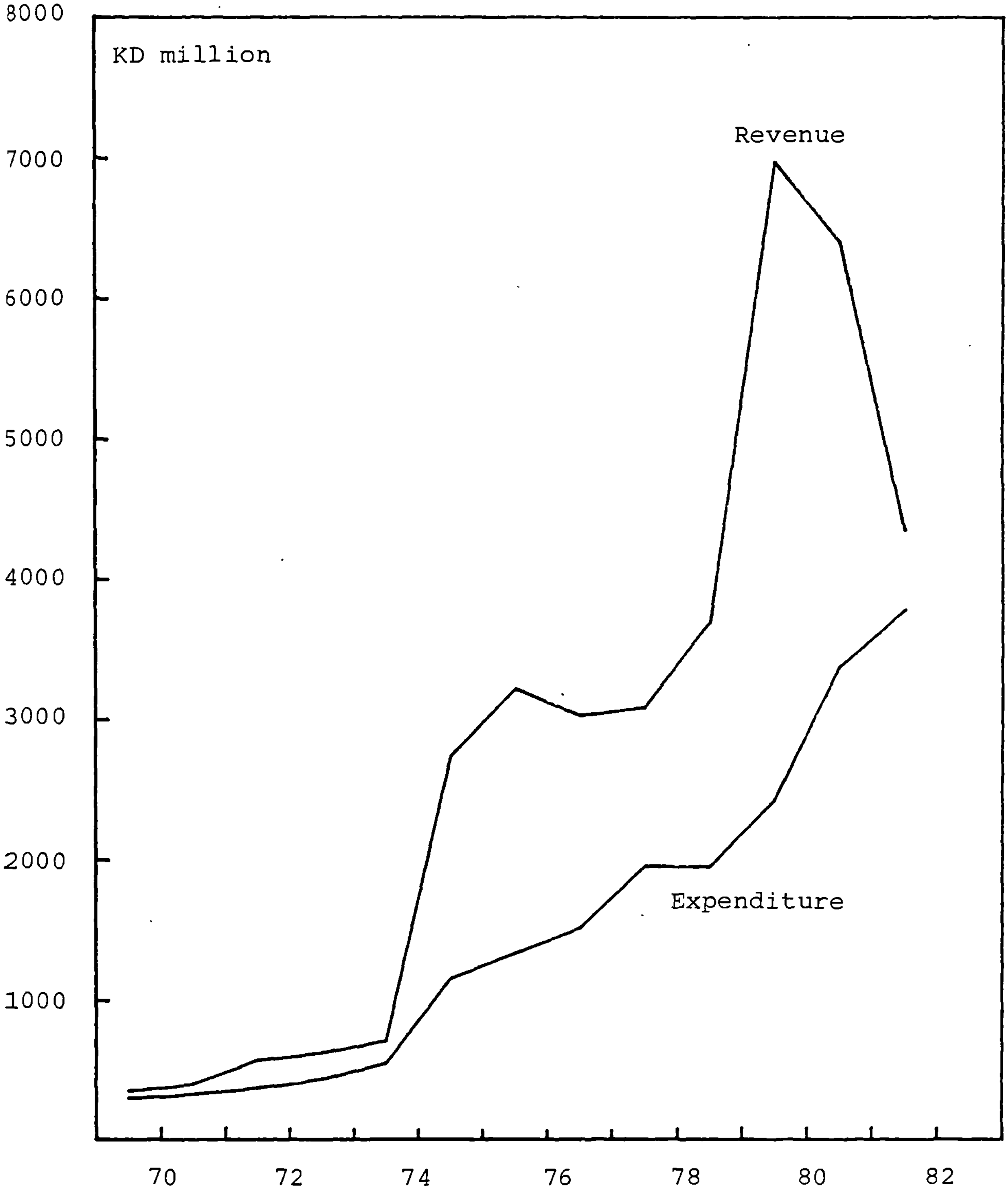
A simple regression of total revenue on total expenditure using rates of change produces the following results:

$$TE = 14.72 + 0.3\ TR$$
$$(3.12) \quad (5.58)$$
$$R^2 = 0.757 \quad SE = 14.80 \quad DW = 1.95$$

R^2 is not sufficiently high to suggest a one-to-one relationship, implying that there are other factors besides revenue that determine expenditure. Moreover, the significance of the constant term as indicated by its t-statistic implies that the regression line does not pass through the origin, which means that the relationship between the two variables is not proportional. It should also be stated that because of the first factor mentioned above, total expenditure is more influenced by oil revenue than by investment income. The correlation coefficient between the growth rates of total expenditure and oil revenue is 0.86, whereas that between the former and

Figure 2.5

Government Revenue and Expenditure



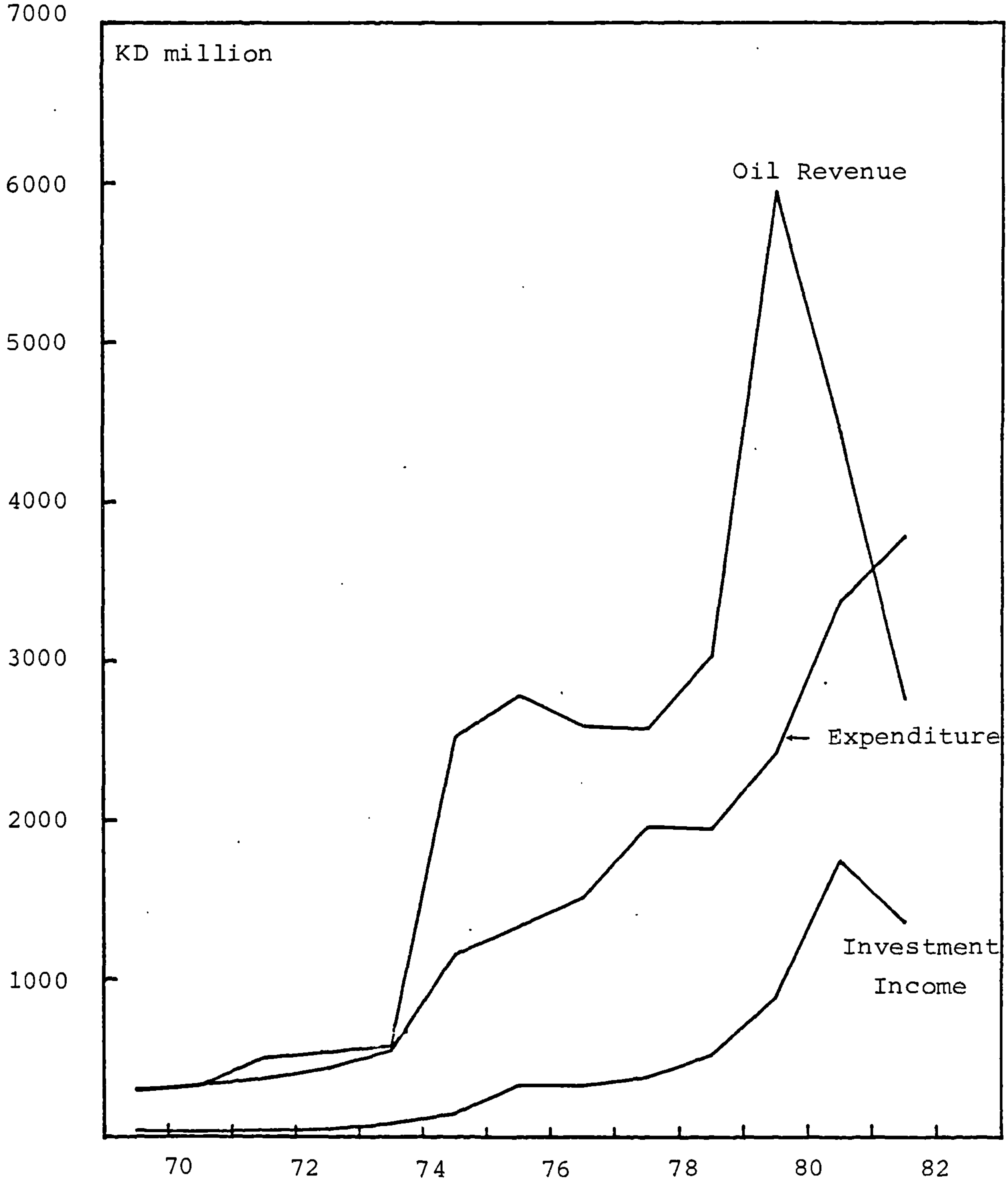
investment income is only 0.37. This relationship is shown graphically in Figure 2.6.

Several attempts have been made to model the revenue and expenditure sides of public finance in Kuwait. Khouja (1973) made the first attempt when he estimated a six-equation econometric model of the real sector of the Kuwaiti economy; two of the six equations were for public finance. He estimated an equation of total revenue as a function of the difference between exports and net factor income, and an equation of expenditure as a function of total revenue. Statistical results were good but the model was too simple and aggregated. Khouja deduced from his model that changes in expenditure are 60 percent less than those in revenue, this he partially attributed to non-economic or "philosophical" factors and, also, to the limited absorptive capacity of the Kuwaiti economy.

Better modelling of public finance is found in Khouja and Sadler's (1979) annual model of the Kuwaiti economy. The model contains an equation explaining total government expenditure in terms of GNP, lagged revenue from abroad (oil revenue + investment income) and a dummy variable, and another equation that explains government domestic revenue in terms of GNP. The model was estimated by OLS and 2SLS using data for the period 1962-76. Khouja and Sadler found that the three explanatory variables in the expenditure equation account for over 90 percent of the variation in the dependent variable, but they found the coefficient of GNP to be very small. They attributed this to the proposition that "a large proportion of GNP does not relate to the local economy" in which case they would have been better off using non-oil GDP because, as has been argued, it is a better proxy for economic activity. They also found the

Figure 2.6

The Effect of Oil Revenue and Investment Income on Government Expenditure



coefficient of lagged revenue to be sigificant, which they attributed to the actual existence of time lag in the receipt of revenue. The dummy variable was also significant, and that was taken to confirm the expanding role of the government since 1971 when GNP and the government's share thereof began to increase markedly at the expense of the private sector. Moreover, the equation showed a statistically significant autonomous component of government expenditure which is regarded as fixed, irrespective of the level of economic activity, because this component is used to cover welfare expenditure and similar items. The equation for domestic revenue revealed that 78 percent of the variation in the dependent variable can be explained by GNP. The small coefficient was taken to confirm the community's limited participation in the cost of government administration and social services. Since domestic revenue consists mainly of some customs duties and fees for some services, it is more plausible to make it a function of domestic economic activity as proxied by non-oil GDP. Therefore, the equation might have produced a better fit if non-oil GDP had been used instead of GNP.

El-Mallakh and Atta (1981) estimated two equations for government oil and non-oil revenue. Oil revenue was specified to depend on current and lagged values of oil GDP, but the lagged value alone turned out to be significant. Non-oil revenue was simply made a function of non-oil GDP which turned out to be highly significant ($t = 12.6$).

Kuwait International Investment Company (1984) presented a quarterly forecasting model of public finance containing four behavioural equations to explain oil revenue, other revenue, current expenditure and investment expenditure. No equations were presented for investment income, expenditure on land acquisition and foreign expenditure, on the grounds that they tend to be highly volatile and determined -or influenced- to a large extent by social or political factors (see Figure 2.7). This may seem inapplicable to investment income which should, theoretically, depend on yields in foreign financial markets among other factors, but in the fiscal year 1981/82 investment income fell by about 22 percent, just when everybody had expected it to rise sharply because foreign interest rates reached record highs in 1981. The reason for the drop was the reduction in reserves brought about by the withdrawal of about $4 billion to finance a loan to Iraq. Some other withdrawals were necessary to finance support operations for the stock market. Therefore, it was felt inappropriate to try to model investment income.

The Claremont Economics Institute (1983) suggested an investment income equation of the following form:

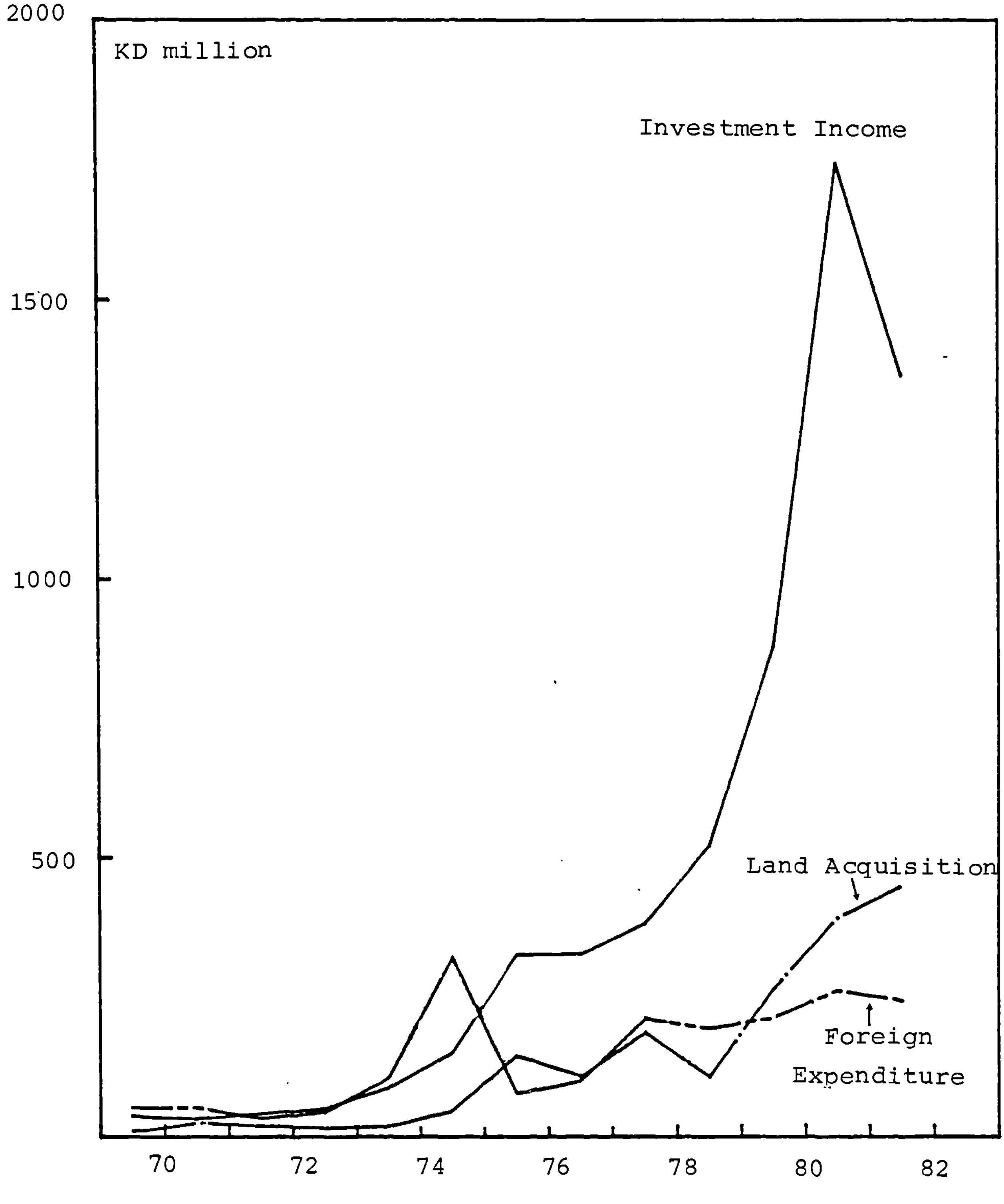
$$Yi = R\left[a_1 r_1 + a_2 r_2 + (1-a_1-a_2)\ r_3\right]$$

where Yi is investment income, R is invested reserves, a_1 and a_2 are the proportions of the portfolio in bills and notes respectively and r_1, r_2 and r_3 are yields on bills, notes and tangible assets respectively. But given the fact that the asset composition and geographical distribution of Kuwait's foreign investment portfolio are unknown, investment income cannot be estimated from the above equation.

Ghuloum (1984) estimated an expenditure equation as part of a simple money supply model. He contends that government expenditure in Kuwait is determined by three sets of factors: economic factors such as inflation, growth and the need to maintain and expand infrastructure; non-economic factors which largely depend on political considerations; and the "revenue constraint" which tends to influence expenditure in the long run only. He points out that changes in revenue affect expenditure only if they are conceived to be permanent like

Figure 2.7

Volatility of Some Components of Public Finance



those resulting from the 1973/74 oil price hike. Accordingly, he estimates an equation in which government expenditure is a function of past expenditure on "fixed" items of the budget, such as wages and investment expenditure which tend to grow over time and are less influenced by political considerations, and a moving average of the balance of trade. Both coefficients were found to be significant.

2.4. Foreign Trade

Kuwait depends heavily on foreign trade: the major part of government revenue accrues from the export of oil and gas and owing to the weakness of its agricultural and industrial sectors, Kuwait depends on the outside world for food as well as consumer and capital goods. The importance of foreign trade for the Kuwaiti economy can be seen from the high ratio of imports and exports to GDP. In 1982, the two ratios were 56.5 and 59.2 percent respectively.

As we have said before, oil exports comprise over 90 percent of total exports, with the rest consisting of re-exported goods and some domestically produced goods, mainly fertilizers. Re-exports usually consist of consumer durables and capital goods imported from abroad and then re-exported to neighbouring countries. The re-export trade evolved mainly out of the fact that Kuwait developed its harbour facilities and telecommunication systems earlier than other countries in the region. Kuwait's imports have continuously increased over time and yet the balance of trade has been in surplus ever since economic data were recorded because of the fast growth of oil exports.

The following are the results of regressing trade balance on its various components using annual data for the period 1970-82. The purpose of this exercise is to elucidate the dominant factor in determining the trade balance.

The following notation is used, with variables measured as rates of change.

TB = trade balance

OX = oil exports

RX = other exports

X = total exports

IM = imports

$$TB = -3.69 + 1.34\ OX$$
$$(-0.93) \quad (20.60)$$
$$R^2 = 0.975 \quad SE = 13.29 \quad DW = 1.53$$

$$TB = -44.97 + 2.42\ RX$$
$$(-1.27) \quad (2.37)$$
$$R^2 = 0.339 \quad SE = 68.01 \quad DW = 2.20$$

$$TB = -5.73 + 1.41\ X$$
$$(-1.36) \quad (19.46)$$
$$R^2 = 0.972 \quad SE = 14.05 \quad DW = 1.43$$

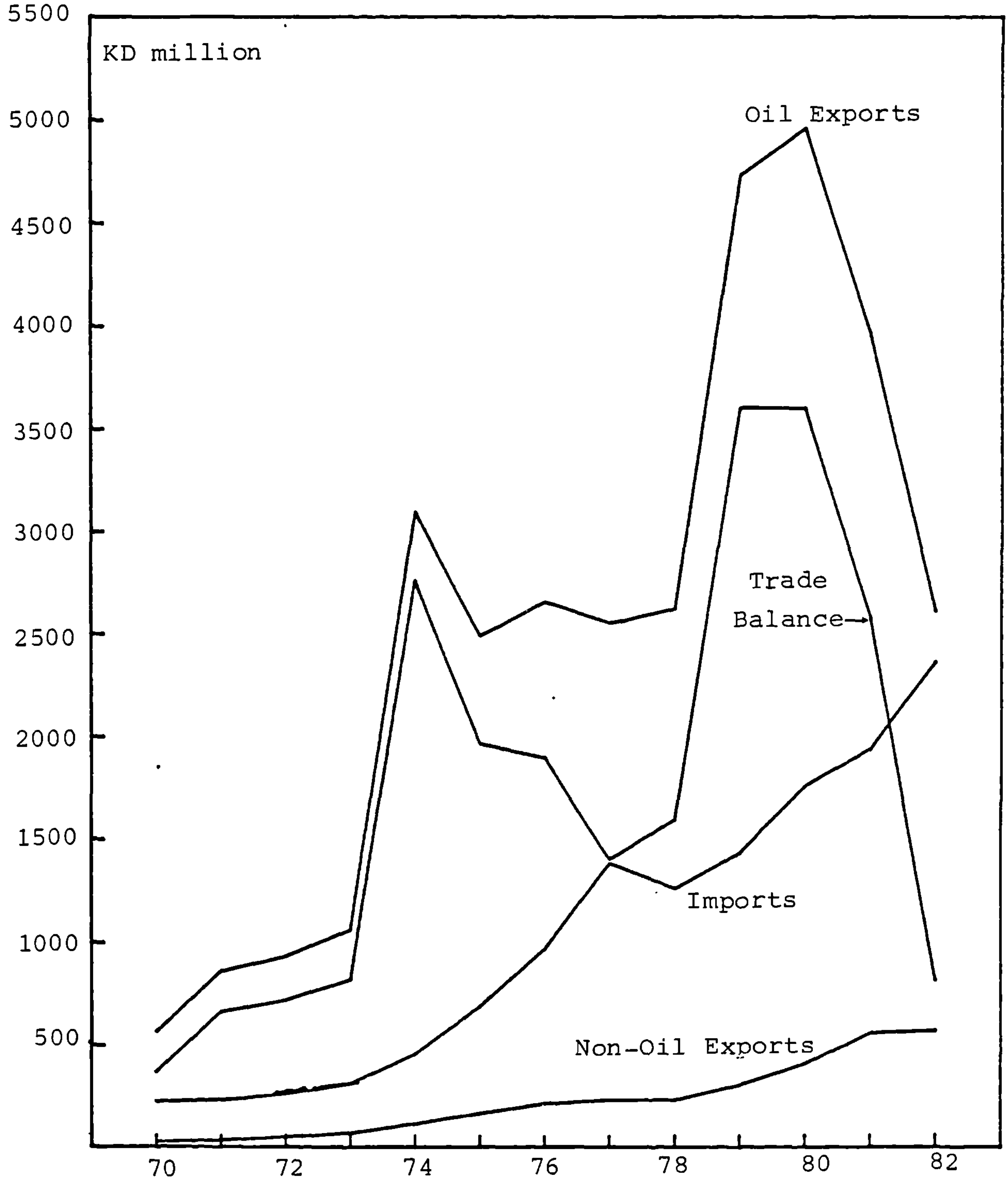
$$TB = 18.1 + 0.38\ IM$$
$$(0.52) \quad (0.31)$$
$$R^2 = 0.009 \quad SE = 83.3 \quad DW = 2.11$$

These regression equations show clearly that oil exports have been the major determinant of the balance of trade, whereas imports have had no significant effect. Figure 2.8 illustrates the same fact graphically.

Some attempts have been made to model the foreign trade sector. In his first

Figure 2.8

Foreign Trade



model, Khouja (1973) estimated an equation for imports whereas exports were assumed to be exogenous. Imports were made a function of GNP which was found to be significant. Khouja found extremely high marginal propensity to import, this he attributed to the inadequacy of domestic output for domestic demand and also due to the absence of major trade barriers (tariffs and quotas). Another factor is the need to import capital goods to fulfil the needs of various productive sectors.

A more sophisticated import function was estimated by Khouja and Sadler (1979) in which imports were made a function of GNP, change in the GNP deflator and the ratio of money supply to disposable income lagged one period, all of which were found to be significant. The ratio of money supply to disposable income was included to account for the role of the banking system in financing imports. However, the volume of bank credit to the private sector would have been a better and more accurate measure of the role of the banking system as shall be seen later. Moreover, data on the GNP deflator (1962-76) must have been unreliable private estimates, since the Central Statistical Office did not begin to construct price indices (consumer and wholesale) until the early 1970s, and even these are not particularly accurate.

In the Claremont model, two equations were estimated for exports and imports, both in log-log form. Exports were made a function of the quantity of oil exported and the price of crude oil which gave a very good fit ($R^2 = 0.99$), whereas imports were made a function of total GDP, producing R^2 of 0.73. A more sophisticated import function will be presented later as part of the structural model of Chapter 6.

The forecasting model developed at the Kuwait International Investment Company (1984) contains three equations to forecast oil exports, non-oil exports and imports. Oil exports were made a function of a linear combination of the monetary value of the exports of crude oil, refined oil and liquified petroleum gas, which is more plausible than just using crude oil as in the Claremont model. Non-oil exports and imports were estimated using autoregressive processes since they tend to grow over time. This procedure was felt to be sufficient in a model constructed for the purpose of forecasting rather than hypothesis testing.

2.5. Other Characteristics of the Kuwaiti Economy

As already stated, Kuwait shares with other LDCs many of their common characteristics and problems, but the Kuwaiti economy also displays a number of other characteristics. As has already been shown, it is the extent of Kuwait's dependence on oil, for which it is a price-taker, that makes it an LDC. Other major characteristics of Kuwait's economy are as follows (some of which have already been mentioned or referred to implicitly).

(1) Kuwait is a welfare state with one of the highest standards of living in the world. World Bank (1983) statistics show that in 1980 Kuwait had a per capita GNP of $24,160 compared with $15,980 for Switzerland, $13,730 for Sweden, $11,590 for the United States, and $8,520 for the United Kingdom.

(2) Kuwait does not have any capital constraints on development, this is not the case in LDCs generally. The budget has been in surplus ever since data were recorded. Indeed, planners have to think as to how to dispose of the surplus in the best possible manner.

(3) The Kuwaiti economy is extremely open and depends heavily on the rest of the world for imports, foreign currency earnings and labour force as Table 2.3 shows. Moreover, there are no restrictions on foreign exchange transactions or capital transfers. Indeed, economic growth per se depends on the foreign sector.

Table 2.3: Measures of Openness

Ratio	Percent	
Imports/GDP	56.5	(1982)
Exports/GDP	59.2	(1982)
Imports/Domestic Expenditure	59.6	(1982)
Revenue from Abroad/Total Revenue	94.9	(1981/82)
Expatriate Labour Force/Total Labour Force	78.1	(1980 census)

(4) The price elasticity of the demand for imports is very low because there is very little substitutability between locally produced goods and imported goods.

(5) Marginal propensity to consume is low and that is attributed to: (i) fast growth of per capita income, (ii) reaching the stage of near-saturation in consumption, (iii) government's responsibility for some consumption expenditure, e.g. medical services and education, and (iv) the large proportion of expatriate labour with high propensity to save.

(6) Marginal propensity to invest domestically is low and that is attributed to: (i) lack of domestic investment opportunities, (ii) yield differentials in favour of foreign investment and (iii) restrictions on investment by expatriates.

(7) Marginal propensity to import is very high. Khouja's (1973) estimates show that 80 percent of any increase in expenditure on private consumption and investment is spent on imported goods and services.

(8) The public sector is very large. The government owns the oil sector which accounts for about 60 percent (or more according to Stauffer (1981)) of

GDP. The ratio of government expenditure on consumption and investment to total domestic expenditure was 33.6 in 1982. The public sector employs about 43 percent of the labour force.

(9) The balance of payments (with the outside world) of the public sector is determined by exogenous factors (e.g. conditions in the oil market), whereas that of the private sector is determined by endogenous factors (e.g. preference for local investment vis-a-vis foreign investment). Because of the heavy dependence on the outside world, the private sector's balance of payments is always in deficit and this deficit is covered by the public sector's surplus.

CHAPTER 3

STRUCTURE AND DEVELOPMENT OF KUWAIT'S MONETARY SECTOR

3.1. Historical Background

The monetary history of Kuwait reflects, to a considerable extent, its economic history. Monetary evolution has been largely influenced by the rapid expansion of the Kuwaiti economy, particularly following the remarkable growth of oil revenue since late 1973. Monetary development has since been associated with the phenomena of the post-1973 era, namely economic, population and sectoral growth which created an ever increasing demand for banking services.

While this would suggest that monetary development in Kuwait has been "demand-following", certainly for the period after 1973, prior to this time it could, more accurately, be described as a combination of "demand-following" and "supply-leading", with one phenomenon gradually giving way to the other. Looking back to the fifties and sixties, before the advent of sustained growth, "supply-leading" banking services started with the foundation of the National Bank of Kuwait in 1952, inducing some sort of real investment. As the growth process continued, particularly in the post-1973 period, the "supply-leading" impetus steadily gave way to the "demand-following" response.

The modern monetary history of Kuwait goes back to 1961 when the national currency, the Kuwaiti Dinar (KD), came into circulation to replace the Indian Rupee (the original legal tender). This was initiated in order to secure the independence of the monetary sector, and it was the result of the implementation of Law No. 41/1960 concerning the inauguration of a Currency Board solely responsible for issuing currency. Up until this time, the Indian Rupee was used as the medium of exchange in accordance with an agreement between the Kuwaiti government and the Reserve Bank of India. In essence, the Kuwaiti government obtained Rupees by selling Sterling to the Reserve Bank of India. In the same way, Kuwaiti banks were able to convert their holdings of excess Rupees into Sterling. This arrangement remained effective until the KD became the medium of exchange in 1961, whereupon the Rupees were gradually withdrawn from the system and presented to the Reserve Bank of India for conversion into Sterling.

The Currency Board continued to perform its sole function of issuing currency until 1968. Currency issued was backed by reserves consisting of 50 percent gold and 50 percent foreign currency convertible into gold. At that time, commercial banks were founded and supervised in accordance with the Commercial Law governing the operations of public shareholding companies at large; however, this contained no specific provisions for banking institutions. It was increasingly felt that a public body should be set up to be in charge of supervising and controlling the foundation and operations of banking and financial institutions. In 1968, therefore, the Central Bank of Kuwait was founded to replace the Currency Board in accordance with Law 32/68 (Central Bank Law), this included provisions for issuing currency and the regulation of the banking industry. The Law stated that issued currency must be backed by reserves composed of 50 percent gold and 50 percent of other items including: foreign currency, bonds denominated in foreign currency, bonds or financial papers issued or guaranteed by the Kuwaiti government and commercial papers discounted by the Central Bank. The Law entrusted and empowered the Central Bank to carry out several functions in addition to that of issuing currency.

In 1977, some articles of the Central Bank Law were amended by Decree 130/77. These amendments were considered to be necessary in the light of newly-emerging developments and problems. One of the amendments concerned the composition of reserves required to back issued currency, whereby no specific percentage was assigned to gold, allowing foreign assets to comprise the bulk of the reserves. Other amendments were felt necessary for the following reasons:

(1) To reinforce the role played by the Central Bank in strengthening financial markets. Accordingly, the capital of the Bank was raised from KD 5 million to KD 30 million.

(2) To strengthen the role played by the Central Bank in regulating the banking industry and enhancing the effectiveness of the banking system in serving the national economy.

(3) The need for new articles in view of the emergence of specialised banks and investment companies.

Over the years, the monetary sector has assumed increasing importance, due largely to the openness of the economy and the absence of any restrictions on foreign exchange transactions and capital transfers. This importance has been augmented by the effect of monetary developments on all sectors of the national economy.

3.2. Central Bank of Kuwait

A national central bank is often high on the "shopping list" of a newly independent country, arising out of the need to replace the currency board -usually a carryover from the colonial era- by a new monetary authority with wider powers and responsibilities (Collyns (1983)).

There is a significant difference between the role of a central bank in a developed country and that in a developing country. This difference, together with some operational constraints, must be borne in mind when evaluating the performance of central banks in developing countries. The central bank of a developing country must not only assume the role of a regulator, but also that of a developer of the monetary sector and financial markets. Bhatt (1974) asserts that the central bank in a developing country must "take the lead in evolving the credit institutions, instruments, and yield structure that are essential for the efficient mobilisation of savings and the allocation of resources consistent with development objectives."

The Central Bank of Kuwait commenced operations in April 1969 and concentrated its efforts, initially, on acquiring greater insight into the operations of commercial banks. This was necessary in order to execute the tasks assigned to it by Law 32/68 and the amendments of Decree 130/77, which boiled down to formulating and implementing monetary policy.

El-Mallakh and Atta (1981) point out that the role which the Central Bank of Kuwait has played since its foundation is reflected in the rapid financial development that took place in the 1970s. Indicators of financial development include the opening of more bank branches, the emergence and growth of specialised banks and investment companies, the general increase and diversity of banking activities, and increased sophistication of financial markets.

The Central Bank of Kuwait retained the function of issuing currency previously carried out by the Currency Board; article 14 of the Central Bank Law states that "the issuing of currency is a privilege reserved for the State and shall be exercised only by the Central Bank." It also states that "no authority other than the Central Bank shall issue or place in circulation bank notes and metal coins, or any note or document payable to bearer on sight and negotiable as legal tender for the purpose of payment instead of the currency issued." Article 15 of the Law specifies the functions of the Central Bank. Apart from issuing currency, the Bank is entrusted to execute the following tasks:

(1) securing the stability of the Kuwaiti currency and its freedom of conversion into other foreign currencies;
(2) conducting monetary policy in such a manner as will help to foster economic and social progress and the growth of national income;
(3) controlling the banking system;
(4) acting as a banker to the government;
(5) rendering financial advice to the government.

The Central Bank tries to accomplish these objectives under two sets of constraints or "stumbling blocks": the lack of effective monetary tools (e.g open market operations), and the lack of autonomy and independence.

Independence of central banks has always been a controversial issue. The orthodox view is that monetary policy is part of the overall macroeconomic policy and should, therefore, be determined by a top government authority (the Council of Ministers in the case of Kuwait). If this is the case, the central bank should only make suggestions and participate in policy debates. The other extreme view is that monetary policy -like justice- must not be subject to any political pressure. Bryant (1980) lists the following possible views about the desirability or otherwise of political independence of the central bank:

(i) The political process in a democratic society generates pressure on the government to adopt policies inimical to long-run welfare, e.g. policies that foster excessive monetary expansion and hence inflation. Thus, an independent central bank should be insulated from political pressure so that it can pursue the appropriate long-run objectives.

(ii) The insulation of the central bank from political pressure is undemocratic in the sense that it results in a technocratic minority's views about the society's goals being imposed on the will of the majority.

(iii) A fragmentation of decision making power among government agencies is inherently desirable as a political end.

The issue of independence revolves around the desirability, or otherwise, of the central bank's ability to pursue fundamentally different objectives from those pursued by the rest of the government. Some economists argue, however, that the central bank should be required to adopt the same objectives pursued by the government, yet should remain operationally independent on the grounds that decisions will be superior under conditions of independence. For example, Thomas Mayer (1976) advocates a compromise solution in which the Federal Reserve would have its objectives specified by the President, but would nevertheless retain substantial independence from partisan politics. Bryant (1980) criticises Mayer's compromise on the grounds that it is contradictory, and that Mayer does not make it clear whether the Federal Reserve would or would not actually pursue separate objectives. Bryant argues that if controversy over ultimate objectives is ruled out, it is difficult to understand why technical implementation of policy should be greatly affected by different administrative relationships.

In practice, central banks' independence from the government varies considerably even in the developed world (see for example Fair (1979) for a survey of the degrees of independence of central banks in 16 countries). But it seems that there is little evidence of central bank autonomy world-wide. Banaian et al (1983) presented an analysis of the independence of central banks in 12 industrial countries, and concluded that the Federal Reserve and the central banks of Germany and Switzerland enjoy more autonomy than the rest. They argue that only these three banks can be considered as examples of independent central banks. In their study, they analysed the responses of monetary policy to four pressures: fiscal deficit, wage increases, international reserve influences, and import price increases. They came up with evidence suggesting that the Federal Reserve may be classified somewhere in between the German and Swiss cases on the one side and the "dependent" banks on the other. More recently, there have been indications to the effect that President Reagan was joining a campaign led by some supply-siders to bring the Federal Reserve more directly under the Administration's control (see the 1984 Economic Report of the President and the editorial of Financial Times, February 7th 1985).

Bryant (1980) argues that it is difficult in practice to make judgements about the effective independence of the central bank, simply because the authorities may wish to preserve the "fiction" of a semi-independent central bank even when the degree of its effective independence is slight. Additionally, the central bank may disguise differences in ultimate objectives as though they were merely differences in judgement about the appropriate model, or the future paths of non-policy exogenous variables. Such differences in "technical" judgement call attention to the political consequences of independence much less prominently than do differences in objectives. He further argues that diversity of objectives and the types and numbers of monetary policy instruments is correlated with the degree of political independence of the central bank. He asserts that central banks that pursue allocative as well as economy-wide objectives, with not only general but also selective instruments, seem to be less politically independent of their fiscal authorities and governments. A study by Woolley (1977) has also shown that greater selectivity in objectives and instruments might lead to reduced independence, though the causal relationship is not made very clear.

The lack of autonomy and independence of the Central Bank of Kuwait is quite conspicuous. An economist commenting on the status of the Central Bank of

Kuwait once said, "its ability to control monetary expansion had always been circumscribed by the predominance of the Ministry of Finance in setting the economic pace through its fiscal powers." Another point of view is that "the Central Bank's backseat position to the Ministry means that the Governor's relationship with the Finance Minister is crucial to his ability to deal effectively with the banks, and to win the endorsement of his policies from the Council of Ministers." It has also been stated that "if a governor does not have the support of the Finance Minister, he is finished" (see Muehring (1985)). This status is in direct contrast with article 13 of the Central Bank Law which states that "an autonomous public agency having legal status shall be created, named the Central Bank of Kuwait." In reality, the Central Bank of Kuwait is only autonomous in the sense that it has an independent budget. From the decision-making point of view, it is not autonomous because any decision taken by its board of directors can be vetoed by the Ministry of Finance. Article 27 of the Law states that "the representative of the Ministry of Finance to the board of directors may require the postponement of any resolution passed by the board regarding credit and monetary policy for reference to the Finance Minister. If the Finance Minister fails, within seven days of the postponement, to pass a resolution on the matter, the resolution as passed shall become effective."

The Central Bank is also required to inform the Minister of Finance of current and future credit and monetary policy in accordance with article 38. The same article further states that "if the Minister of Finance is of a different opinion, he may give general directions to be followed by the Central Bank and these directions shall be binding on it. If the board of directors of the Central Bank has any objection to such directions, they may submit their objections and reasons in writing to the Minister of Finance, who shall in turn pass them -together with the directions issued by him- to the Council of

Ministers for a decision which shall be final." Even financially, the Central Bank of Kuwait is not completely independent of the Ministry of Finance. Article 31 of the Law states that "the Ministry of Finance shall transfer to the Bank whatever funds are needed to implement a certain specified monetary policy."

The conclusion on this issue is that the Central Bank of Kuwait must be given more freedom in executing policies, to the extent that monetary policy becomes somewhat distinct from fiscal policy or, at least, monetary policy makers become distinct from fiscal policy makers. However, independence should not imply lack of coordination with fiscal policy (see Bryant (1980) PP.327-330 and Okun (1972) for a good discussion of this issue).

Another "stumbling block" for the Central Bank of Kuwait has been the shortage of indigenous personnel who have the training and experience to conduct the Bank's business. The Currency Board had carried out largely mechanical functions which provided few opportunities for staff to develop operational skills. The constraint on human resources has been particularly severe in areas requiring technical expertise such as economic research to guide monetary policy.

Article 31 of the Central Bank Law specifies the tasks that the Bank must execute in order to perform the function of banker to the government. They include the following:

(1) keeping the government KD deposits on which no interest is paid;
(2) carrying out (free of charge) all of the government's banking operations and services, both inside and outside the country;
(3) advising the government on its KD deposits with commercial banks in conformity with monetary policy;
(4) managing some of the government's funds.

Collyns (1983) argues that the role of banker to the government is relatively limited in Kuwait and similar capital-surplus countries like Saudi Arabia and the United Arab Emirates. He points out that given the substantial budgetary surplus, the government does not require loans from the central bank; rather, the government must determine the allocation of its accumulated financial resources between central bank deposits and other uses. This, in my view, is not strictly correct because the disposition of a budget surplus in the optimum manner is as much a problem as financing a deficit, though this is not a task to be carried out by the central bank alone.

A full evaluation of the performance of the Central Bank of Kuwait will be deferred to Chapter 5 which is devoted to studying monetary policy. However, one point must be mentioned here: the Central Bank of Kuwait, by being not only a lender of last resort but also a lender of "primary" resort, has indeed provided the incentive for commercial banks to listen to its advice and follow its instructions. Kuwaiti commercial banks have always felt free to approach the Central Bank for help, particularly since the establishment of the discount window in 1975.

3.2.1. Structure and Growth of Balance Sheet

An examination of the structure and growth of the Central Bank's balance sheet is necessary to put the developments in the right perspective and to highlight the role which the Bank has played.

The Central Bank of Kuwait has experienced remarkable growth: its total assets grew at a compound annual rate of 28.6 percent between 1969 and 1982. Table 3.1 shows the major items on the Central Bank's balance sheet and Figure 3.1 presents a graphical illustration of the growth of foreign assets and discounts.

Figure 3.1

Major Assets of the Central Bank

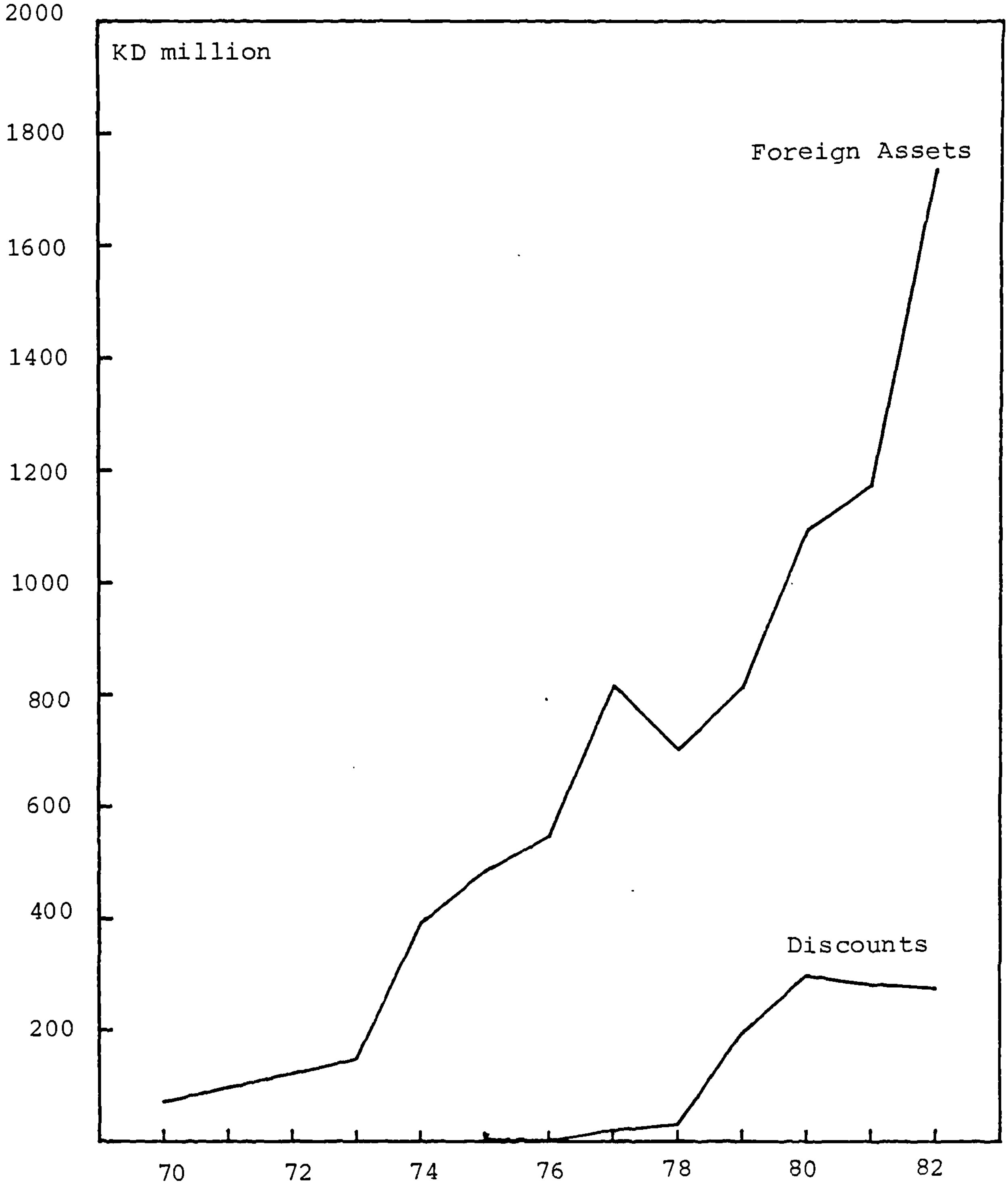


Table 3.1: Assets and Liabilities of the Central Bank

	Percent (1969)	Percent (1982)	Average Compound Growth Rate (%)
Assets			
Foreign Assets	84.1	85.2	28.7
Discounts	0.9*	13.6	80.1
Other Assets	15.9	1.2	5.6
Total Assets	100.0	100.0	28.6
Liabilities			
Monetary Base	65.6	53.8	26.7
Government Deposits	9.2	39.0	43.8
Capital & Reserves	6.5	1.5	14.8
Other Liabilities	18.7	5.7	15.3
Foreign Assets			
Gold	47.2	1.8	0.2
Reserve Position in the IMF	6.9	9.5	31.9
Deposits	31.5	88.3	39.3
Others	14.4	0.4	-2.2
Monetary Base			
Issued Currency	95.9	33.3	16.8
Local Banks' Deposits	4.1	22.3	44.2
Central Bank Bills	3.6**	44.4	230.6

* in 1975.
** in 1979.

(i) Foreign Assets

Foreign assets comprised 85.2 percent of total assets in 1982, with an average annual growth rate of 28.7 percent during the period 1969-82. A substantial portion of the Central Bank's foreign assets originates from the government's (Ministry of Finance) purchases of Kuwaiti Dinars against foreign currency (dollar), received mainly from oil exports. A further portion of foreign assets originates from transfers to the Bank by the Ministry to cover facilities which the Bank provides to commercial banks through the discount window.

Foreign assets mostly take the form of deposits and certificates of deposit with foreign banks (88.3 percent in 1982). The second largest item is the reserve position in the IMF (9.5 percent in 1982). This item is composed of the portion paid in gold of Kuwait's quota in the Fund, net utilisation of KD contribution, IMF withdrawals under special arrangements (such as the IMF's oil facility created in 1974 to provide short-term loans to member countries with balance of payments problems resulting from higher oil prices), and holdings of SDRs. The reserve position in the IMF increased sharply in 1974 and 1975 due to payments of Kuwait's contribution to the oil facility. After 1976 it started declining mainly due to the drop in the balance of the oil facility on account of the settlement of new payments, particularly that they ceased to be given to the IMF in 1977. Instead, new "supplementary financing facilities" were created. In 1982 there was an increase in the reserve position due mainly to the increase in SDR holdings.

(ii) Discounts

Discounts (or rather rediscounts) are the second major item on the assets side of the Central Bank's balance sheet. At the end of 1975, the year in which the discount window was opened, they comprised less than 1 percent of total assets, but since 1979 they have shown remarkable growth as commercial banks resorted to the discount window whenever they faced a liquidity shortage. The growth rate of discounts over the period 1975-82 was 80.1 percent; at the end of 1982 they formed 13.6 percent of total assets.

The mechanics of the discount and rediscount operations is as follows: commercial banks buy (discount) commercial papers before maturity from individuals and corporations. When the banks face a liquidity shortage, they turn to the Central Bank to borrow funds with commercial papers serving as collateral. Loans extended by the Central Bank to commercial banks under this arrangement carry interest, and have the same maturity as that of the commercial papers which remain in the custody of the commercial banks and are cashed on maturity.

At the end of 1978 the balance of commercial paper discounts was KD 30.6 million, but it jumped to KD 195.3 million in 1979 and to KD 298.6 million in 1980. That was the direct result of pressure on the commercial banks' KD liquidity which drove them to resort to the discount window. As demand intensified, the Central Bank decided to extend the maturity of discountable paper from 3 to 12 months. In 1981 and 1982 the balance declined due to the tangible improvement in KD liquidity of the commercial banks and in the market in general, and also the slower pace of credit expansion.

(iii) Monetary Base

Monetary base or reserve money comprises just over a half of the liabilities of the Central Bank. Up to 1978, monetary base was composed of issued currency and local banks' balances with the Central Bank. In 1979, Central Bank bills were introduced as a tool to absorb excess liquidity, and since then they have formed an important part of commercial banks' reserves and monetary base (see Figure 3.2).

Issued currency comprised 95.9 percent of the monetary base in 1969 but that share declined to 33.3 percent in 1982, despite an average annual growth rate of 16.8 percent. Issued currency is mainly determined by the amount of foreign currency supplied to the Central Bank in exchange for KD, i.e. supply follows demand. Foreign currency comes from the following sources:

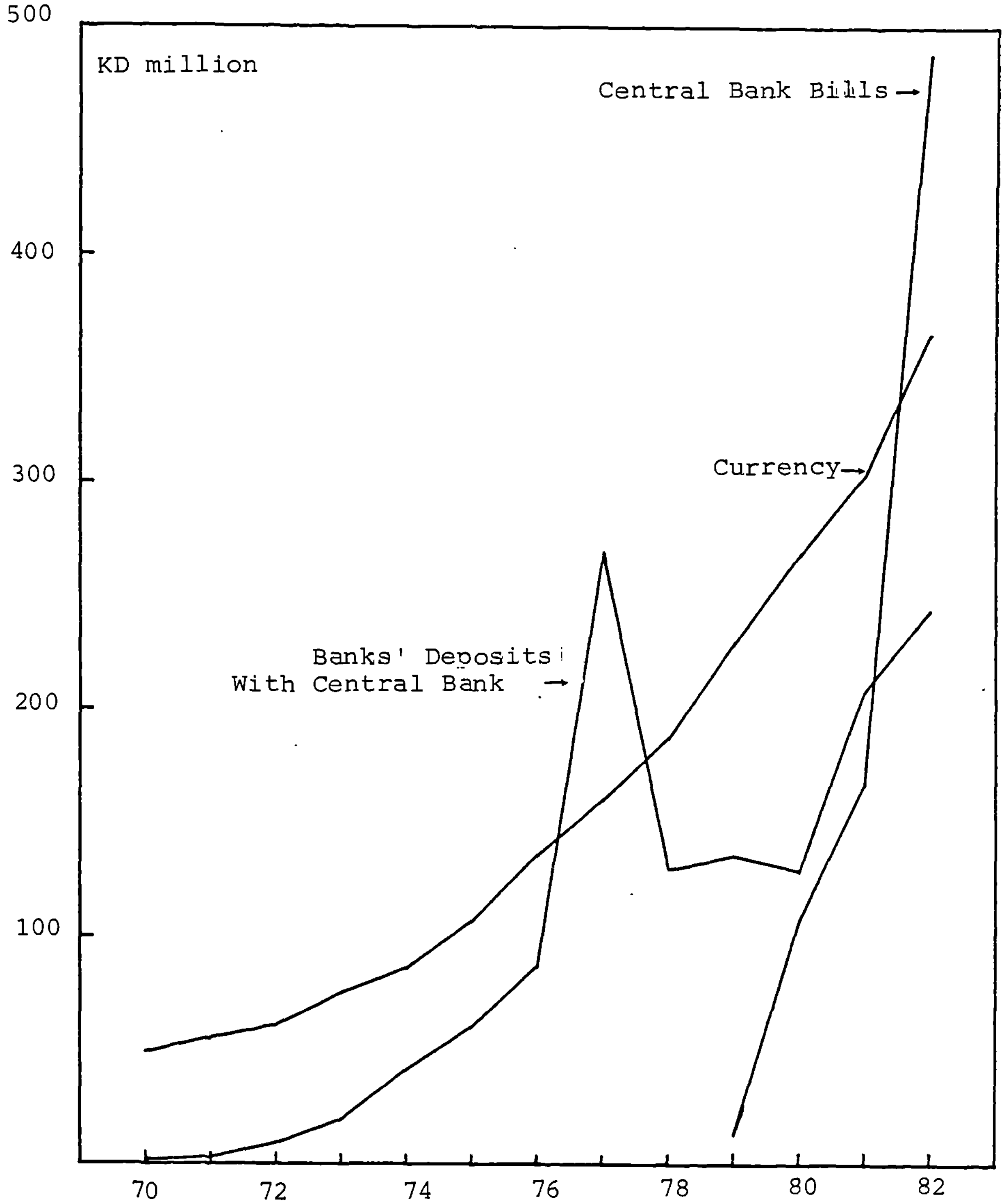
(1) The government, which converts some of its dollar receipts from the export of oil to finance domestic expenditure.

(2) Private corporate sector, which obtains foreign currency from non-oil exports and re-exports as well as income from foreign investment.

(3) Foreign companies working in Kuwait and requiring KDs to finance their local operations. Notable examples are foreign oil companies operating in Kuwait prior to the government's full ownership of the oil sector.

Figure 3.2

Components of the Monetary Base



(4) Commercial banks borrowing foreign currency from abroad and entering swap agreements with the Central Bank.

Moreover, the Central Bank can issue currency to satisfy loans to commercial banks under the discount arrangement.

Local banks' deposits with the Central Bank are the second component of the monetary base. These are non-interest bearing, but yet had an average growth rate of 44.2 percent. This is understandable since the expansion of the banking system has made it necessary for banks to hold current accounts with the Central Bank to settle their increasing interbank transactions and clearing operations. It can also be attributed to pressure from the Central Bank through moral suasion. It must be pointed out that the introduction of Central Bank bills in 1979 reduced banks' demand for deposits with the Central Bank, since the bills represent an interest-bearing substitute. Between 1969 and 1978 the average growth rate of deposits with the Central Bank was 58.2 percent, but between 1979 and 1982 the growth rate declined to 21.5 percent.

The fastest growing component of the monetary base is Central Bank bills, with a growth rate of 230.6 percent between 1979 and 1982. The first jump occurred in 1980 when the value of banks' deposits fell due to substitution for by the interest-bearing bills. This followed the amendment of the liquidity system in the second half of 1980, whereby banks were required to maintain a certain ratio of their funds in the form of cash, current accounts or bills. It must be mentioned here that Central Bank bills are regarded as a component of the monetary base because they are more or less equivalent to interest-bearing accounts with the Central Bank, since they can be liquidated before maturity on presentation to the Bank.

(iv) Government Deposits

The share of government deposits in total liabilities of the Central Bank increased from 9.2 percent in 1969 to 39 percent in 1982, with an average growth rate of 43.8 percent. There was a sharp increase in 1979 and 1980 due to the increment in transfers by the Ministry of Finance to cover the Central Bank's growing discount operations. In 1981 there was a partial drop due to the decrease in transfers, whereas in 1982 they went up sharply following the increase in transfers from the Ministry of Finance to cover the supplementary financing facilities, SDR holdings and Kuwait's contribution in KD to the IMF. This growth is also attributed to a larger volume of government deposits against documentary credits, as well as to the proliferation of accounts of government agencies and ministries.

3.3. Commercial Banks

Article 54 of the Central Bank Law defines commercial banks as "firms whose normal basic business is the acceptance of deposits to be used in banking operations such as discount, sale and purchase of commercial paper, the grant of loans and advances, the issue and receipt of cheques, the floating of public or private loans, trading in foreign currencies and precious metals as well as any other monetary operations or any activity provided for in the Commercial Law, or acknowledged in practice to be included in the business of banks."

Kuwait's commercial banking system presently consists of seven commercial banks. The first Kuwaiti bank, the National Bank of Kuwait, was founded in 1952 and commenced operations in 1953. Prior to that, the only bank operating in the country was the British Bank of the Middle East which had been granted a 30-year concession beginning in 1941. In 1971 this bank became the Bank of

Kuwait and the Middle East. When the Central Bank commenced operations four commercial banks were already active; three more were founded later (including the Bank of Kuwait and the Middle East), the last to appear was a branch of the Bank of Bahrain and Kuwait opened in 1978 (Table 3.2).

Table 3.2: Kuwait's Commercial Banking System

Bank	Year Founded	Number of Branches*
National Bank of Kuwait	1952	51
Commercial Bank of Kuwait	1960	34
Gulf Bank	1960	29
Al-Ahli Bank of Kuwait	1967	12
The Bank of Kuwait and the Middle East	1971	18
Burgan Bank	1975	9
Bank of Bahrain and Kuwait	1978	1

* End of 1984

Kuwait's commercial banking system has the following characteristics:

(1) Heavy government support through actual capital participation and other backup operations such as lending to banks or opening deposits with them.

(2) All of the commercial banks are 100 percent Kuwaiti owned, except the one branch of the Bank of Bahrain and Kuwait which is owned jointly by Kuwaiti and Bahraini interests on a 50/50 basis. The Head Office of the bank is located in Bahrain.

(3) With the exception of the Bank of Bahrain and Kuwait, all of the commercial banks are public shareholding companies listed on the Kuwait Stock Exchange.

(4) Bank-client relationships play an important role in decision making. Although this may be true everywhere, it is a particularly important factor in Kuwait, especially for decisions concerning granting credit.

3.3.1. Structure and Growth of the Consolidated Balance Sheet

The portfolio equilibrium of commercial banks is one in which their balance sheet is far in excess of their net worth and is financed by the issue of short term-liabilities (deposits). In the case of Kuwait, the size of the consolidated balance sheet of commercial banks in 1982 was KD 7373 million, whereas net worth was no more than KD 576.9 million. The extent of deposit-financing is indicated by the ratio of deposits (private and government) to the total size of the balance sheet which was 57.4 percent.

Commercial banks can borrow on more favourable terms than they lend, thus they make profit out of the interest rate differential. The differential results from their ability to simultaneously satisfy the portfolio preferences of depositors (liquidity, convenience and security), and borrowers (better terms than direct borrowing). Banks can do this because of their ability to pool risk (of withdrawal and default) and because they make use of specialised skills. Theoretically, a bank reaches the equilibrium size and composition of the balance sheet when it equates marginal costs and returns of all assets and liabilities.

The growth and composition of the consolidated balance sheet of Kuwait's commercial banks reflects the growth and structural changes in their overall activities, and hence the process of development of the commercial banking system. Since 1969 there have been a number of important changes in the composition of their assets and liabilities and the policies they apply. Owing to the limited absorptive capacity of the Kuwaiti economy, the absence of fully-developed financial markets, and the absence of any restrictions on foreign exchange transactions and capital transfers, commercial banks (and all other financial institutions for that matter) tend to invest part of their resources abroad, particularly in foreign money markets. The bulk of local operations take the form of providing short-term credit facilities to finance domestic economic activity. Table 3.3 shows the structure and growth of the commercial banks' balance sheet.

Table 3.3: Assets and Liabilities of Commercial Banks

	Percent (1969)	Percent (1982)	Average Compound Growth Rate (%)
Assets			
Foreign Assets	69.5	30.5	14.9
Claims on the Private Sector	25.4	58.2	30.5
Reserves	1.2	8.5	42.1
Other Assets	3.9	2.8	19.2
Total Assets	100.0	100.0	22.4
Liabilities			
Demand Deposits	11.9	11.4	22.0
Quasi-Money	51.1	40.7	20.3
Government Deposits	10.2	5.3	16.5
Foreign Liabilities	14.8	20.7	25.7
Capital and Reserves	5.1	7.8	26.5
Other Liabilities	6.9	14.1	29.2
Foreign Assets			
Balances with Foreign Banks	73.8	74.4	15.0
Loans to non-residents	18.1	17.0	14.3
Foreign Investments	8.1	8.6	15.5
Quasi-Money *			
Saving Deposits	29.5	11.2	11.5
Time Deposits and CDs	42.3	77.7	28.7
Foreign Currency Deposits	28.2	11.1	11.9

* A breakdown of quasi-money is only available as from 1971, therefore percentages in the first column are as of 1971, and growth rates are calculated for the period 1971-82.

There are four financial ratios that serve to indicate the performance of commercial banks. These include: reserves to private deposits, reserves to KD deposits, claims on the private sector to private deposits, and claims on the private sector to net foreign assets. The first two are indicators of the liquidity position, the third indicates the extent of credit expansion, whereas the fourth indicates the extent of banks' local utilisation of resources. Figures 3.3 and 3.4 trace out the behaviour of the four ratios in the period 1971-82.

The liquidity of the banking system improved considerably after 1974 as indicated by the increase in the first two ratios. This followed the Central Bank's measure of imposing a mandatory liquidity ratio requiring banks to maintain not less than 25 percent of their total deposits in liquid assets, with at least 7.5 percent to be kept in KDs. The rising ratio of claims on the private sector to private deposits shows that credit expansion has been substantial. Similarly, the rising ratio of claims on the private sector to net foreign assets indicates increasing local utilisation of banks' resources.

(i) Foreign Assets

Foreign assets have significantly declined in importance. Their share in total assets declined from 69.5 percent in 1969 to 30.5 percent in 1982 with an annual average growth rate of 14.9 percent, far below the growth rate of total assets (22.4 percent). This can largely be attributed to the increasing importance of local operations as credit demand soared. It is also explained by the banks' attitude towards risk; the banks, on the whole, tend to be risk averse, i.e. preferring to restrain their investment in foreign assets whenever foreign financial markets exhibit any instability or uncertainty, they opt instead to invest in the less-profitable -but safer- domestic assets,

<u>Figure 3.3</u>

Indicators of Commercial Banks' Liquidity Position

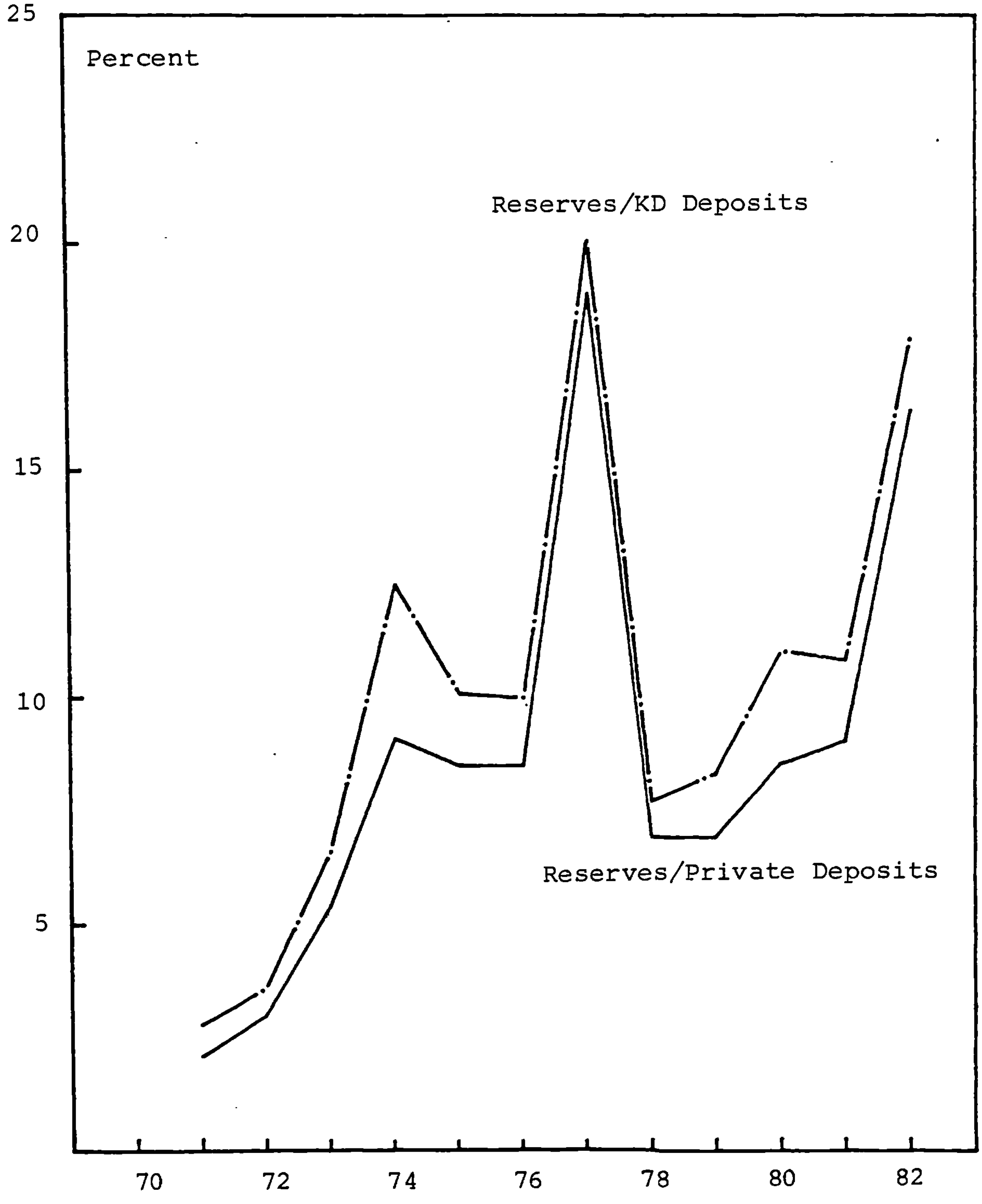
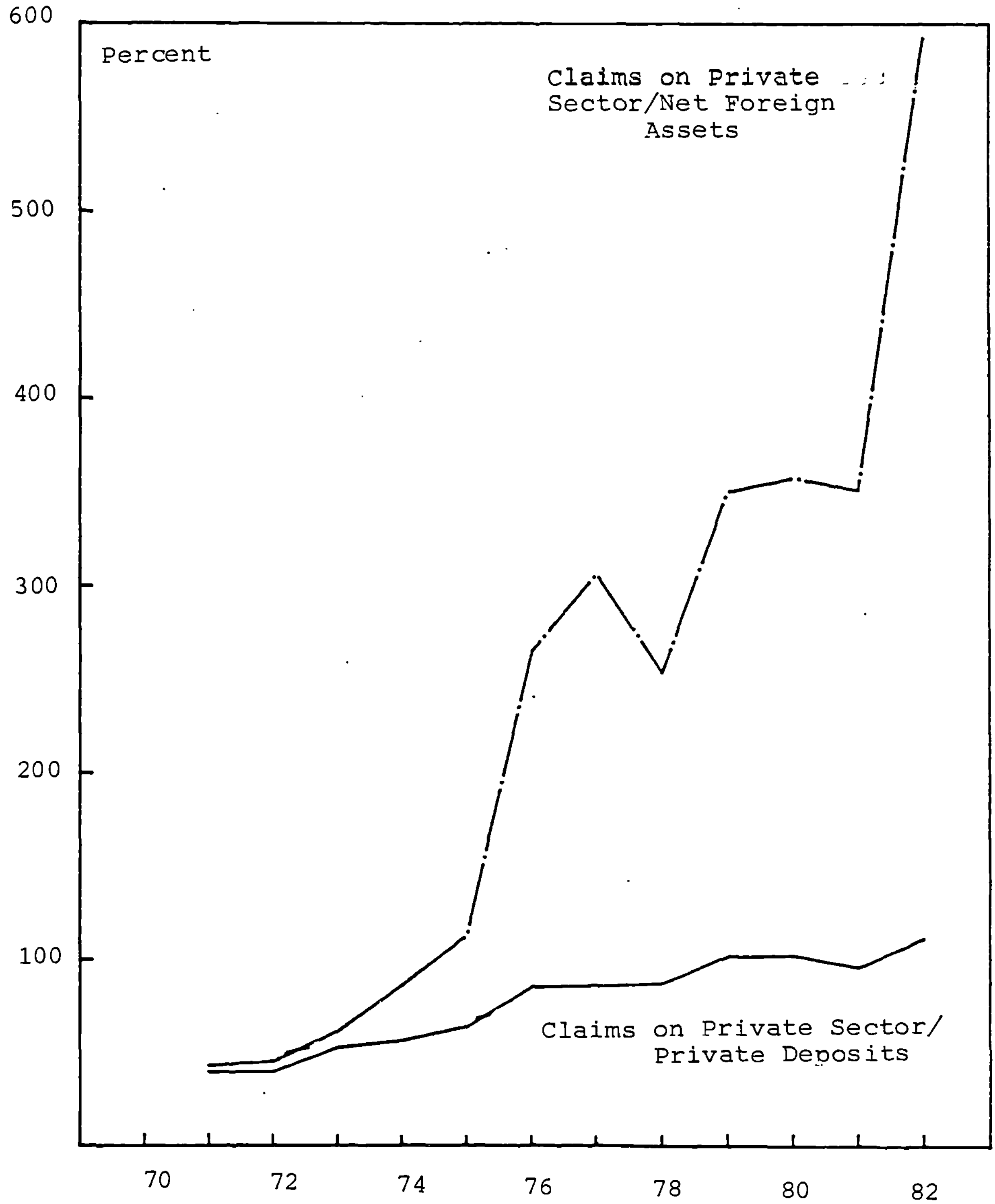


Figure 3.4

Measures of Credit Expansion and Local Utilisation of Resources



particularly credit and Central Bank bills (see Figure 3.5). This is not always the case, however, there have been occasions when the banks increased their foreign assets proportionately more than their domestic assets as the yield differential was high enough to justify bearing the international risk. This has also occurred when domestic economic activity has slackened, resulting in a weak domestic demand for credit. In 1980, there was a slowdown in bank credit to some local activities at a time when the Eurodollar interest rate was reaching record highs. As a result, the growth rate of foreign assets in 1980 rose to 33.6 percent compared with 15.9 percent in 1979, at a time when the growth rate of the major component of domestic assets (claims on the private sector) declined from 35.9 to 26.1 percent. In 1981, the growth rate of foreign assets declined to 19.4 percent due to exchange and interest rate instability and a booming domestic stock market. In 1982, foreign assets remained virtually unchanged as international interest rates declined gradually and financial markets remained depressed by economic recession.

The composition of foreign assets has changed little, since the growth rates of the various categories of foreign assets have mirrored the growth rate of the overall total. Foreign assets can be divided into three broad categories (see Figure 3.6):

(1) Balances with foreign banks. This item constitutes about three quarters of foreign assets and take the form of deposits and certificates of deposit, mostly denominated in foreign currencies and for a term of one year or less. Part of the balances is denominated in KD and held with offshore banking units based in Bahrain.

(2) Advances and discounts (loans) to non-residents. This accounts for about 17 percent of foreign assets. The growth rate of this item has been slightly below that of total foreign assets.

Figure 3.5

Assets of Commercial Banks

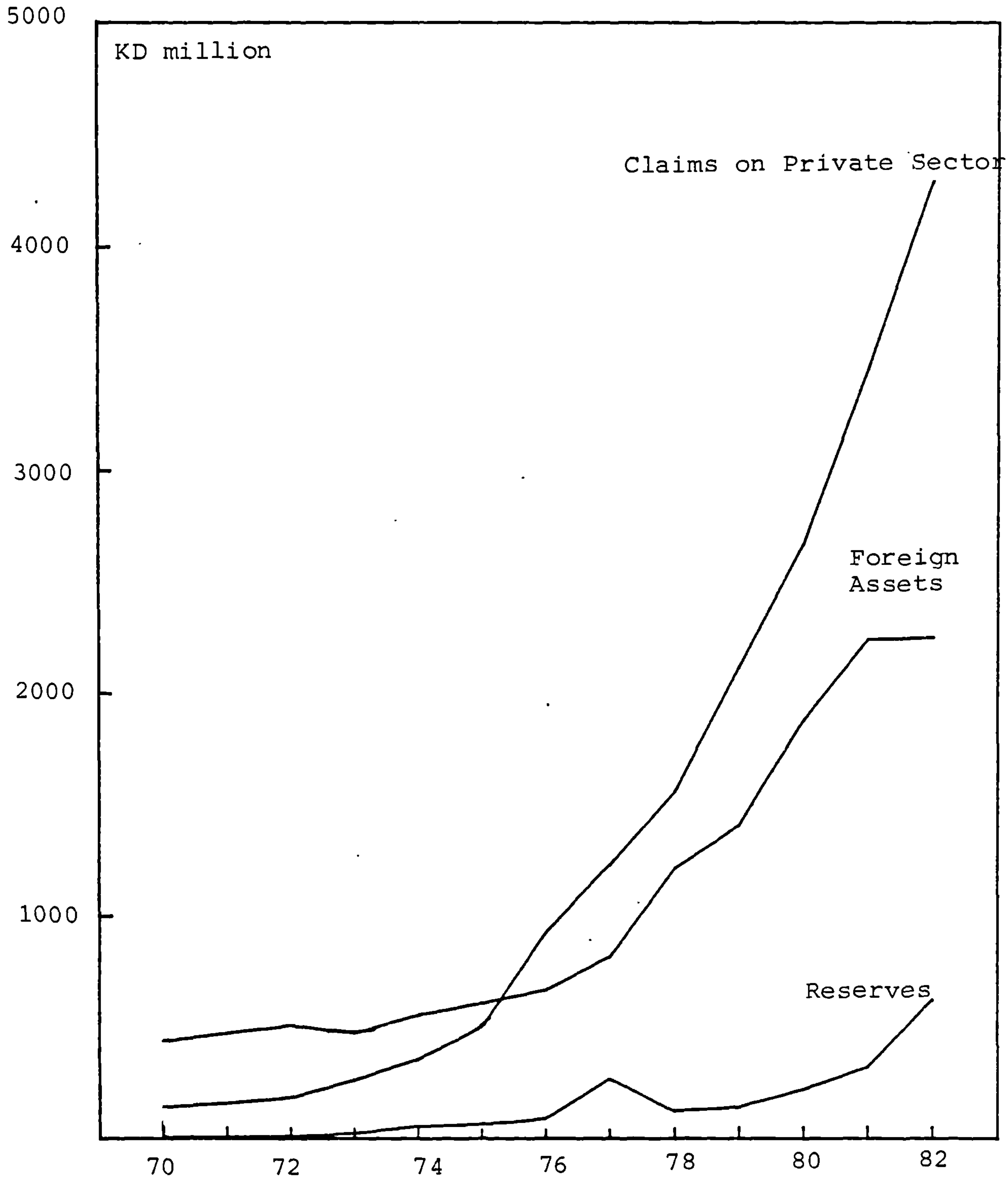
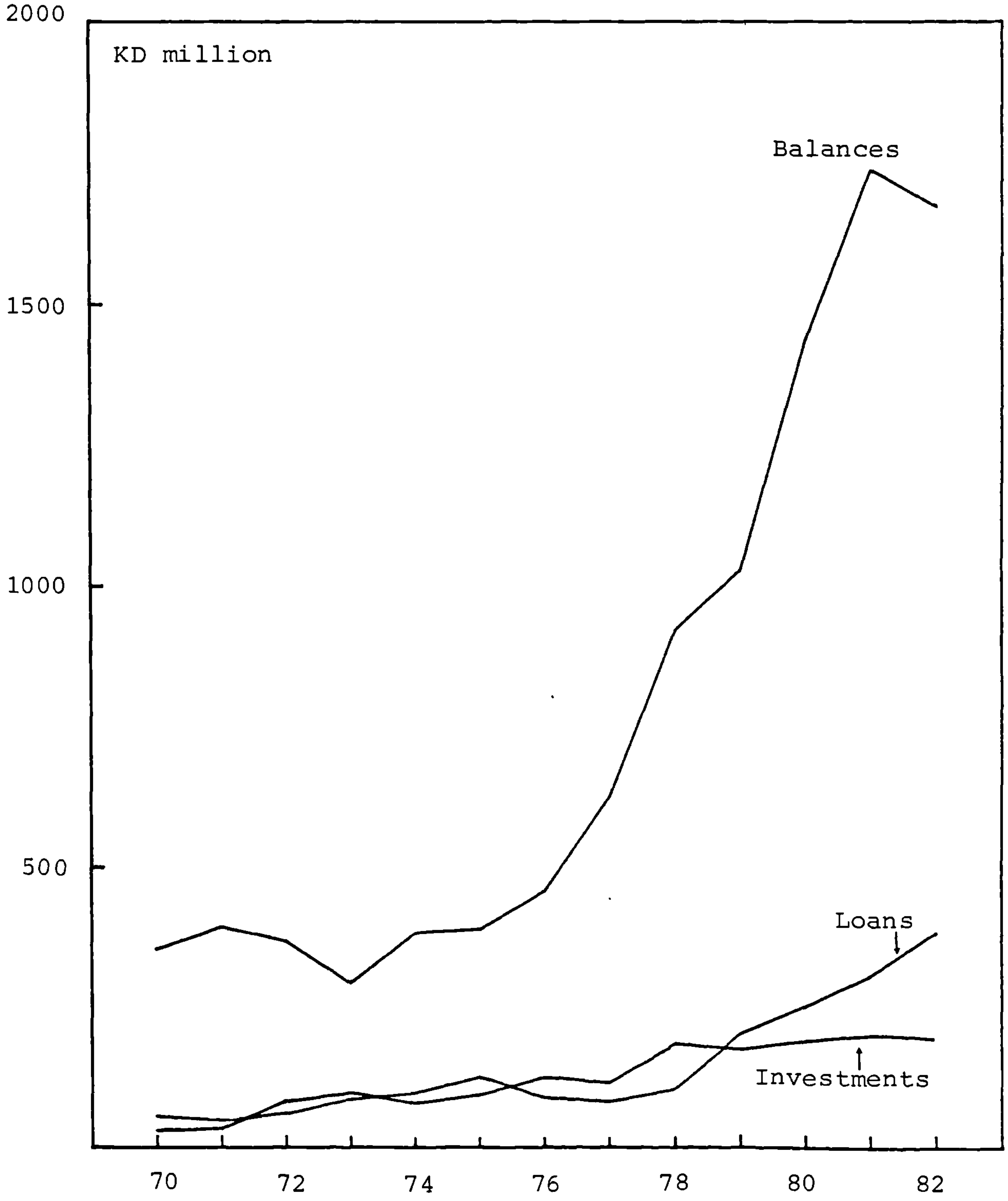


Figure 3.6

Foreign Assets of Commercial Banks



(3) Foreign Investments. This category comprises 8.6 percent of total foreign assets and is mainly composed of shares, medium and long-term bonds and direct equity participation in foreign companies. It is interesting to note that in 1979, this item declined by 5.8 percent at a time when advances and discounts to non-residents increased by 94.9 percent. The same factor, rising interest rates, explains both, i.e. making lending more attractive and causing share and bond prices to be depressed.

(ii) Claims on the Private Sector

Claims on the private sector constitute the bulk of domestic operations. They registered an average growth rate of 30.5 percent in the period 1969-82. In that period they surpassed foreign assets in importance, forming 58.2 percent of total assets in 1982, nearly double the percentage share of foreign assets, compared with 25.4 percent in 1969. The growth in this item of the balance sheet is attributed to the rapid growth of the Kuwaiti economy, particularly since 1974, and the resulting increase in absorptive capacity, as well as the risk aversion attitude taken by banks towards investing in foreign markets.

About 90 percent of the claims on the private sector take the form of loans and credit facilities granted to finance economic activity of the private and joint sectors (owned jointly by the government and the private sector). The remainder is distributed between claims on specialised banks (about 9 percent) and local investment in shares and bonds (about 1 percent).

There has been a significant shift in the distribution of credit facilities among various economic activities as can be seen from Table 3.4. Personal loans increased in proportion and helped intensify the extent of speculation in domestic stock and real estate markets. Industry and agriculture -the two sectors that must receive utmost attention in any developing country- got the smallest portion of bank credit, with a stagnating or declining share. This is due to their low profitability compared with other activities. The situation verifies the proposition that depending on market forces for the allocation of resources in a developing country is not appropriate for the prospects of economic development. Overall, the credit distribution policy of Kuwait's commercial banks has not been compatible with, or conducive to, economic development. It must be pointed out, however, that the pattern of demand has also been a contributory factor.

Table 3.4: Commercial Banks' Credit Facilities by Sector

Sector	Percent (1972)	Percent (1982)	Average Compound Growth Rate(%)
Trade	35.9	24.5	31.2
Industry	5.0	5.0	36.4
Construction	23.1	17.3	32.4
Agriculture and Fisheries	7.3	1.1	12.9
Financial and Real Estate	12.1	26.4	47.2
Personal	16.6	25.7	42.5
Total	100.0	100.0	36.3

(iii) Reserves

Commercial banks' reserves registered an average annual compound growth rate of 42.1 percent in the period 1969-82. Their growth accelerated after 1979 when it became profitable to hold reserves since Central Bank bills, which became part of the reserves in that year, carry interest higher than the discount rate. Prior to 1979, reserves consisted of currency held by banks and balances with the Central Bank.

In 1980, a 3 percent required reserve ratio was imposed by the Central Bank on commercial banks, creating a distinction between required and excess reserves. However, the distinction seems insignificant because, even before the introduction of the required reserve ratio, banks' reserve holdings were substantial and in excess of subsequent requirements. The behaviour of total reserves indeed reflects the behaviour of excess reserves as illustrated in Figure 3.7.

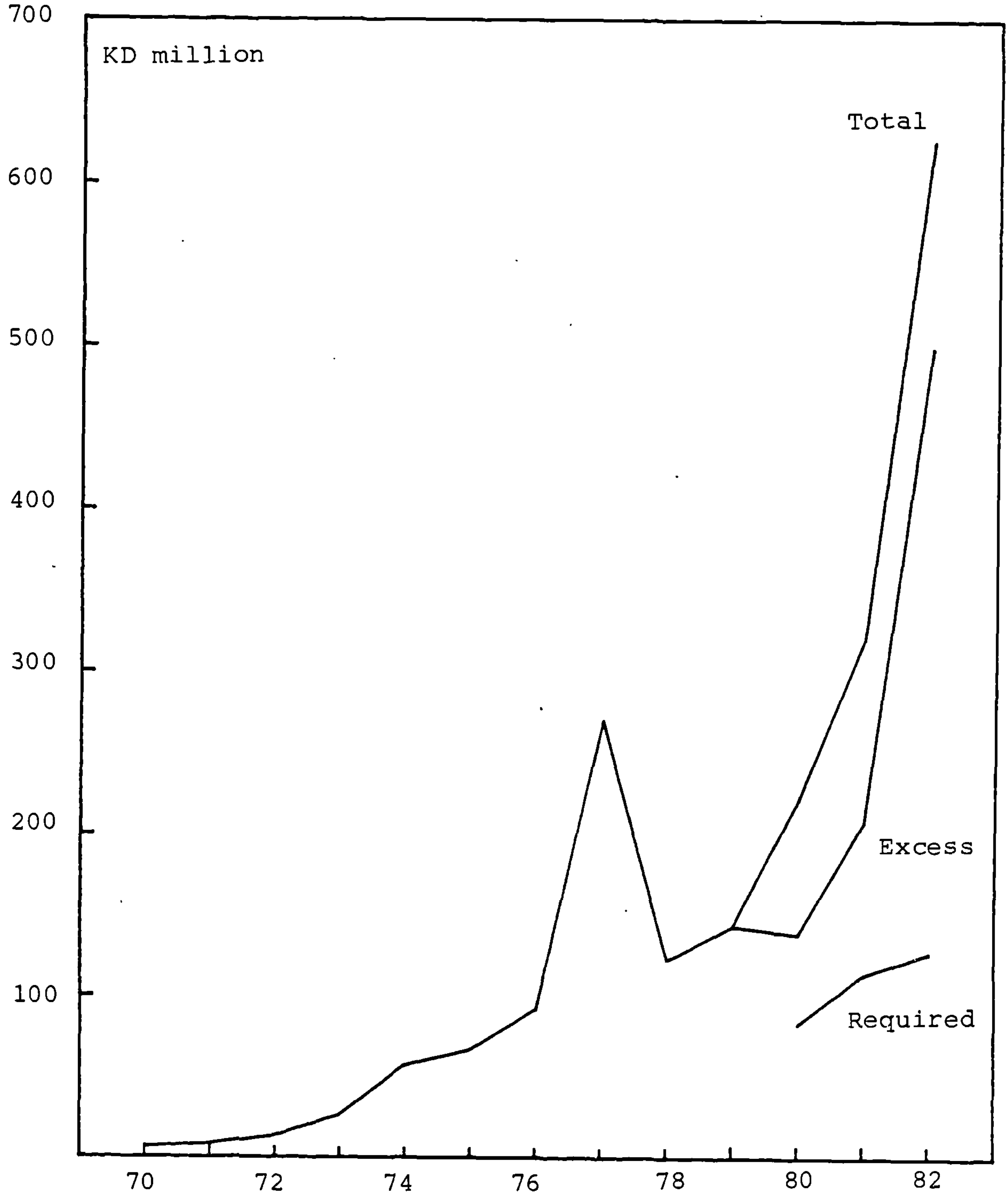
Table 3.5 shows correlation coefficients of currency reserves Rc, balances with the Central Bank Rb, and Central Bank bills Rk, on the one hand, and required reserves Rq, excess reserves Re, and foreign interest rate (yield on foreign assets) r_f on the other. The table shows that Rk is most strongly correlated with Re, whereas Rc is most strongly correlated with Rq, which may imply that banks tend to hold excess reserves as Central Bank bills and required reserves as cash. It also shows that Rk is most strongly correlated with foreign interest rate than Re and Rb, because excess reserves are more sensitive to changes in foreign interest rates than required reserves.

Table 3.5: Correlation Coefficients of Reserve Assets

	Rq	Re	r_f
Rc	0.924	0.718	-0.251
Rb	0.487	0.751	-0.311
Rk	0.715	0.949	-0.515

Figure 3.7

Excess and Required Reserves of Commercial Banks



(iv) Deposits of the Private Sector

On the liabilities side, deposits of the private sector* (the monetary liabilities of commercial banks) comprised 52.1 percent of total liabilities in 1982, down from 63 percent in 1969. Thus, deposits have lost part of their relative contribution to the resources of commercial banks in favour of foreign liabilities and interbank deposits. Demand deposits formed about 21.9 percent of total private deposits and 11.4 percent of total liabilities in 1982. The less-liquid deposits add up to quasi-money which is composed of saving deposits, time deposits, certificates of deposit and foreign currency deposits. Certificates of deposit were considered part of quasi-money in 1977 when they were developed as a new type of financial instruments in the local market. It is important to note that only a portion of total certificates of deposit issued by commercial banks is included in quasi-money, the portion kept by parties other than the banks themselves.

Quasi-money registered a sharp jump in 1971 (28.8 percent), following the decline in 1970 as a result of higher domestic interest rates triggered by higher international rates. Another sharp increase was registered in 1974 (31.2 percent), because of two (supply and demand) factors: (i) higher deposit rates resulting from the banks' strive to make deposits more attractive to finance the increased demand for credit (supply factor), and (ii) higher personal incomes resulting from the government's decision to raise wages and salaries of its employees following the rise in oil prices (demand factor). In 1976 and 1977 quasi-money grew at a fast pace (37.5 and 32.2 percent respectively) for two reasons: the increase in the number of immigrants

* For this purpose the private sector is defined as including: individuals, institutions and companies belonging to the private and joint (with government participation) sectors, as well as public institutions with independent budgets (independent of the general government budget).

following the 1975-76 civil war in Lebanon and the increase in government expenditure.

In 1980 the growth of quasi-money (31.5 percent) was due to higher interest rates and the consequent conversion of demand deposits into time and foreign currency deposits. In 1981 there was a sharp rise in demand deposits (122.3 percent) which was due to intensive activity in the domestic stock and real estate markets since these activities require the maintenance of demand deposits to settle transactions. The exact opposite occurred in 1982 when demand deposits fell by 10 percent due to slower activity in the stock market, and the collapse of the unofficial (parallel) stock market in the second half of the year.

(v) Government Deposits

Government* deposits are almost entirely in foreign currencies as government KD deposits are kept with the Central Bank. This item has declined in importance as a source of funds for commercial banks as indicated by its share of total liabilities which declined to 5.3 percent in 1982 from 10.2 percent in 1969.

(vi) Foreign Liabilities and Capital

Foreign liabilities have increased in importance as a source of funds. This partially reflects local banks' expanding operations with foreign banks, particularly the offshore banking units in Bahrain. Kuwaiti banks resort to borrowing from foreign markets whenever their liquidity is under strain. This

* For this purpose, government is defined as including: ministries, government departments and public institutions with attached (as opposed to independent) budgets.

is so because banks cannot satisfy all of their borrowing requirements by resorting to the Central Bank's discount window, since the volume of obtainable discounts is limited by the availability of discountable commercial papers of a quality acceptable to the Central Bank.

Lastly, the increase in capital and reserves is attributed to banks' profitability and the need to finance expanding credit demand. The increase in capital is achieved through stock dividends and rights issues.

3.4. The Working of the Monetary Sector

In this section the working of the monetary sector, and hence the money supply process, is studied by combining the activities of the Central Bank and commercial banks. The first step in this endeavour is to construct a consolidated balance sheet of the monetary sector.

3.4.1. Consolidated Balance Sheet of the Monetary Sector

It is possible to construct a consolidated balance sheet of the monetary sector by combining similar items of assets and liabilities of the Central Bank and commercial banks. Items that appear as assets in the balance sheet of the Central Bank and as liabilities in the balance sheet of commercial banks or vice versa (such as deposits of commercial banks with the Central Bank) should be excluded. Table 3.6 illustrates the composition of the consolidated balance sheet of the monetary sector.

Monetary liabilities of the monetary sector are represented by the broad definition of the money supply, this is composed of currency in circulation (liability of the Central Bank) and private deposits, which in turn consist of demand deposits and quasi-money (all are liabilities of commercial banks).

Table 3.6: Consolidated Balance Sheet of the Monetary Sector

Assets		Liabilities	
Net Foreign Assets	NFA	Monetary Liabilities	M
Claims on the Private Sector	CR	Government Deposits	GD
Other Assets	OA	Other Liabilities	OL

The balance sheet identity of the monetary sector can be written as follows

$$NFA + CR + OA = M + GD + OL$$

therefore

$$M = NFA + CR + OA - OL - GD$$

$$OA = TA - NFA - CR$$

$$OL = TL - GD - M$$

where

TA = total assets, TL = total liabilities

therefore

$$OA - OL = GD + M - NFA - CR$$

$$= -(NFA + CR - GD - M) = - NOA$$

where NOA stands for net other assets, mainly reflecting the equity position of commercial banks. This term appears under the heading "other net" in the consolidated balance sheet of the monetary sector (see Table A.12). Hence

$$\Delta M = \Delta NFA + \Delta CR - \Delta NOA - \Delta GD$$

Based on the above equation, Table 3.7 shows that up to 1974, changes in net foreign assets accounted for the bulk of changes in the money supply. From 1975 onwards the major factor has been changes in claims on the private sector.

Table 3.7: Accounting for Changes in the Money Supply (KD million)

	ΔM	ΔNFA (+)	ΔCR (+)	ΔNOA (-)	ΔGD (-)
1971	93.9	74.0	24.3	3.3	-7.7
1972	67.7	61.1	26.0	-23.6	4.2
1973	48.2	-40.3	78.9	-10.4	20.0
1974	148.6	320.5	95.6	-60.3	-207.2
1975	170.7	122.0	144.8	-23.6	-72.5
1976	329.1	-34.4	427.6	-81.1	17.0
1977	363.0	321.1	304.2	-164.1	-98.2
1978	367.0	93.0	320.9	-112.8	65.9
1979	339.4	103.0	559.9	-111.6	-211.9
1980	567.8	422.0	552.1	-53.0	353.3
1981	1010.3	301.4	782.2	-130.3	57.0
1982	315.0	299.4	838.9	-515.6	-307.6

3.4.2. Analysis of the Money Supply Process

In an open economy like Kuwait, the money supply originates mainly from government domestic expenditure financed by oil revenue. The government owns the oil sector and receives sales proceeds in dollars. To finance domestic expenditure, the government exchanges some of its dollars at the Central Bank for KDs which will subsequently be received by the public (e.g. as wages and salaries) and a major portion is kept as currency, demand deposits and quasi-money.

In recent years, the role of local operations of commercial banks, represented mainly by claims on the private sector (domestic credit), has assumed increasing importance as a source of the money supply. The effect of claims on the private sector on the money supply runs through the money creation multiplier. Credit is used to finance economic activity and that leads to an increase in currency in circulation. The other portion is kept as deposits with banks, again leading to an increase in the money supply.

Owing to the limited absorptive capacity of the domestic economy, the dependence on imports, and the absence of restrictions on capital movement between Kuwait and abroad, a major portion of the money supply -that originates from government expenditure and banking operations- is channelled outside the country by the private sector in the form of current transfers (to settle import bills) or capital transfers (investment abroad). Therefore, net private sector transactions with the outside world, or the private sector's balance of payments deficit, operates on the negative side as a leakage outlet.

This analysis of the money supply process, which is adopted by the Central Bank, provides another identity (not a behavioural equation) that accounts for changes in the money supply; it is one which has greater explanatory value than that presented earlier. The identity is as follows:

Changes in the Money Supply = Net Government Domestic Expenditure
+ Changes in Claims on the Private Sector
- Net Private Sector Transactions Abroad
- Change in Net Other Assets

where

Net Government Domestic Expenditure =
Total Government Domestic Expenditure
- Domestic Government Revenue
- Government Purchases from Abroad

Change in net other assets is the same as that of the previous identity, reflecting mainly changes in shareholders' equity (capital and reserves). It has a contractionary effect on the money supply because any increase in shareholders' equity is financed by undistributed profit, which is held back rather than injected into the economy in the form of dividends, or by the funds absorbed by capital increases through issue premiums. Table 3.8 shows changes in the money supply and the factors affecting it according to the identity presented above.

This approach to analysing changes in the money supply can be used to explain the monetary trends in Kuwait, but it is inappropriate for monetary management unless it is possible to forecast and influence the various components.

Table 3.8: Sources of Changes in the Money Supply (KD million)

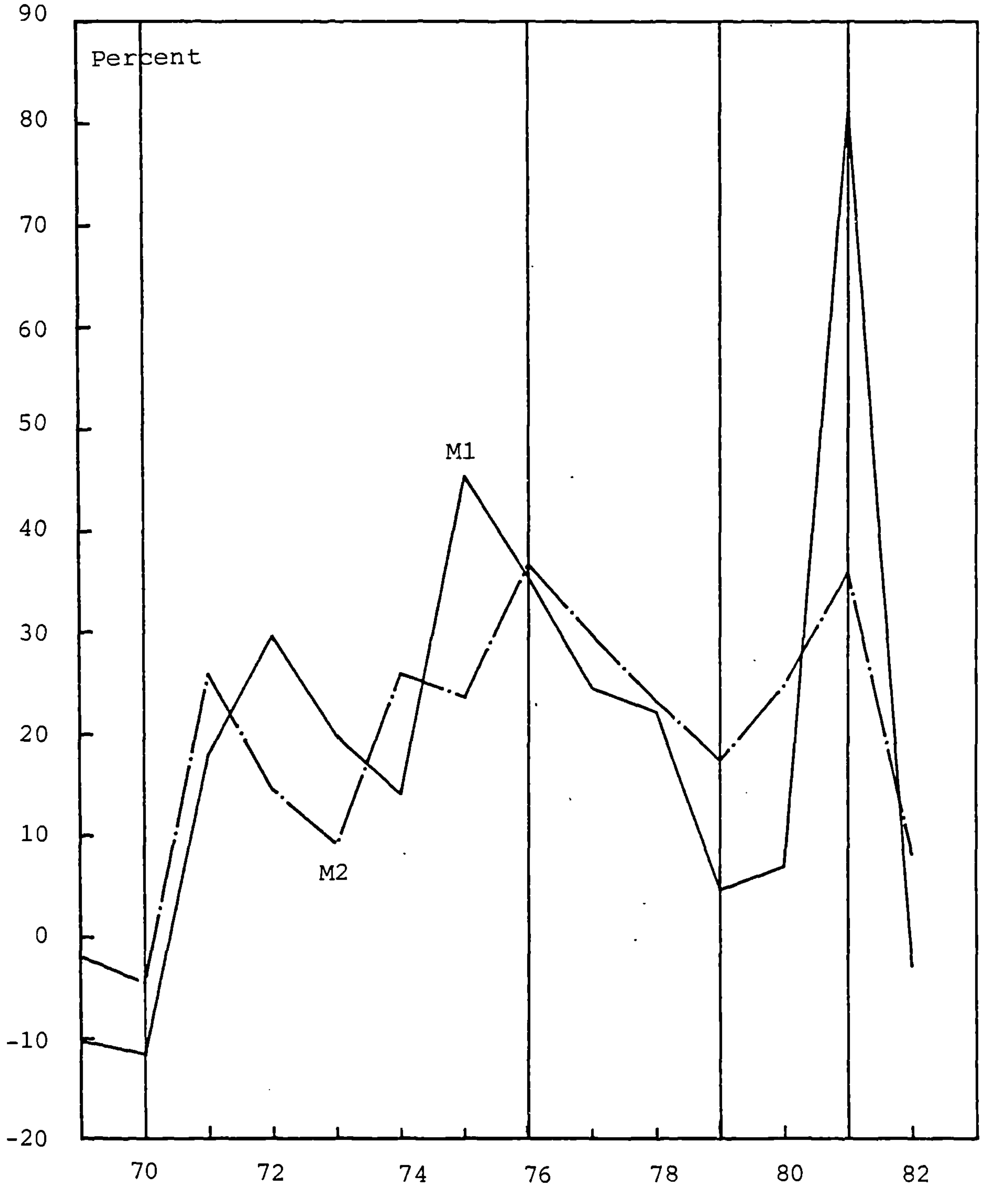
	Change in M	Net Govt. Dom. Exp. (+)	Change in Claims on Private Sector (+)	Private Sector Deficit (-)	Other (net) (-)
1971	93.9	227.8	24.3	-161.5	3.3
1972	67.7	277.0	26.0	-211.7	-23.6
1973	48.1	288.3	78.9	-308.7	-10.4
1974	148.6	463.7	95.6	-350.4	-60.3
1975	170.7	586.7	144.8	-537.2	-23.6
1976	329.1	821.5	427.6	-838.9	-81.1
1977	363.4	1070.5	306.8	-849.8	-164.1
1978	366.6	1160.3	317.1	-998.0	-164.1
1979	339.4	1324.4	559.9	-1433.3	-111.6
1980	567.8	1662.6	552.1	-1593.9	-53.0
1981	1010.3	2408.5	787.7	-2055.6	-130.3
1982	315.0	2514.4	833.4	-2517.2	-515.6

3.4.3. Monetary Trends in Kuwait

Monetary trends in Kuwait can be monitored through the growth rates of the money stock defined in its broad sense i.e. the sum of currency in circulation, demand deposits and quasi-money. As shown in Figure 3.8, there have been several historical episodes in which monetary growth changed pace due to changes in the factors affecting the money supply.

Figure 3.8

Historical Episodes of Monetary Growth



The period 1969-1970 witnessed monetary deceleration. This was due, on one hand, to stagnantion in domestic government expenditure* resulting from the decline in oil revenue, and an increase in the government's foreign commitments following the 1967 Arab-Israeli war, on the other. The second reason was the rise in capital outflows in response to higher interest rates in international financial markets.

The period 1971-1976 was a period of rapid monetary growth. Three reasons were behind this massive acceleration. Firstly, expansionary fiscal policy that followed the multiple increase in oil prices in 1973/74. Secondly, expansion in bank credit to the private sector that accompanied the brisk economic activity at that time. Thirdly, a decline in capital outflows resulting from apprehension about foreign investment initiated by the collapse of the Bretton Woods system of fixed exchange rates. This latter tendency was augmented by a flourishing domestic economy largely stimulated by a major development programme that had been launched by the government. Rapid monetary expansion led to intensive speculative activity in domestic stock and real estate markets. The stock market eventually collapsed in 1977.

The period 1977-1979 was a period of relatively moderate monetary growth. The growth rate of broad money fell continuously from the peak of 36.9 percent in 1976 to 17.4 percent in 1979. Two main factors explain this: moderate expansion in government expenditure and a slower pace of credit expansion. The

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* Though no detailed data are available on government expenditure over this period, figures in the closing account of the Ministry of Finance show that government domestic expenditure declined by an average annual rate of 1.2 percent during the period 1967-1970.

first is attributable to the adoption by the government of an expenditure rationalisation objective, whereas the second was the outcome of measures of monetary policy taken to regulate and control credit following the 1976-77 upheaval.

The period 1980-1981 was a period of renewed accelerating monetary growth similar in spirit to the 1974-1976 period, in the sense that it came after another round of oil price increase (1979) and was followed by another stock market crisis (1982). In 1981 the growth rate of broad money (35.9 percent) was the highest since 1976 (36.9 percent), whereas the growth rate of narrow money was the highest ever (81.4 percent). Renewed acceleration of monetary growth during the period was mainly due to the more rapid pace of government expenditure, this more than offset the contractionary effect of the private sector balance of payments deficit.

In 1982 there was a considerable slowdown in monetary growth. In fact, narrow money declined by 2.9 percent following the record 81.4 percent surge in 1981, whereas the growth rate of broad money declined from 35.9 percent to 8.1 percent. The main reason for the slowdown was the policy-initiated stagnation of domestic government expenditure after oil revenue had started to fall; in the fiscal year 1981/82, oil revenue was inadequate to cover government expenditure. Moreover, there was a slowdown in credit expansion, particularly following the stock market crisis in the second half of 1982 which obliged banks to be careful in their lending policies. Changes in the equity position of commercial banks also played an important contractionary role in 1982, as the value of this item soared to KD 515.6 million due to a tangible increase in the capital and reserves of commercial banks, up to KD 577 million from KD 411 million in 1981. The private sector's deficit with the outside world also increased substantially because of the stock market crisis, and political uncertainty resulting from the Iraq-Iran war and the Israeli invasion of Lebanon. All of these factors triggered massive capital outflows.

Overall, monetary trends in Kuwait have not always been favourable. Monetary growth in excess of real growth has led to inflationary pressures, intensive speculation in the stock and real estate markets, and to maldistribution of resources from the normative development point of view (see Moosa (1985a)).

3.5. Other Financial Institutions

Kuwait's monetary sector is complemented by other financial institutions. These include three specialised banks, one Islamic bank, twenty eight investment companies, several insurance companies and a number of foreign exchange dealers. They are subject to varying degress of Central Bank supervision, but in general they operate with fewer restraints imposed by the Central Bank than in the case of commercial banks. Their operations are closely linked to the monetary sector. Together with commercial banks, these institutions play an important role in developing local financial markets.

3.5.1. Specialised Banks

Article 76 of the Central Bank Law defines specialised banks as "banks whose main business is to finance specific economic sectors such as the real estate, the agricultural and industrial sectors and which do not accept demand deposits." Article 77 outlines the constraints on their activities by stating that "specialised banks shall be governed by the provisions which regulate the banking industry in as much as they shall not be in conflict with the nature of their activities." While commercial banks provide short-term credit facilities to finance such activities as construction, trade and services, specialised banks provide medium and long-term loans to finance the development of the real estate and industrial sectors in particular.

There are three specialised banks in Kuwait: the Credit and Savings Bank, the Kuwait Real Estate Bank, and the Industrial Bank of Kuwait. The activities of the first two are confined to the housing and real estate sector, whereas the third aims at promoting industrial development. By law, specialised banks are not allowed to accept demand deposits but they are allowed -within variable terms- to accept other types of deposit. Moreover, the Real Estate Bank and the Industrial Bank have been allowed to issue negotiable certificates of deposit and public bonds.

The Real Estate Bank is a public shareholding company listed on the Kuwait Stock Exchange. It, therefore, provides loans on a commercial basis and at such terms as may be prevalent in the market. The Credit and Savings Bank, and the Industrial Bank are respectively owned by the government and the joint sector (partial government ownership). They are fully backed by the government and, therefore, provide soft loans in terms of repayment, maturity, associated technical aid and interest rate. This is particularly the case with the real estate loans given by the Credit and Savings Bank, these have a maturity of 45 years at a rate not exceeding 2 percent per annum with interest paid by the Ministry of Finance rather than the borrower. The Industrial Bank provides loans for up to 9 years at a rate not exceeding 4 percent.

In the period 1977-1982, the consolidated balance sheet of specialised banks increased from KD 705.2 million to KD 1776.2 million, registering an average annual growth rate of 20.3 percent. The most important item on the assets side is local loans, comprising over a half of total assets in 1982. Deposits with commercial banks make up about 21.3 percent, whereas foreign assets (made up of deposits with foreign banks and foreign loans and investments) form about 15 percent. Other items on the assets side are local investments in stocks and bonds (2.3 percent), and other assets including cash and balances with the Central Bank (5.4 percent).

On the liabilities side, capital and reserves comprise about 40 percent of total liabilities, which means that this item is the major source of funds. Private deposits are about 26 percent: they include the deposits of commercial banks as well as saving and time deposits of individuals and institutions. Other liabilities in order of importance are government deposits and loans, foreign liabilities (deposits of foreign banks and foreign loans and investments), and certificates of deposit and bonds.

Kuwait Finance House is a special type of specialised bank. It is an Islamic bank that does not deal in transactions involving the payment or receipt of interest. This is in conformity with the teachings of the Islamic religion that forbids dealing in interest or, more precisely, usury. The bank is involved in operations that yield profit, not interest, and pays its depositors profit shares rather than fixed interest.

3.5.2. Investment Companies

When the Central Bank started operations in 1969, there were two investment companies: Kuwait Investment Company and Kuwait Foreign Trading, Contracting and Investment Company, both of which are public shareholding companies.

The Kuwait International Investment Company was founded in 1973, and fourteen more were created in the 1974-1977 period. By the end of 1982 there were 20 investment companies with total assets of KD 1986.4 million with about 90 percent of this total belonging to the largest and oldest three companies mentioned above. Investment companies play an important and complementary role to commercial and specialised banks in mobilising available financial resources, and channelling them into various investment fields. They also play an important role in directing local funds to the Eurobond market, particularly through the issue of KD bonds.

Despite the "international" image of Kuwait's financial companies, there has been an increasing tendency to become more local. In 1977, foreign assets comprised 58.3 percent of total assets, but this percentage declined to 41.7 in 1982. On the other hand, local assets (cash, deposits, loans and local investments) rose from 32.8 to 46 percent. This shift in the structure of the balance sheet was due to the flourishing domestic economy and stock market on the one hand, and increasing apprehension about foreign investment, on the other. This trend, however, was reversed -as from 1983- following the stock market crisis of 1982.

On the liabilities side, foreign liabilities are the main sources of funds, particularly for companies that do not receive much in the way of government funding. In 1982, the ratio of foreign liabilities to total liabilities was 38.4 percent. The second and third most important sources of funds are "resources from residents" (28.2 percent) and "capital and reserves" (20.4 percent).

3.6. Financial Markets

The need for developed domestic financial markets has been felt ever since the foundation of the Central Bank of Kuwait. The need is prompted by two motives:

(1) the desire to limit capital outflows and thereby channel resources towards domestic economic development; and

(2) the necessity of financial markets for the Central Bank to conduct successful open market operations and, thus, enhance monetary policy.

As has been mentioned earlier, one of the objectives of the Central Bank is to develop financial markets. Indeed, this has been realised to a certain extent as financial markets have witnessed significant development since 1969.

3.6.1. Interbank Market

Since 1974, commercial banks have started to feel significant strains on their liquidity. This has been due to an increasing demand for credit at a time when the banks were required to maintain a certain minimum liquidity ratio, as from September 1974. These conditions have provided the right atmosphere for the evolution of the interbank market through which banks facing a shortage of funds could borrow from other banks having a surplus. The Central Bank encouraged the development of the interbank market by deciding to consider interbank deposits as liquid assets, as far as calculating the liquidity ratio was concerned, and also by exempting interbank funds from the 10 percent interest rate ceiling; this means that interest rates on interbank deposits (interbank rates) were left to be determined by market forces. There are some institutions that act as brokers in the interbank market, providing daily interest rate quotations on the bid and offer sides for deposits of various maturities. The development of this market is reflected in the remarkable growth of interbank deposits from KD 6.6 million in 1973 to KD 1773.3 million in 1982.

3.6.2. Money Market

The money market in Kuwait is still in its infancy, its main problem is the lack of diversified financial instruments. There are just two types of instrument and these have only recently been introduced: Central Bank bills (which can only be acquired by financial institutions), and negotiable certificates of deposit.

3.6.3. Securities Market

The dominant, and most popular, securities are shares in public shareholding companies. Trading in shares became active in the 1970s and, in particular, after 1973 -due to uncertainty abroad and a flourishing domestic economy. Intensive speculation, fuelled by bank credit as well as other malpractices, resulted in two crises followed by periods of depression in the stock market: 1977 and 1982. The latest was by far the most serious, and its effects spilled over to other sectors of the economy. This has triggered government intervention to save the market and introduce various stringent reforms.

KD denominated bonds are another type of security. The primary market for these securities emerged in 1968, when the first issue of KD denominated bonds was placed in the market in favour of the World Bank. Since then, an increasing number of issues has been launched, most of which were in favour of non-resident borrowers. On the other hand, the secondary market for KD bonds remained inactive until 1977 following the establishment of the Arab Company for Trading Securities, this company acts as a market-maker in KD bonds. An international bank (Orion Bank (1984)) has described the Kuwaiti capital market as the most developed in the Middle East. Al-Baker (1982a), (1982b) presents a good exposition of the structure and development of the Kuwaiti capital market.

APPENDIX 3.1

SOURCES AND USES OF THE MONETARY BASE

The balance sheet indentity of the Central Bank can be written as follows

$$FA + DC + OA = B + GD + CL + OL$$

where

FA = foreign assets

DC = discounts

OA = other assets

B = monetary base

GD = government deposits

CL = capital and reserves

OL = other liabilities

therefore

$$B = FA + DC + OA - GD - CL - OL$$

or in terms of changes

$$\Delta B = \Delta FA + \Delta DC + \Delta OA - \Delta GD - \Delta CL - \Delta OL$$

The above equation accounts for any change in the monetary base in terms of changes in the sources of the base ΔFA, ΔDC, ΔOA on the positive side and ΔGD, ΔCL, ΔOL on the negative side. It tells us that any change in foreign assets, discounts, or other assets that is not matched by an equivalent change in government deposits, capital and reserves, or other liabilities will lead to a change in the monetary base. Changes in foreign assets of the Central Bank have been the major source of the monetary base. The uses of the monetary base are two: currency in circulation C and banks' reserves R, i.e.

$$B = C + R$$

therefore

$$\Delta B = \Delta C + \Delta R$$

The above equation shows that any change in the monetary base is distributed between currency in circulation and banks' reserves.

CHAPTER 4

MONETARY AGGREGATES AND ECONOMIC ACTIVITY

4.1. Definition of Money

This chapter is devoted to conducting empirical work on some of the vital issues in monetary economics as applied to Kuwait. Most of the findings are to be used later in the discussion of monetary policy and the specification of the structural model. In particular, attention will be focused on various monetary aggregates and their relation to real economic activity. The starting point is the definition of money.

Economists are not in agreement as to what specific items constitute the economy's money stock. The disagreement is further widened by the purpose for which the definition of money is sought. Essentially, two definitions are required for two purposes:

(i) the definition that most likely conforms to the theoretical concept of the money stock from a functional point of view;

(ii) the definition that is required for conducting monetary policy.

Osborne (1984) notes that those who refer to the definition of money as an empirical matter confuse the definition of a word with the identification of the things that ought to be designated by the word. He extracts 10 approaches to the definition of money from the appropriate literature and notes that three of them emerge from a common root. Among the definitions he discusses is that of tangible media of exchange, and he argues that intangible balances function in the same way as tangible tokens which implies that tangibility is not a criterion of money. Other approaches which he examines place emphasis upon liquidity, the means of payments, the relation between money and GNP, and the stability of the demand function. Osborne concludes that although the majority of the definitions do not tell us what money is, they do help us understand why money matters and also help in understanding the financial system.

Theoretically, money is any asset that performs the functions of money, namely: medium of exchange, unit of account and store of value. In practice, there is no clear-cut line between assets which perform these functions and those which do not. In the case of Kuwait, the following assets can be considered for inclusion in the money stock:

(i) currency in circulation;

(ii) demand deposits;

(iii) saving deposits;

(iv) time deposits;

(v) certificates of deposit;

(vi) foreign currency deposits.

Item (i) is a liability of the Central Bank, whereas items (ii)-(vi) are liabilities of commercial banks. Following procedures set out by the International Monetary Fund, the Central Bank of Kuwait defines the sum of (i) and (ii) as M1 which is the narrow concept of money, whereas the sum of (iii)-(vi) is defined as quasi-money. Narrow money and quasi-money add up to M2, the broad concept of money which is termed "liquidity" in the Central Bank's literature.

Miri (1982) has shown that monetary aggregates in Kuwait range from M1 to M13, which can be obtained by the gradual addition and aggregation of the items mentioned earlier, as well as other items such as government deposits and liabilities of specialised banks and investment companies. His work, however, seems of little value as he does not explain the theoretical or empirical significance of each of his monetary aggregates.

Quasi-money is distinguished from money M1 on the grounds that the former does not directly function as a medium of exchange. This distinction rests on the belief that being a medium of exchange is the most important function of money and, therefore, the stock of money should be the amount of medium of exchange in existence. This view, which has been put forward by Newlyn (1964) and Yeager (1968), raises some problems when applied to Kuwait. At first glance it seems that M1 is the medium of exchange in Kuwait, but a closer look shows that the matter is not that simple. Some part of demand deposits does not function as a medium of exchange but rather as a store of value. This is so because some people keep their funds in the form of demand deposits rather than interest-bearing quasi-money, not because they want to use them to settle transactions, but rather because they do not want to earn interest in accordance with the teachings of the religion of Islam which forbids usury. On the other hand, some people make special arrangements with their bankers to issue cheques against their saving deposits, in which case some part of saving deposits is a medium of exchange.

Proponents of the M1 definition reject the inclusion of quasi-money on the grounds that money must be directly and immediately usable as a medium of exchange. However, the case for M2 has been strengthened by legislative actions and innovations in the banking industry (e.g. NOW accounts in the United States). These factors have blurred the distinction between demand deposits and quasi-money as they have resulted in increasing the "moneyness" of quasi-money. Because of this, some economists (for example Friedman and Schwartz (1970)) have suggested that money should be defined to include assets which are regarded as a "temporary abode of purchasing power", e.g. to bridge the gap between receipts and payments of income rather than to transfer spending power into the future (investment). In real situations this definition is even less helpful than the definition of the medium of exchange, since there is no way of telling the reason for holding or spending funds.

Friedman and Meiselman (1963) also argue that time deposits are such close substitutes for other monetary items (currency and demand deposits) that it is preferable to treat them as if they were perfect substitutes, than to exclude time deposits from the definition of money. Chetty (1969) disputes the all-or-nothing approach and argues that, in reality, various liquid assets may not be regarded as perfect substitutes for money nor can they be treated as completely unrelated to money. In this context, Gurley (1960) used a definition which assigned weights of one to currency and demand deposits, and weights of one half to other liquid assets. Such weights can alternatively be derived by canonical correlation, or the method of principal components to get a "good" theoretical measure of the money stock in a statistical sense (e.g. minimum variance), although it is difficult to give economic interpretation to the weights. Such a measure of the money stock will be derived for the special case of Kuwait.

Legal, institutional, social and procedural factors can influence the definition of money. For example, there is a major difference between M1 as measured in the United Kingdom and as measured in Kuwait. In the U.K. 60 percent of cheques "in transit" between banks is deducted from the sum of currency and demand deposits to arrive at M1. This adjustment is made because cheques are credited to the accounts of recipients before being debited to the accounts of drawers. In Kuwait, on the other hand, this is not the case, as cheques are not credited to recipients unless they have been cleared. Therefore, no adjustment is made to the sum of currency in circulation and demand deposits.

Two more important points should be mentioned concerning the definition of money in Kuwait:

(i) The definition of money in narrow and broad senses does not include deposits of the government or entities under its direct control (i.e. those with attached budgets), but does include deposits of entities with independent budgets, e.g. Kuwait Airways Corporation. The justification for this procedure is that entities with independent budgets usually perform some sort of economic function and carry out real production. In their study of the demand for money in Middle Eastern countries (including Kuwait), Crockett and Evans (1980) seem to agree with this practice, although with some caution. However, they perform their tests using definitions of money that include and exclude government deposits; this will also be done here. Mackenzie (1979) discusses the issue for Egypt.

(ii) Foreign currency deposits held by residents with commercial banks are treated as part of the money stock. This is valid for Kuwait, as there is no restriction on foreign exchange transactions; hence, funds in foreign currency can be freely converted into local currency, and as such they constitute a source of liquidity no less important than deposits in local currency. The importance, or otherwise, of including foreign currency deposits in the definition of M2 in Kuwait will be tested later.

The specific definition of money adopted is important for the purpose of monetary policy. For example, the money stock as measured by M1 may be constant while M2 is increasing. If the authorities feel it is appropriate to adopt an expansionary monetary policy, acceptance of M1 would call for specific actions to increase the supply of currency and demand deposits, but acceptance of M2 would suggest that the desired expansion of the money stock is already there and no specific action is needed. In general, questions regarding the definition of money might only be of academic importance if the different aggregates behaved similarly, in which case it makes little difference which monetary aggregate the authorities should control or monitor; this is not always the case in reality, however. In a recent article, Alan Walters (1985) points out that from 1870 until 1970 it did not much matter how one defined the British money supply because all aggregates were highly correlated. However, from the 1970s, the increased freedom of credit markets and financial innovation generated a divergence between narrow and broad aggregates.

The problem is, then, to choose the most appropriate definition of money to conduct monetary policy. However, neither theoretical considerations, nor empirical evidence are conclusive as to which definition is most stably related to income or other real variables that are supposed to be influenced by changes in the money stock. In choosing a monetary target, the monetary authorities attempt to determine (i) which monetary aggregate is most highly correlated with and most stably related to a set of determining variables, and (ii) which aggregate it can most easily control. These two criteria are not mutually exclusive because unstable demand for money can reduce the authorities' ability to control the money supply, depending on the definition chosen. If, for example, the demand for deposits rises relative to the demand for currency, the money multiplier will change and that would impair the authorities' ability to control the monetary aggregate which includes deposits. Crockett and Evans (1980) point out that in developed countries, the principle of control (ii) is sometimes adduced in support of M1 which tends to be more responsive to open market operations and interest rate policies. They argue, however, that this is only true in developed countries, because policy instruments in developing countries apply principally to the volume of credit extended by the banking system, which would make M2 easier to control. The problem of control will be considered in more detail when talking about monetary policy, but for the time being attention will be focused on the strength and stability of the relation between monetary aggregates and real macroeconomic variables.

Obviously, the inherent nature of this problem is empirical. This is verified by the regular and frequent re-evaluation of the definition of money in the United States. An official U.S. report (Federal Reserve System (1976)) puts the issue clearly as follows: "In conducting monetary policy, the Federal Reserve should use as an intermediate target that money total (aggregate)..... through which it can most reliably affect the behaviour of its ultimate objectives - the price level, employment, output, and the like. Which total or totals best satisfy the requirement depends in turn on (1) how accurately the total can be measured; (2) how precisely, and at what cost, including side effects, the Fed can control the total; and (3) how closely and reliably changes in the total are related to the ultimate policy objectives."

A great deal of research has been done on the subject of the appropriate definition of money, and the related issue of substitutability between money and near-money assets. Although the bulk of research has been on the U.S., the empirical approaches can be applied with some modifications to other countries. The following approaches have been used:

(i) The Friedman-Meiselman (1963) approach whereby a money substitute should be included in money, if income is more highly correlated with the sum of the money substitute and money than with each separately. Studies employing this technique have generally produced results in favour of broader definitions of money.

(ii) The cross elasticity approach, whereby substitutability between money and near money is measured as the percentage change in narrow money per percent change in the rate of return on competitive assets. In this case, the demand for narrow money M1 is specified as

$$(M1)^d = f(Y, r_m, r_s)$$

where

Y = income

r_m = rate of return on money (usually 0)

r_s = rate of return on money substitutes

So, the cross elasticity at the means is calculated as

$$Ec = \frac{\partial (M1)^d}{\partial r_s} \cdot \frac{r_s}{(M1)^d}$$

such that

$$\frac{\partial (M1)^d}{\partial r_s} < 0$$

(iii) The elasticity of substitution which is measured as the percentage change in narrow money per percent change in near money assets*. In this case the demand for near money S^d is included as an argument in the demand for money function which is specified as follows:

$$(M1)^d = f(Y, r_m, S^d)$$

in which case, the elasticity of substitution at the means is measured as

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* In the case of Kuwait, it is possible to estimate the elasticity of substitution between quasi-money (QM) and demand deposits (DD) from the following regression equation for the demand for quasi-money

$$QM^d = \underset{(1.18)}{42.4} - \underset{(-2.58)}{0.23}\ DD^d + \underset{(30.32)}{1.1}\ QM_{t-1}$$

$R^2 = 0.993$ SE = 61.8 DW = 2.90

The large coefficient of the lagged dependent variable implies that the demand for quasi-money is dynamically unstable. In this case, the short-run elasticity of substitution as defined above is -0.07, implying that a 100 percent increase in the demand for demand deposits will lead to a 7 percent decrease in the demand for quasi-money.

$$Es = \frac{\partial (M1)^d}{\partial s^d} \cdot \frac{s^d}{(M1)^d}$$

such that

$$\frac{\partial (M1)^d}{\partial s^d} < 0$$

The empirical results of these approaches have not always been consistent, but often contradictory and generally inconclusive. However, such studies provide more evidence for than against a broader definition of money.

Some economists have examined the moneyness of financial assets using cross section data. Conlisk (1970) presented some cross country inflation evidence on the moneyness of time and saving deposits. He specified an equation in which inflation was made a function of the growth rates of real income and money supply. All growth rates were calculated as average compound annual rates over the period 1950-63 for 58 countries. He fitted the equation for the whole sample and then for sub-samples according to the degree of development. His conclusion was that "what evidence there is, indicates that saving and time deposits are better left out of the definition of money than included equally with currency and demand deposits."

Results of studies employing cross-section data again proved to be inconsistent and contradictory. Using Conlisk's model and his definition of variables, Villanueva and Arya (1972) presented contrasting evidence based on average values over the period 1955-68. Immediate post-war reconstruction years were eliminated and the series was extended to more recent years, thereby retaining the thirteen-year interval. Empirical results were in favour of a broader definition of money that includes saving and time deposits.

It must be mentioned here, that it has been demonstrated (for example Meigs

(1975)) that the emergence of money substitutes has not made any material difference to the impact of monetary policy on real variables except reducing the size of the impact multiplier. The crucial issue, however, is not the size of the multiplier but rather its stability.

Finally, it is sometimes argued (for example Sayer (1982)) that since the control of a given statistical definition of money would alter the statistical relationship, the appropriate statistical definition of the money supply will itself be affected by monetary policy; thus, it is misleading and even dangerous to think of monetary policy simply in terms of the control of a particular monetary aggregate. Rather, the authorities should monitor and control a variety of monetary aggregates which, collectively, can provide a more accurate picture of monetary conditions.

4.2. Empirical Evidence for Kuwait

In this section, some tests for the definition of money in Kuwait will be presented using the Friedman-Meiselman approach of correlation between monetary aggregates and non-oil GDP. Testing the stability and predictability of the demand for various monetary aggregates will be deferred to sections 4.4 and 4.5 respectively.

Five monetary aggregates are considered here, ranging from narrow money M1 to M2A which is broad money M2 plus government deposits,

$$M1 = C + D$$

$$M1A = M1 + S$$

$$M1B = M1A + T$$

$$M2 = M1B + F$$

$$M2A = M2 + G$$

where

C = currency in circulation

D = demand deposits

S = saving deposits

T = time deposits (including CDs)

F = foreign currency deposits.

G = government deposits

Moreover, a theoretical monetary aggregate will later be derived by the method of principal components in order to test its correlation with non-oil GDP. According to the Friedman-Meiselman approach, an asset X should be included in the definition of money if

$$R(M1 + X, Yn) > R(M1, Yn)$$

and

$$R(M1 + X, Yn) > R(X, Yn)$$

where R is the correlation coefficient and Yn is non-oil GDP. Table 4.1 shows correlation coefficients between non-oil GDP and various monetary aggregates/assets. They were calculated using 32 quarterly observations over the period 1975-82.

Table 4.1: Correlation Coefficients Between Monetary Assets and Non-Oil GDP

Monetary Aggregate/Asset	Correlation Coefficient
M1	0.869
S	0.820
M1A	0.890
T	0.898
M1B	0.909
F	0.791
M2	0.922
G	0.761
M2A	0.921

The table domonstrates the following:

(i) Since $R(M1A,Yn) > R(M1,Yn)$ and $R(M1A,Yn) > R(S,Yn)$, then M1A is a better definition than M1.

(ii) Since $R(M1B,Yn) > R(M1A,Yn)$ and $R(M1B,Yn) > R(T,Yn)$, then M1B is a better definition than M1A.

(iii) Since $R(M2,Yn) > R(M1B,Yn)$ and $R(M2,Yn) > R(F,Yn)$, then M2 is a better definition than M1B.

(iv) Since $R(M2,Yn) > R(M2A,Yn)$ and $R(M2,Yn) > R(G,Yn)$, then M2 is a better definition than M2A.

This simple correlation analysis supports the use of a broad monetary aggregate (excluding government deposits) for policy purposes on the grounds that it is more highly correlated with real economic activity as represented by non-oil GDP.

4.3. Causality Testing

Correlation does not necessarily imply causation, neither does it tell the direction of causation. Variables may be functionally (causally) related, but not necessarily correlated, or they can be correlated but not necessarily functionally related. The first situation may arise because correlation is a measure of linear association only, implying strong non-linear functional relationships cannot be picked up by the correlation coefficient. The second situation is more frequent than the first, and arises because of a common association of the variables under investigation with another variable such as time. A causality test will, therefore, be conducted in order to find the direction of effect between money and income using the procedure suggested by Granger (1969) and Sims (1972), and found, for example, in Pierce (1977), Pierce and Haugh (1977), Sargent (1979), Frenkel (1977),(1979), Schwert (1979), Zellner (1979), Bhattacharyya (1980), and Batavia and Lash (1982). The methodology has also been applied to the Kuwaiti economy by the Claremont Economics Institute (1983), and by Ghuloum (1984).

Granger's criterion for determining causality relies on time-series techniques and completely ignores the role of economic theory in providing prior restrictions. The criterion is simply that after extracting all the information from the own past values of a variable, if the addition of another variable as a regressor would further reduce prediction error variance, then the latter variable is causal. In other words, a variable is causal if it explains the residuals of another variable which cannot be explained by the history of that explained variable. Later, Sims (1972) adapted Granger's definition of causality to a closed dynamic bivariate model to test the money-income causality.

Ando (1981) criticises the Granger-Sims methodology on the grounds that the residuals do not necessarily possess the properties required to make the estimated coefficients unbiased. He points out that if the bivariate reduced form equation in question is part of a large system, there will be a problem of omitted variables which will be compounded in the residual term, and thus we cannot say anything about the lack of correlation between the included independent variable and the excluded variables, nor about the serial correlation characteristics of omitted variables. Ando concludes that the Granger-Sims procedure is more likely to produce biased results than not, unless the investigator has very solid reasons to believe that the set of variables which he is considering is indeed the correct one, and that there is no significant omitted variables in the equation being analysed. However, Ando qualifies his objection to the Granger-Sims test of causality by stating that it can produce reliable results if good approximations are made, in the sense that data generated by the actual economy do not deviate from the fundamental assumptions. Tobin (1981) shares Ando's scepticism of non-structural tests, particularly if applied to two variables. He argues that autoregressions of simple variables or vectors should not take explanatory priority over contemporaneous structural interdependence.

Finally, causality testing can be criticised on the grounds that there is no clear-cut definition of causality. In the Granger sense, "causal" means containing information that helps better predict a variable. The Cowles Commission for Research in Economics at the University of Chicago (Koopmans (1950), Hood and Koopmans (1953)) defines causality in terms of the validity of identifying restrictions on the reduced form of a system of equations, this emphasises the uniqueness of the transmission mechanism of changes in the set of predetermined variables to those in the endogenous variables. So, whereas the Granger definition is in terms of prediction error variances, the Cowles definition is in terms of the parameter estimates. Arnold Zellner (in Sims (1977)) presents some interesting comments on different notions of causality. See also Desai (1981).

Nevertheless, causality testing can be useful, provided that the relationship under investigation can be justified on the basis of economic theory. Consider the following two hypotheses for the special case of Kuwait:

(i) whether or not causality runs from money to income (non-oil GDP);

(ii) whether or not there is feedback from income to money.

On a priori economic considerations, we expect money to influence income via the monetarist real expenditure approach, but do not expect feedback from income to money. The economic rationale for this proposition is as follows. Government expenditure affects non-oil GDP and the money supply. The effect on non-oil GDP has already been pointed out (see Chapter 2). The effect on the money supply is contemporaneous because recipients of funds spent by the government will demand more currency, demand deposits and quasi-money, to which the banking system will respond by increasing the money supply. Now that banks have a higher level of deposits, they can afford to expand credit to the private sector, thus resulting in higher private real expenditure, the effect of which will be transmitted to non-oil GDP. But higher level of income, implying faster economic activity, induces higher demand for credit; if the banking system responds with higher supply of credit and monetary expansion (depending on the availability of excess reserves), a feedback effect will emerge. However, the supply of credit does not follow demand automatically. It shall be formally shown that whereas demand for credit depends on economic activity, supply depends on the flow of deposits and banks' portfolio decisions. It remains true, however, that causality may run from income to the money supply under very specific conditions, namely that the government pursues a policy of stabilising interest rates by controlling the money supply in an IS-LM model. Under such conditions, a rise in income will be associated with an increase in interest rates, forcing the government to increase the money supply to counteract this effect. Such a model, however, is not strictly applicable to Kuwait, at least because interest rate is not significantly responsive to income as shall be seen later.

The test procedure that is used here is the one suggested by Battacharyya (1980) which is a version of the Granger-Sims methodology. It goes as follows: to test causality between two variables X and Y, we first estimate the two regression equations:

$$Y = a_1 + b_1 X + u$$

$$X = a_2 + b_2 Y + v$$

and then the empirical residuals u and v. We then proceed as follows:

(i) Reject the null hypothesis that X does not cause Y at the a significance level if

$$n \sum_{i=1}^{m} R^2(u, v_{t-i}) > \chi^2_a(m)$$

where

n = sample size

m = maximum lag

$R(u, v_{t-i})$ = correlation coefficient between the residuals u and v_{t-i}

(ii) Reject the null hypothesis that Y does not cause X at the a significance level if

$$n\sum_{i=1}^{m} R^2(v, u_{t-i}) > \chi^2_a(m)$$

The following results were obtained by regressing non-oil GDP Yn measured at quarterly rates on broad money M, and vice versa, using 32 quarterly observations for the period 1975-82.

$$Yn = 187.63 + 0.14\ M$$
$$(7.0) \quad (13.1)$$
$$R^2 = 0.851 \quad SE = 68.7 \quad DW = 2.15$$

$$M = -793.72 + 5.98\ Yn$$
$$(-3.3) \quad (13.1)$$
$$R^2 = 0.851 \quad SE = 445.1 \quad DW = 1.82$$

The test was conducted using a maximum lag of four quarters. The choice was to some extent arbitrary, but this lag is long enough to capture any cause and effect relationship between the two variables, and any longer lag would considerably reduce the sample size. In any case, trials with longer lags did not change the results.

HO: M does not cause Yn

For this test $n\sum R^2(u, v_{t-i}) = 10.3$ and since $\chi^2_{0.05}(4) = 9.5$, the null hypothesis is rejected, which means that M causes Yn.

HO: Yn does not cause M

For this test $n\sum R^2(v, u_{t-i}) = 5.2$ which is less than $\chi^2_{0.05}(4)$. Therefore, the null hypothesis that Yn does not cause M is accepted, confirming that there is no feedback from income to money. Again, it must be stressed that there is still a possibility of a small feedback which cannot be captured by this bivariate causality test. One reason for this may be the fact that the time series were not "pre-whitened" prior to testing, as suggested by Sims (1972) who designed a filter to flatten the spectral density of time series and give them white noise properties (see also Aghevli and Khan (1978) for applications to LDCs). Another possible reason for the failure to detect any feedback is the small sample size and errors of measurement in the non-oil GDP series resulting from interpolation of annual series. However, for the purpose of specifying the model of the monetary sector, it shall be assumed that feedback is negligible.

4.4. Stability of the Demand for Money

Stability of the demand for money function has crucial implications for monetary policy. Indeed, Laidler (1971) describes the importance of a stable demand for money function for the working of monetary policy as "self-evident". This is so because if the demand for money is a stable function of some variables (e.g. income), then changes in the supply of money must result in at least one of those variables changing in order to maintain equilibrium in the money market. Laidler also points out that although the demand for money function does not provide the whole transmission mechanism whereby changes in the quantity of money might lead to changes in income and prices, it provides a vital link in that mechanism.

For the time being, it shall be assumed that the transactions motive is the major source of the demand for money in a rapidly growing economy with little financial sophistication like that of Kuwait. Therefore, the demand for money is mainly determined by the level of economic activity as proxied by non-oil GDP. In this case, it is fair to test the stability of the demand for money against non-oil GDP. In essence, this is a test of the stability of the income elasticity of the demand for money. The technique used here is the Chow (1960) test of stability (see also Fisher (1970)) over the period 1975-82* which is arbitrarily divided into two sub-periods, 1975-78 and 1979-82. Aggregates to be considered are M1, M1A, M1B, M2 and M2A. The following are the regression results:

<u>The period 1975-78</u>

$$(M1)^d = -92.98 + 1.45\ Yn$$
$$(-1.4) \quad (7.9)$$
$$R^2 = 0.816 \quad SE = 55.28 \quad DW = 1.79$$

$$(M1A)^d = -81.14 + 2.07\ Yn$$
$$(-0.85) \quad (7.8)$$
$$R^2 = 0.812 \quad SE = 79.56 \quad DW = 1.76$$

$$(M1B)^d = -526.42 + 4.76\ Yn$$
$$(-2.6) \quad (8.3)$$
$$R^2 = 0.831 \quad SE = 171.65 \quad DW = 2.14$$

$$(M2)^d = -413.68 + 4.78\ Yn$$
$$(-1.9) \quad (7.9)$$
$$R^2 = 0.818 \quad SE = 180.65 \quad DW = 1.89$$

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* It was not possible to use a larger sample because of the unavailability of quarterly figures on non-oil GDP before 1975. This is so because the quarterly figures were obtained by interpolating annual series depending on the growth rate of government expenditure -since it is the prime source of activity in non-oil sectors. Because quarterly expenditure figures are not available for the period before 1975, it was not possible to obtain quarterly figures for non-oil GDP by interpolation on this basis.

$$(M2A)^d = -347.6 + 4.82\ Yn$$

$$(-1.57) \quad (7.85)$$

$$R^2 = 0.814 \quad SE = 183.65 \quad DW = 1.92$$

<u>The period 1979-82</u>

$$(M1)^d = -479.83 + 2.16\ Yn$$

$$(-1.21) \quad (3.6)$$

$$R^2 = 0.474 \quad SE = 247.15 \quad DW = 1.04$$

$$(M1A)^d = -218.8 + 2.22\ Yn$$

$$(-0.54) \quad (3.6)$$

$$R^2 = 0.476 \quad SE = 253.42 \quad DW = 1.30$$

$$(M1B)^d = -620.57 + 5.08\ Yn$$

$$(-0.66) \quad (3.5)$$

$$R^2 = 0.473 \quad SE = 582.88 \quad DW = 1.34$$

$$(M2)^d = -411.4 + 5.45\ Yn$$

$$(-.42) \quad (3.61)$$

$$R^2 = 0.483 \quad SE = 612.75 \quad DW = 1.39$$

$$(M2A)^d = -544.2 + 5.92\ Yn$$

$$(-0.5) \quad (3.7)$$

$$R^2 = 0.494 \quad SE = 651.1 \quad DW = 1.39$$

<u>The period 1975-82</u>

$$(M1)^d = -205.99 + 1.75\ Yn$$

$$(-2.15) \quad (9.64)$$

$$R^2 = 0.756 \quad SE = 176.63 \quad DW = 1.04$$

$$(M1A)^d = -68.1 + 2.01\ Yn$$
$$(-0.69) \quad (10.7)$$
$$R^2 = 0.792 \quad SE = 182.44 \quad DW = 1.21$$

$$(M1B)^d = -639.65 + 5.1\ Yn$$
$$(-2.83) \quad (11.94)$$
$$R^2 = 0.826 \quad SE = 415.58 \quad DW = 1.54$$

$$(M2)^d = -793.72 + 5.98\ Yn$$
$$(-3.28) \quad (13.07)$$
$$R^2 = 0.851 \quad SE = 445.03 \quad DW = 1.82$$

$$(M2A)^d = -825.8 + 6.29\ Yn$$
$$(-3.2) \quad (12.9)$$
$$R^2 = 0.849 \quad SE = 471.8 \quad DW = 1.75$$

These empirical results reveal inadequacy of the specification, as the R^2 and DW statistcs verify some missing variables. Moreover, equations estimated over the period 1975-78 produce higher DW statistics than those estimated over the period 1979-82, which may indicate missing variables in the latter. If it is assumed that one of the missing variables is interest rate, then this surely implies growing financial sophistication in the period 1979-82 as compared with the earlier period.

It is still useful to test for the stability of the function using this specification. A finding in favour of stability will enhance the credibility of the results, because missing variables often cause instability. Performing a Chow test requires the sum of squares of empirical residuals of all of these regressions. The following notation is used:

$\sum e_1{}^2$= residual sum of squares of period 1 (1975-78)

$\sum e_2{}^2$= residual sum of squares of period 2 (1979-82)

$\sum e_t{}^2$= residual sum of squares of total period (1975-82).

Strictly speaking, the Chow test of stability is basically a test of whether the function has shifted significantly from one sub-period to the other. To reject the null hypothesis that the function is stable at the a significance level, the following condition must be satisfied:

$$F^* > F_a(k, n-2k)$$

where

$$F^* = \frac{\{\sum e_t{}^2 - (\sum e_1{}^2 + \sum e_2{}^2)\} / k}{(\sum e_1{}^2 + \sum e_2{}^2)/(n-2k)}$$

and

k = number of estimated coefficients including the constant term (2 in this case),

n = number of observations (32 in this case)

Table 4.2 shows the residual sum of squares and the F* value for the four monetary aggregates.

Table 4.2: Residual Sums of Squares and F Statistics

	$\sum e_1{}^2$	$\sum e_2{}^2$	$\sum e_t{}^2$	F*
M1	42783	855182	935995	0.59
M1A	88620	899075	998505	0.15
M1B	412476	4756551	5181153	0.03
M2	456864	5256461	5941493	0.56
M2A	472183	5935037	6677857	0.59

Since $F_{0.05}$ (2,28) = 3.34, the demand for all of the monetary aggregates under investigation was stable over the period 1975-82, despite the missing variables. The lowest value of F* was found for M1B which means that the demand for M1B has been the most stable of all monetary aggregates, and this is verified graphically in Figures 4.1-4.5. It must be mentioned, however, that there are difficulties associated with the Chow procedure, specifically that it depends on an arbitrary choice of the break point and is not powerful for small samples.

4.5. Predictability of the Demand for Money

To enhance the predictive power of the demand function, the specification is improved by incorporating a lagged dependent variable reflecting the process of adjustment from actual to desired balances. As income changes, reflecting changes in economic activity, people restructure their portfolios, switching from less liquid to more liquid assets, or vice versa. They may choose, for example, to switch from time deposits to demand deposits, or from foreign currency deposits to local currency saving deposits, for transactions and precautionary purposes. This process of adjustment is not instantaneous, however, since time deposits are tied up for fixed periods and cannot be liquidated before maturity, at least not without incurring some cost. Keran and Al-Malik (1979) point out that the lag is especially important when both money and income are accelerating at a rapid rate, referring to the case of Saudi Arabia. In Kuwait, changes have also been occurring rapidly, so it seems fair to assume an adjustment lag of one quarter. The rationale for lag dependent variables in the demand for money functions will be discussed in detail in Chapter 6 but, for the time being, suffices it to say that an adjustment lag of one quarter is justified on the grounds that the average maturity of deposits at Kuwait's commercial banks is three months. Using a specification that incorporates a stock adjustment mechanism represented by lagged dependent variable, the following demand functions have been estimated for the five monetary aggregates using 31 quarterly observations.

Figure 4.1

Stability of the Demand for M1

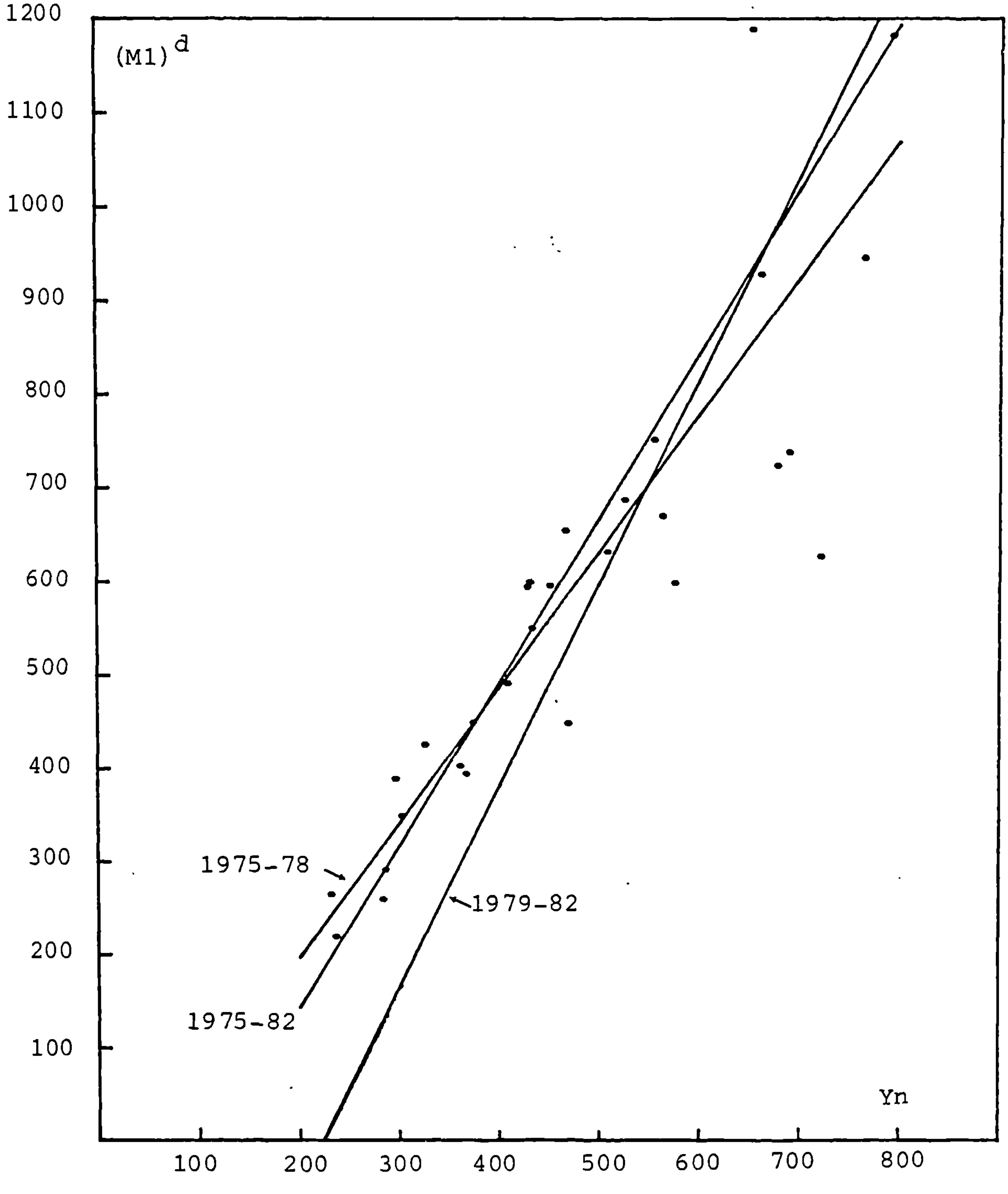


Figure 4.2

Stability of the Demand for M1A

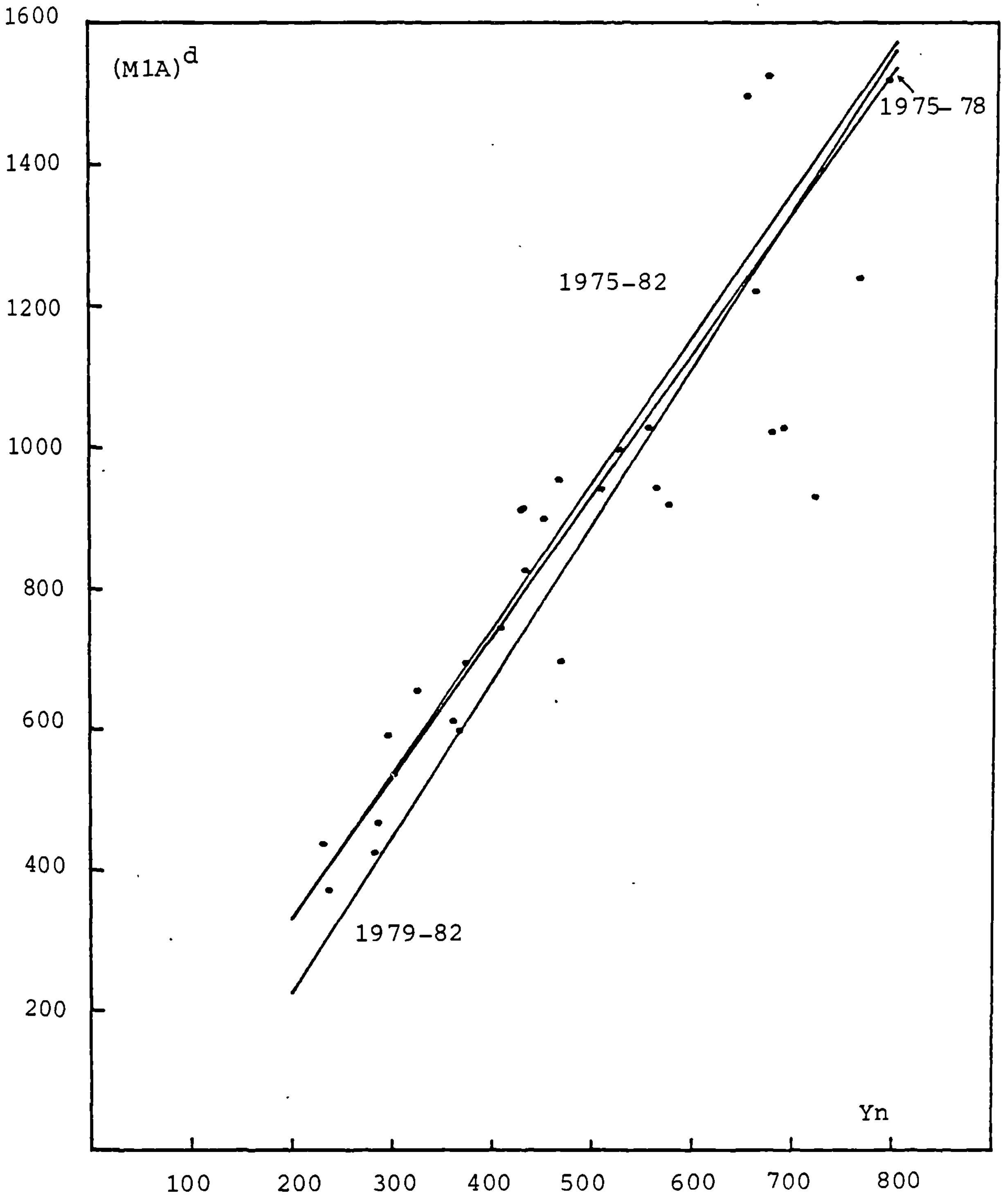


Figure 4.3

Stability of the Demand for M1B

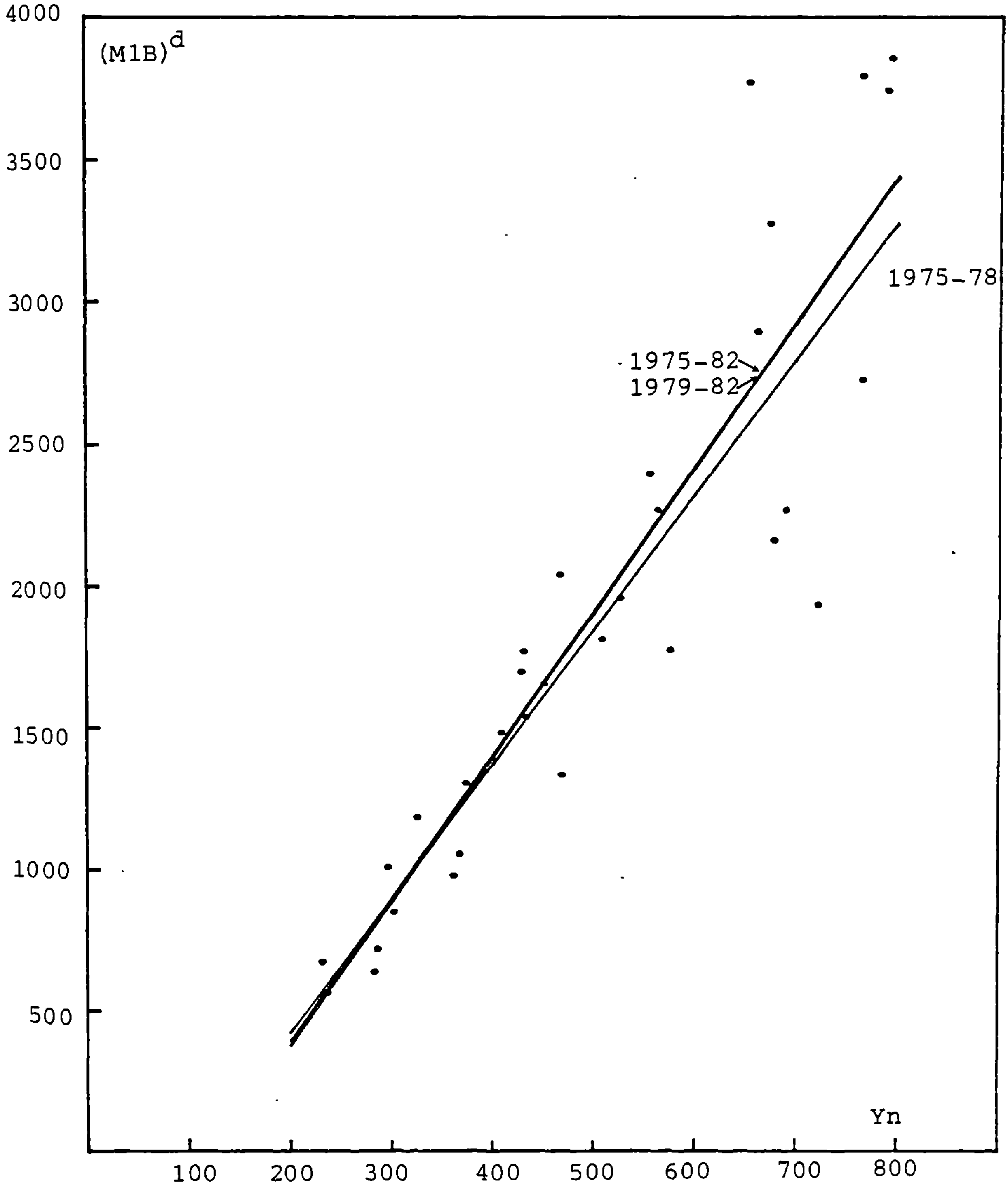


Figure 4.4

Stability of the Demand for M2

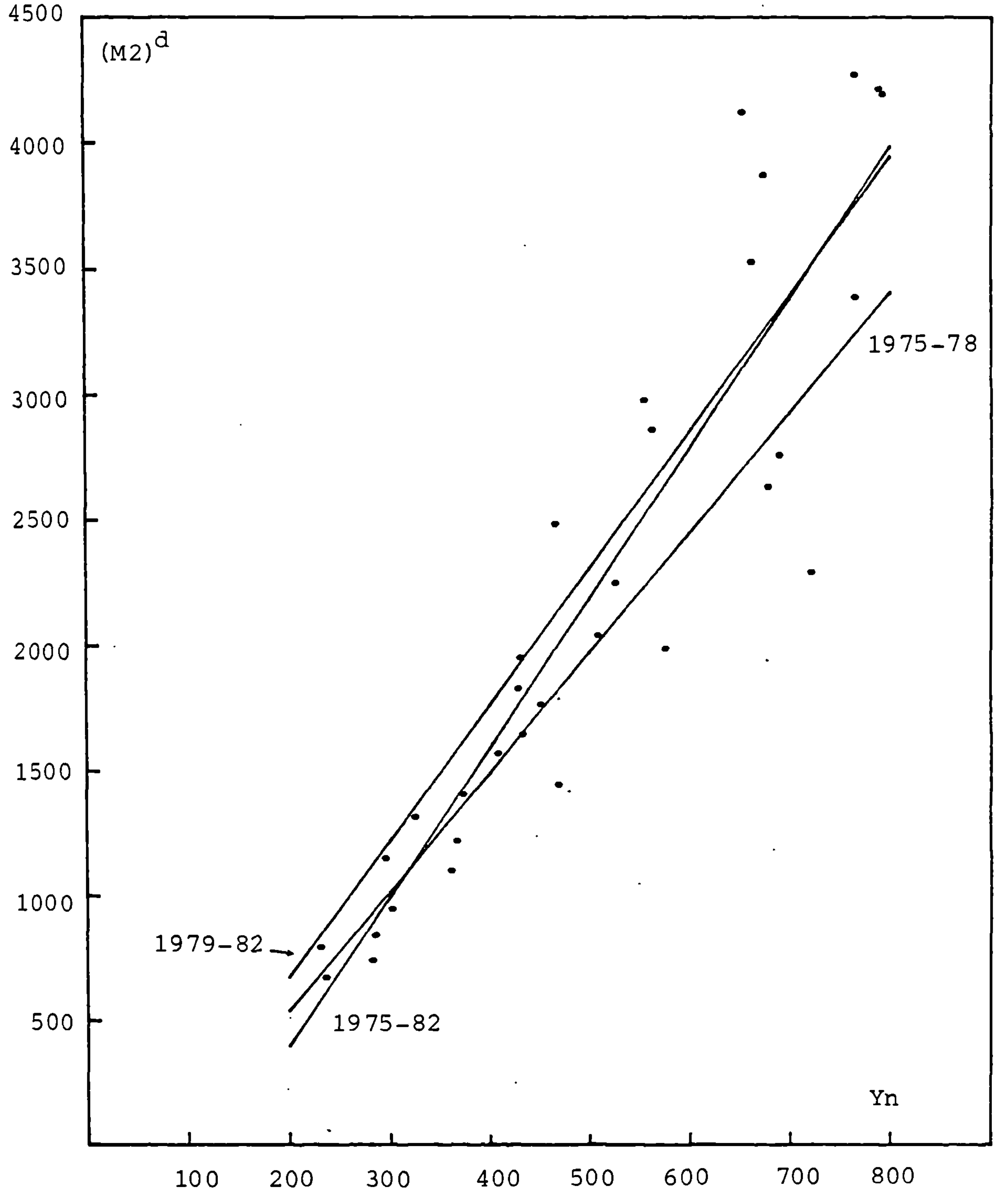
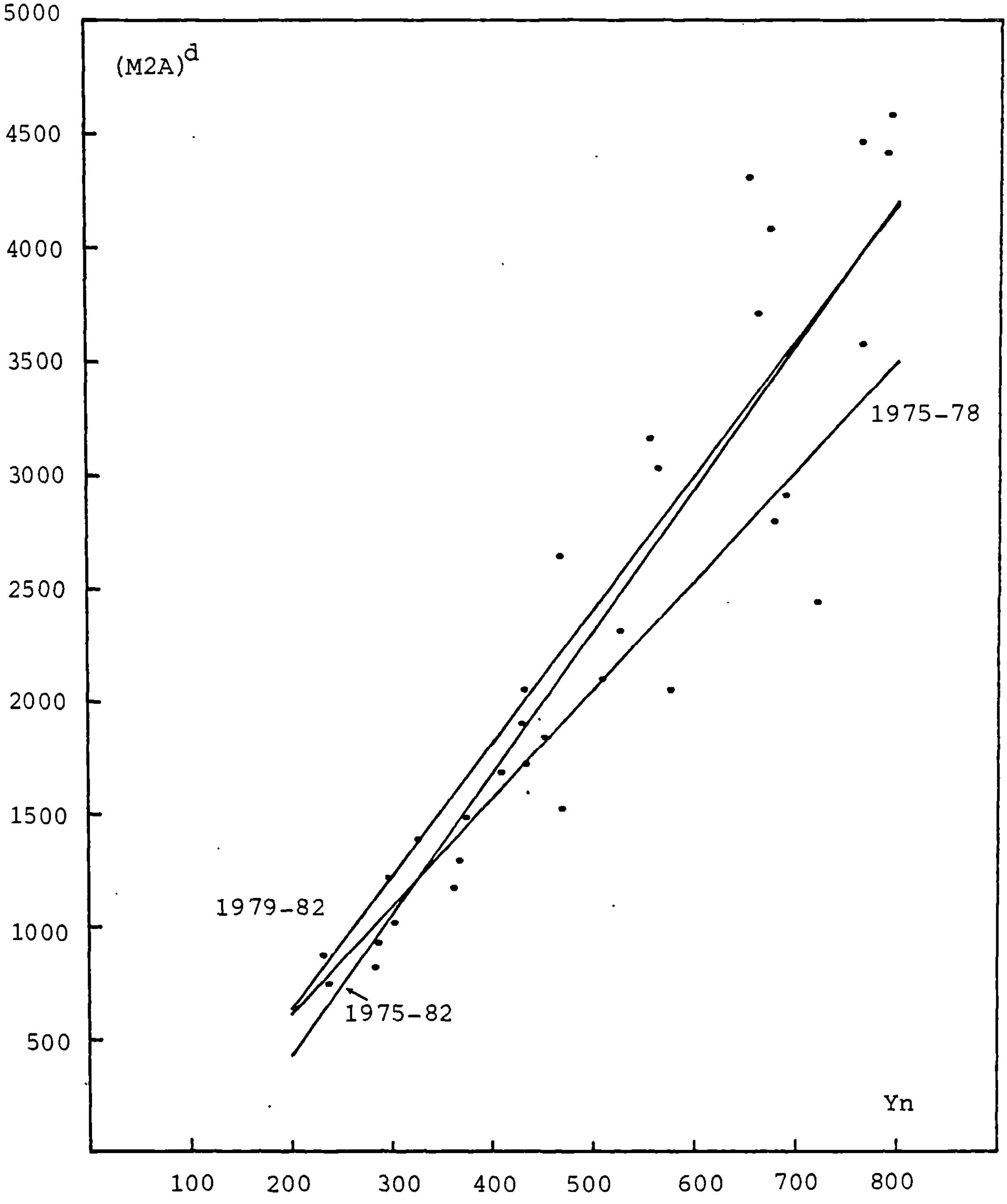


Figure 4.5

Stability of the Demand for M2A



$$(M1)^d = -69.99 + 0.55\ Yn + 0.73\ (M1)_{t-1}$$
$$(-1.09) \quad (2.74) \quad (7.36)$$
$$R^2 = 0.912 \quad SE = 106.75 \quad DW = 1.51$$

$$(M1A)^d = -22.67 + 0.63\ Yn + 0.72\ (M1A)t-1$$
$$(-0.35) \quad (2.82) \quad (7.25)$$
$$R^2 = 0.923 \quad SE = 111.25 \quad DW = 1.56$$

$$(M1B)^d = -24.63 + 0.35\ Yn + 0.97\ (M1B)t-1$$
$$(-0.37) \quad (1.39) \quad (20.95)$$
$$R^2 = 0.989 \quad SE = 105.32 \quad DW = 1.51$$

$$(M2)^d = -29.42 + 0.50\ Yn + 0.95\ (M2)_{t-1}$$
$$(-0.45) \quad (1.96) \quad (23.98)$$
$$R^2 = 0.993 \quad SE = 99.24 \quad DW = 1.76$$

$$(M2A)^d = -1059.1 + 3.41\ Yn + 3.19\ (M2A)_{t-1}$$
$$(-5.47) \quad (5.64) \quad (5.23)$$
$$R^2 = 0.919 \quad SE = 327.51 \quad DW = 0.99$$

The measure of predictability that is used here is the ratio of the standard error of the estimates to the mean value of the dependent variable. Dividing by the mean is necessary to eliminate the scale factor and make comparison easy, as presented in Table 4.3.

Table 4.3: Measures of Predictability of the Demand for Money

Monetary Aggregate	Ratio of Standard Error to the Mean
M1	0.1564
M1A	0.1169
M1B	0.0540
M2	0.0443
M2A	0.0432

Since lower values of the ratio of standard error to the mean indicate better predictability, a value of 0.0432 for M2A implies a marginally better predictability than for M2, which is better by far than any of the other aggregates. This is illustrated graphically in Figures 4.6-4.10. It may seem peculiar that the demand for M2 has a better predictability than M1B, even though the demand for the latter was found to be more stable, but a different specification is used here, one that contains a lagged dependent variable. The reason why this same specification was not used to conduct the Chow test is that this test is not strictly appropriate for equations containing lagged dependent variables (see Goldfeld (1973)).

In conclusion, if attention is to be focused on a single monetary aggregate, the broad M2 is the one that should be monitored and controlled. Empirical evidence indicates that it is the most highly correlated with non-oil GDP, that the demand for it has shown stability and can be accurately predicted. The inclusion of government deposits in the definition of money does not result in any significant improvement.

4.6. A Theoretical Monetary Aggregate

Following Gurley (1960) and Chetty (1969), a monetary aggregate can be derived as a weighted average of the financial assets that comprise broad money M2. The correlation of this aggregate with economic activity will be tested subsequently.

The monetary aggregate Mw is defined as

$$Mw = \sum_{i=1}^{5} w_i \, A_i$$

Figure 4.6

Demand for M1: Actual and Predicted

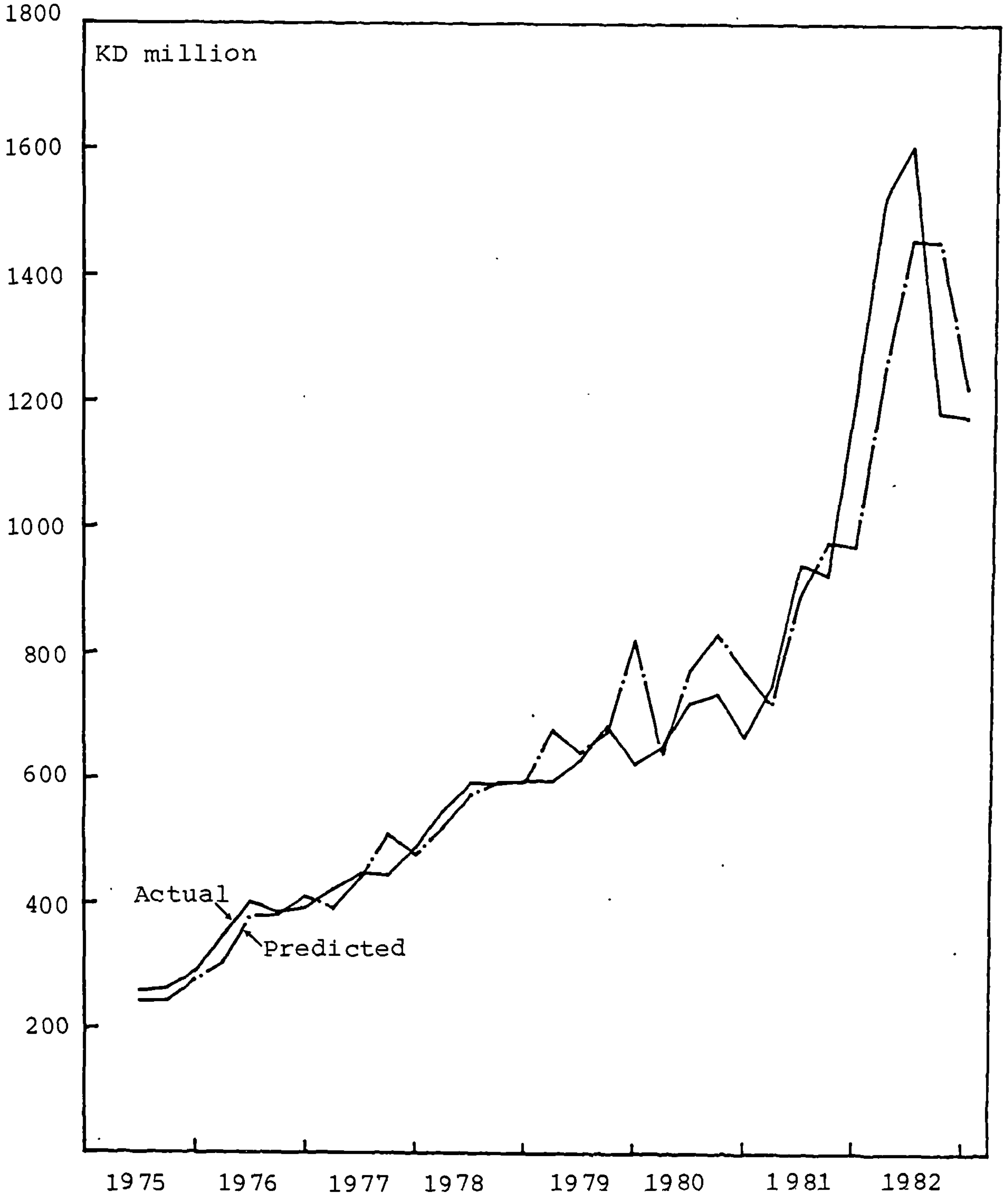


Figure 4.7

Demand for M1A: Actual and Predicted

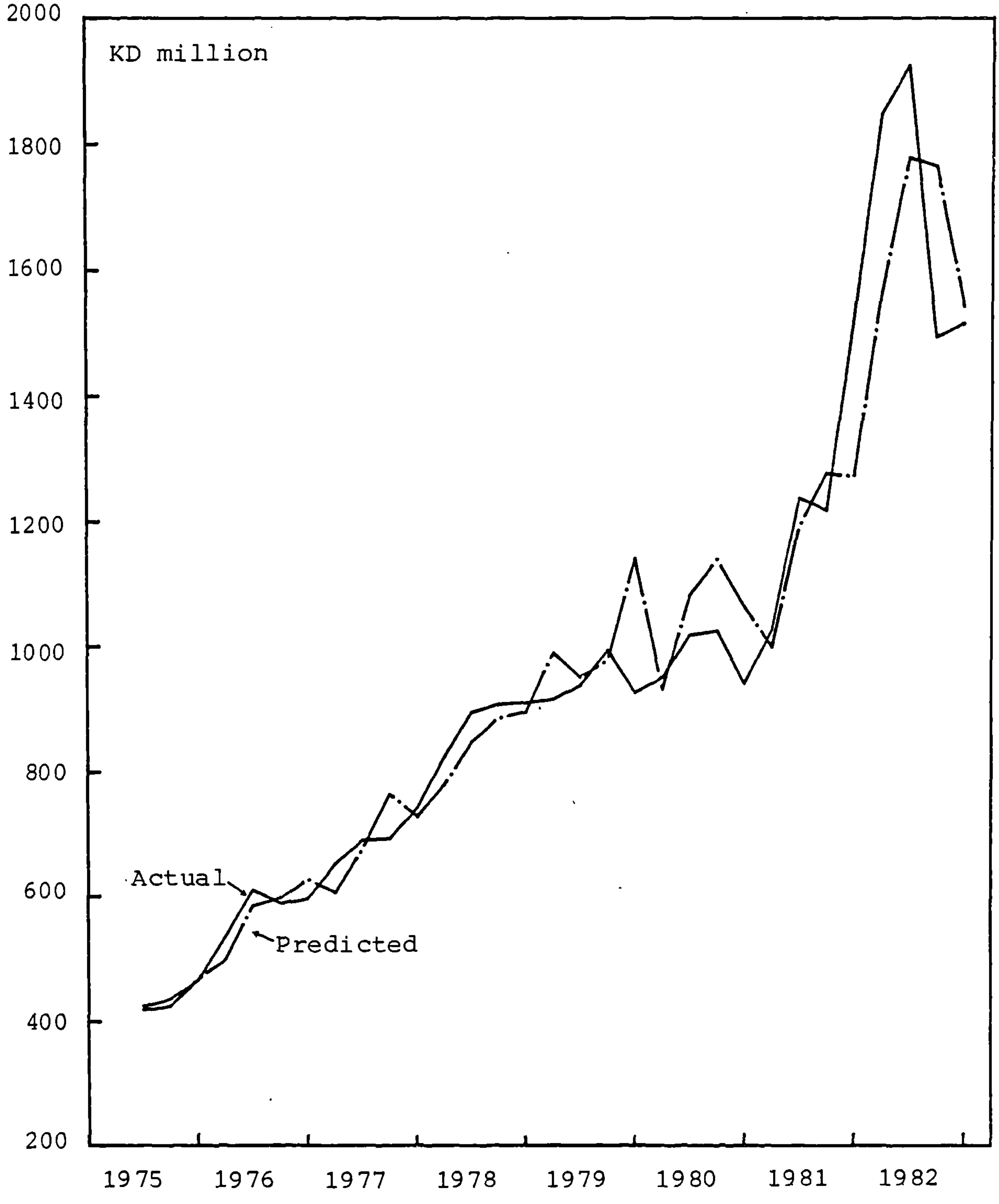


Figure 4.8

Demand for M1B: Actual and Predicted

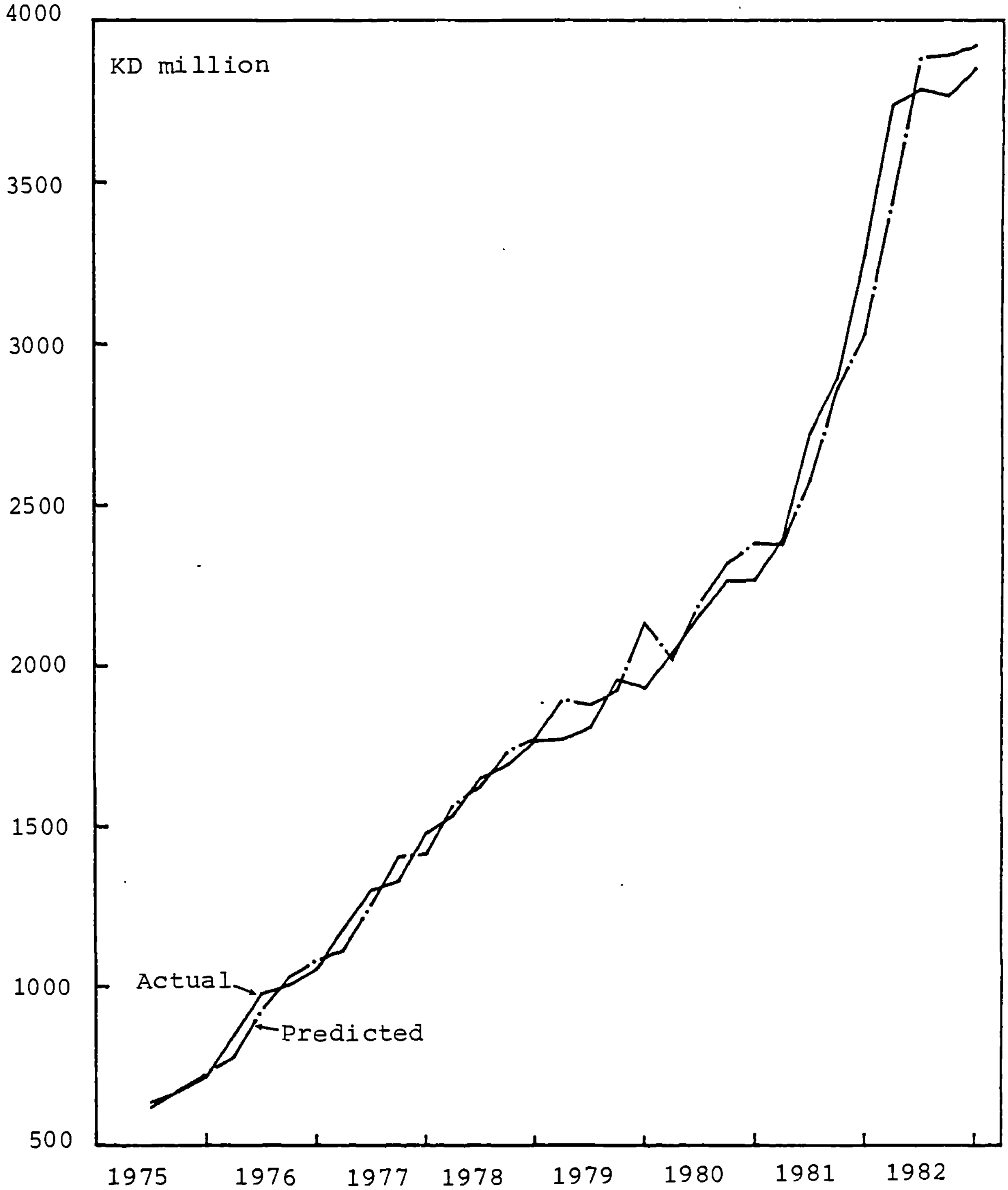


Figure 4.9

Demand for M2: Actual and Predicted

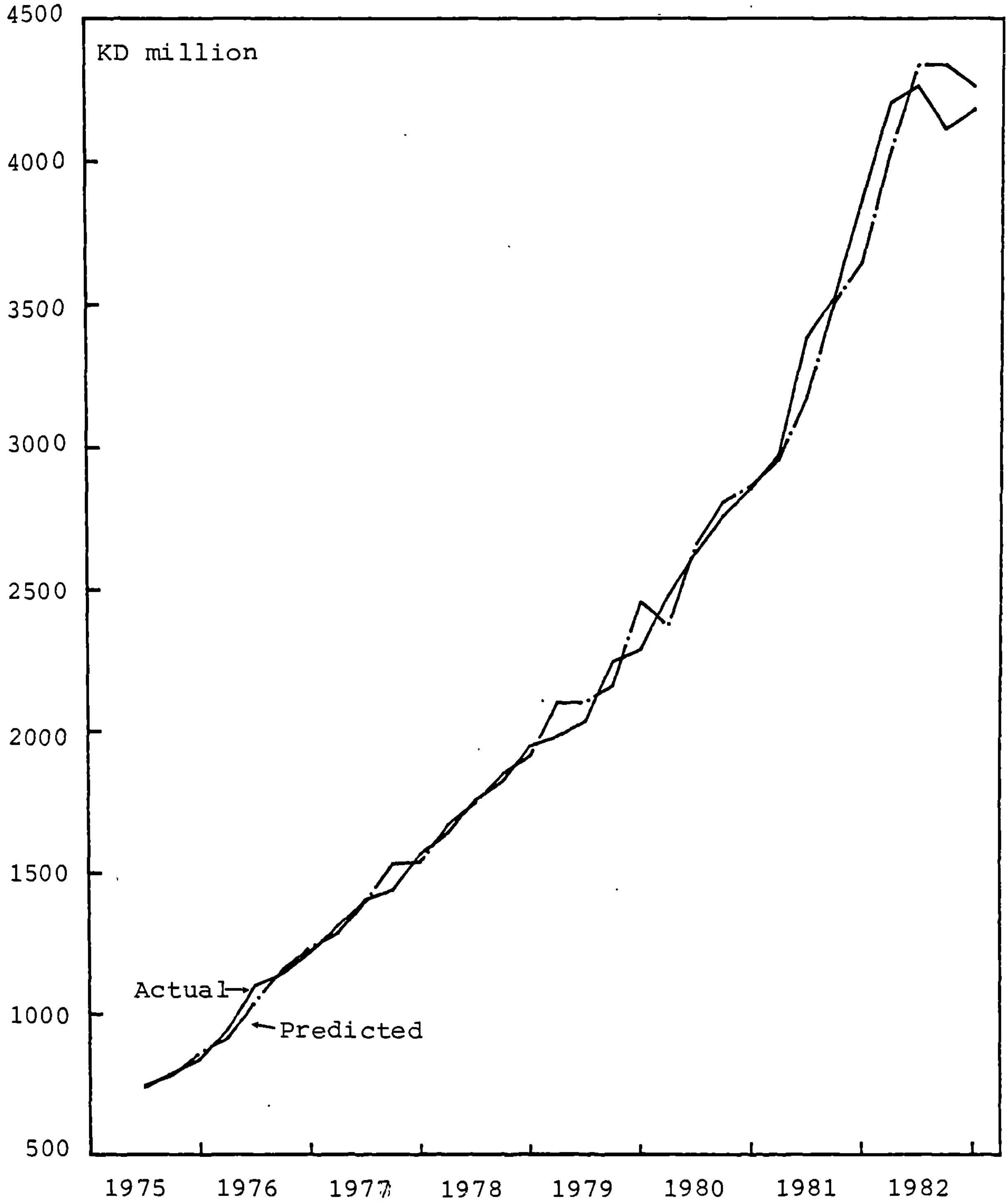
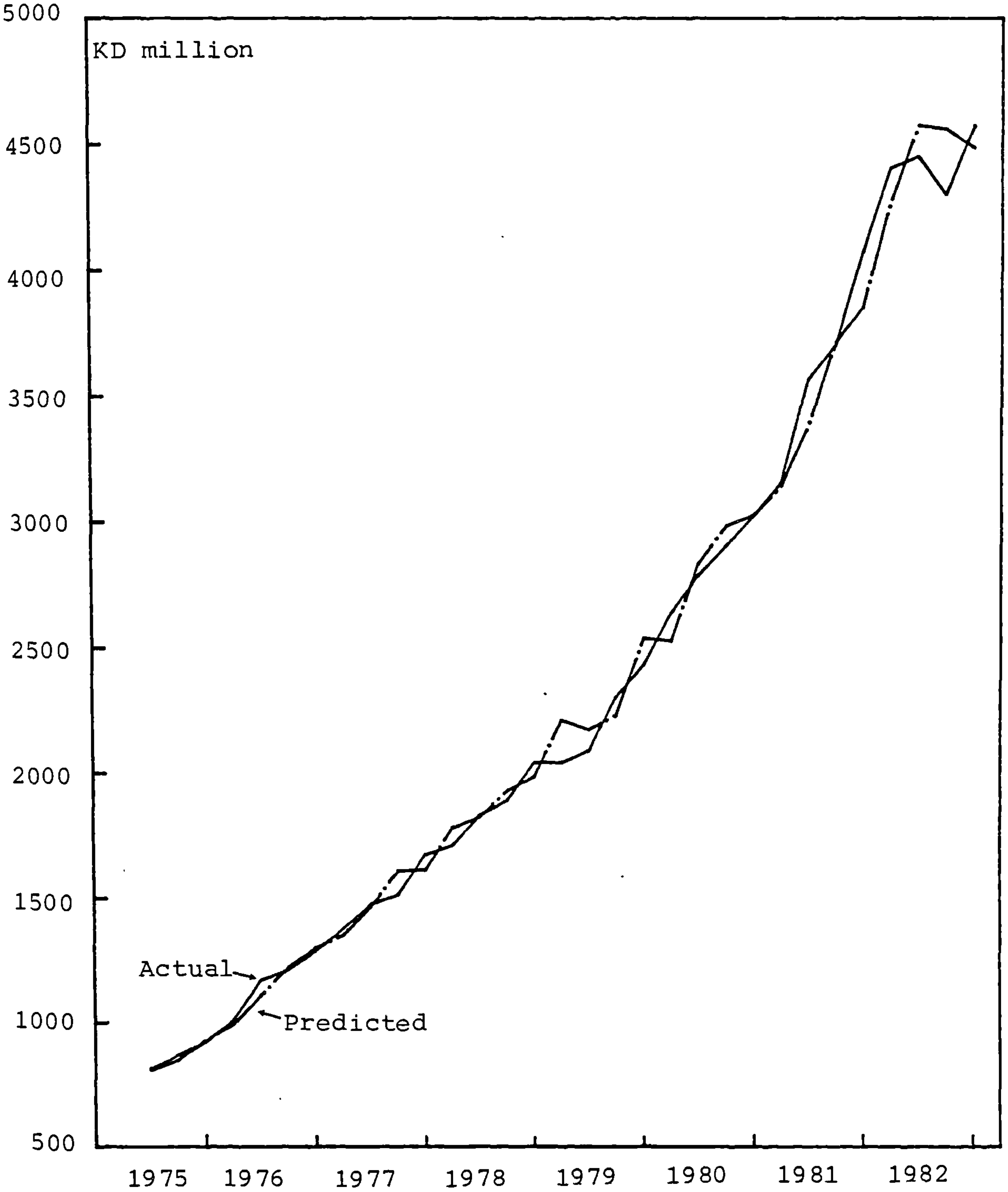


Figure 4.10

Demand for M2A: Actual and Predicted



such that

$$\begin{bmatrix} A_1 \\ A_2 \\ A_3 \\ A_4 \\ A_5 \end{bmatrix} = \begin{bmatrix} C \\ D \\ S \\ T \\ F \end{bmatrix}$$

It is obvious that if $w_1 = w_2 \ldots\ldots\ldots = w_5 = 1$, then Mw will be equivalent to M2. The weights are to be estimated by the method of principal components. Since C, D, S, T and F are all measured in the same units (Kuwaiti Dinars), we can use their actual instead of standardised values.

The correlation matrix R of C, D, S, T and F is as follows:

$$R = \begin{bmatrix} 1 & 0.897 & 0.815 & 0.990 & 0.795 \\ 0.897 & 1 & 0.704 & 0.889 & 0.653 \\ 0.815 & 0.704 & 1 & 0.774 & 0.545 \\ 0.990 & 0.889 & 0.774 & 1 & 0.760 \\ 0.795 & 0.653 & 0.545 & 0.760 & 1 \end{bmatrix}$$

Since R is a symmetric matrix, it follows that

$$\sum_j R_{1j} = \sum_i R_{i1} = 4.497$$

$$\sum_j R_{2j} = \sum_i R_{i2} = 4.143$$

$$\sum_j R_{3j} = \sum_i R_{i3} = 3.838$$

$$\sum_j R_{4j} = \sum_i R_{i4} = 4.413$$

$$\sum_j R_{5j} = \sum_i R_{i5} = 3.753$$

$$\sum_i \sum_j R_{ij} = \sum_j \sum_i R_{ij} = 20.644$$

According to the method of principal components, the weights are given by

$$w_i = \sum_j R_{ij} / \sum_i \sum_j R_{ij}$$

Therefore

$$\begin{bmatrix} w_1 \\ w_2 \\ w_3 \\ w_4 \\ w_5 \end{bmatrix} = \begin{bmatrix} 0.990 \\ 0.912 \\ 0.845 \\ 0.971 \\ 0.826 \end{bmatrix}$$

and

$$\sum w_i^2 = 4.151$$

which means that the first principal component Mw explains 83 percent of total variation in C, D, S, T and F.

Having estimated the weights, it is possible to derive a time series for Mw. Further calculations reveal the following:

(i) The correlation coefficient between Mw and non-oil GDP is 0.919, which is less than that between M2 and non-oil GDP.

(ii) The "theoretical" demand for Mw was stable over the period 1975-82 as indicated by the Chow-test (F* = 0.48) and Figure 4.11.

(iii) The "theoretical" demand for Mw had good predictability using a model that contains non-oil GDP and a lagged dependent variable as explanatory variables. The ratio of the standard error of the estimate to the mean value of the dependent variable turned out to be 0.042 (see Figure 4.12).

Figure 4.11

Stability of the Demand for Mw

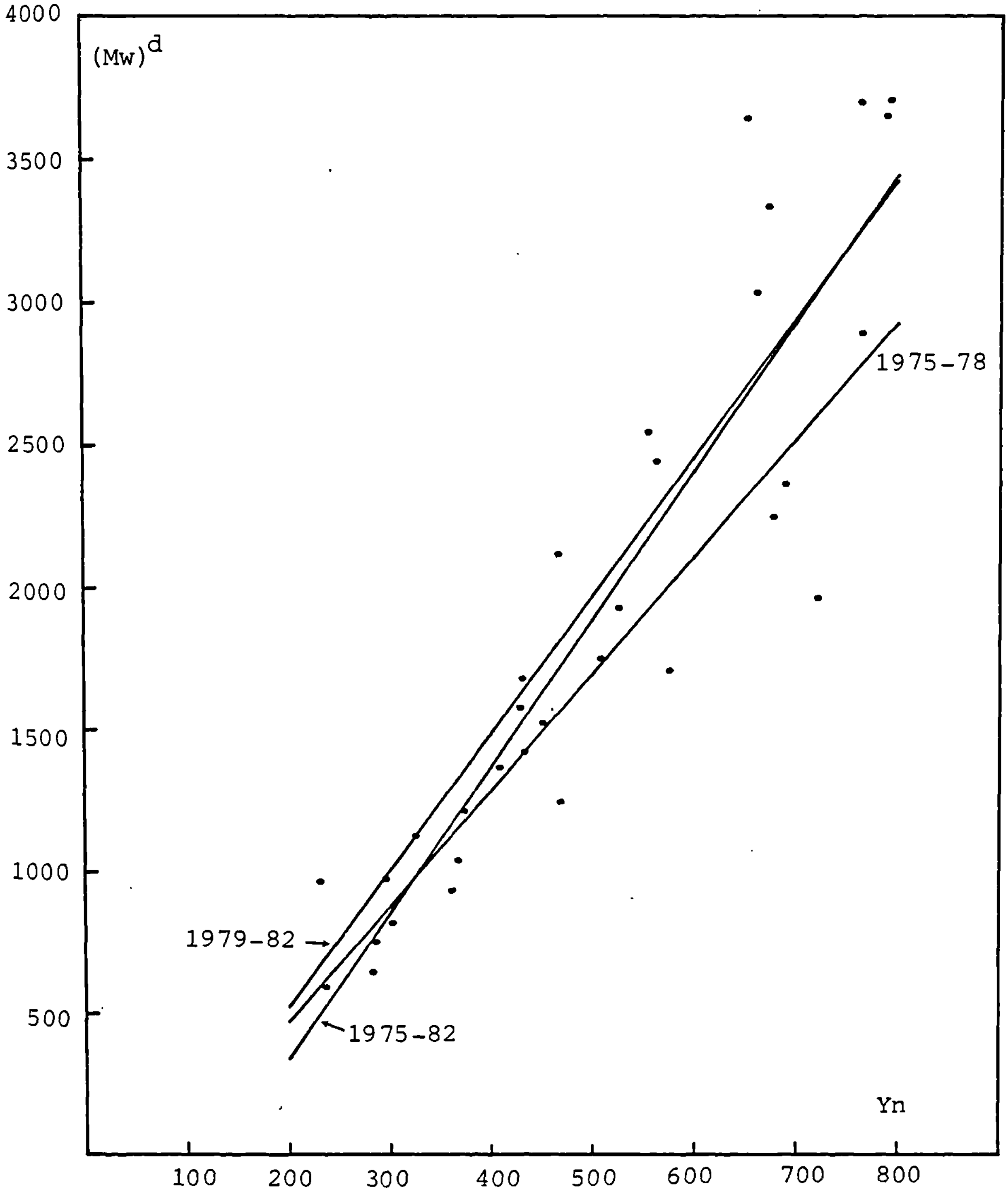
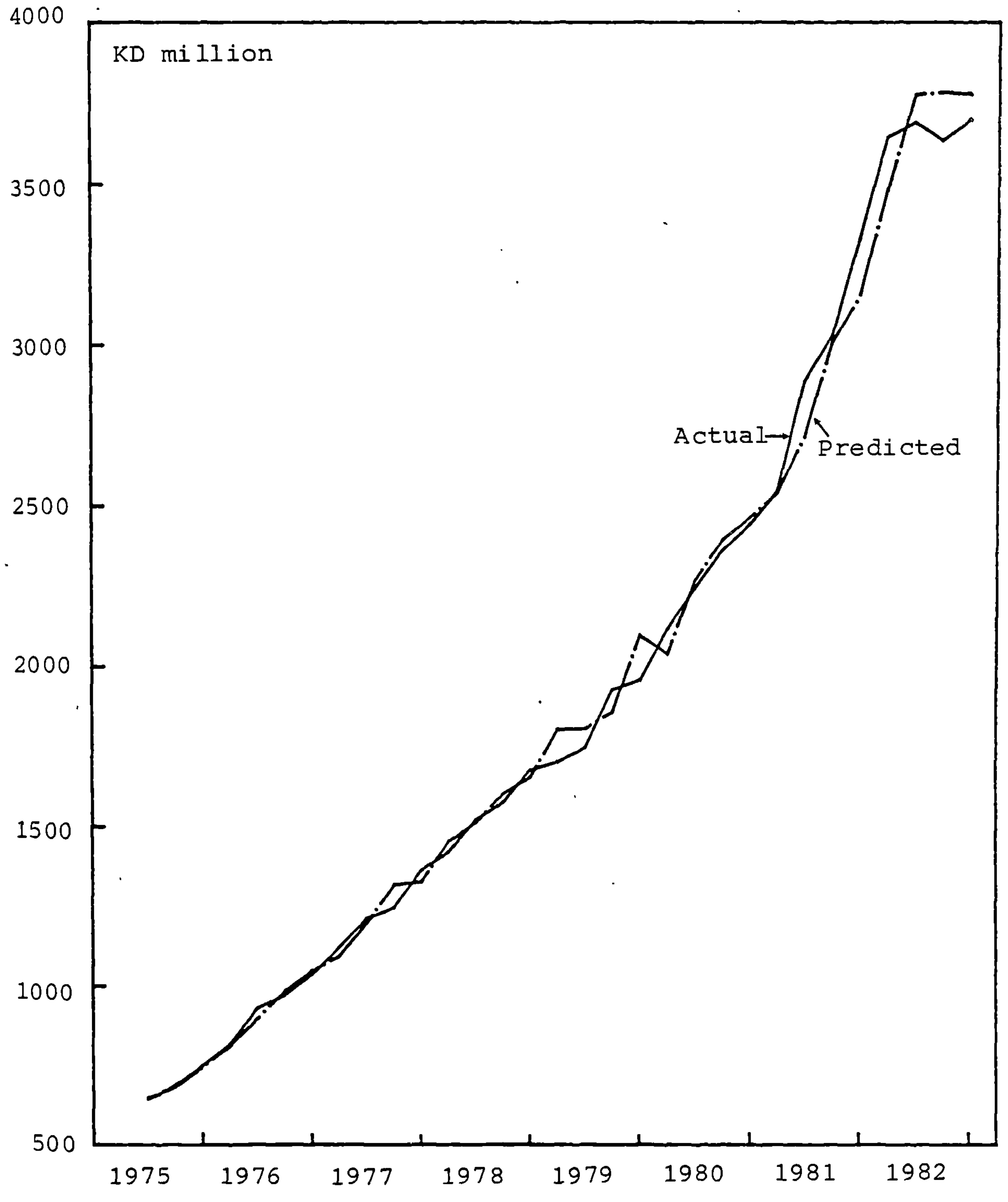


Figure 4.12

Demand for Mw: Actual and Predicted



The concept of Mw, however, remains of little practical importance as no valid economic interpretation can be given to the weights. This, indeed, is the problem with the method of principal components. In any case, it is not significantly superior to M2 with respect to stability and predictability.

4.7. Velocity of Circulation

The capacity of the monetary sector to finance economic development by expanding the money supply without causing inflation depends on the behaviour of the income velocity of circulation of money, defined as the ratio of income to the money stock. If velocity falls as real per capita income rises, monetary expansion is more desirable and effective than if it rises or stays unchanged.

Economists have, in general, argued that velocity is a negative function of per capita income. One of the reasons to explain this inverse relationship is the conviction that as the savings to income ratio rises during development, it causes the ratio of money to income to rise also, implying falling velocity. Such studies include Friedman (1960), Selden (1956), Gurley (1967), Ezekiel and Adekunle (1969), Soligo (1967), the United Nations (1967), and Melitz and Correa (1970). Friedman and Selden have each shown that velocity in the United States is a negative function of per capita real income. Gurley has estimated a regression for a cross section of 70 countries for which velocity was found to be a decreasing function of per capita GNP. Ezekiel and Adekunle have similarly done a more detailed cross-sectional analysis of the impact of per capita GDP on velocity in 37 countries, whereas Soligo investigated the relationship for Pakistan. The United Nation's Economic Commission for Asia and the Far East (ECAFE) investigated the relationship for Ceylon, India, Pakistan, the Philippines, South Korea and Taiwan. Lastly, Melitz and Correa found the same relationship in another cross-sectional study of 51 countries.

The results of the above-mentioned studies, however, do not provide clear-cut evidence for the negative correlation between velocity and per capita income. Chow's (1966) work on the United States produced contradictory results to those of Friedman and Selden. Ezekiel and Adekunle were not very successful in estimating statistically significant velocity equations in which per capita income had a negative sign. Moreover, Melitz and Correa discarded per capita real GNP from their final regressions because it seemed statistically insignificant. For Pakistan, Soligo found that there had been no definite trend in velocity and he did not use per capita income to explain its behaviour. The United Nation's study concluded that "the secular behaviour of income velocity in these countries shows considerable diversity."

In this context, Short (1973) questions the justification for concluding that what is true for the United States, or cross-sections of developed and underdeveloped economies, is true (over time) for any single underdeveloped economy. He argues that "the fact that velocity decreases as one goes in a cross-section to countries with higher and higher per capita incomes is not, a priori, inconsistent with the velocity of each country increasing as its per capita income rises over time." He further argues that available empirical evidence for developing economies suggests that velocities have not fallen uniformly as per capita incomes have risen. This is not necessarily inconsistent with long-run declining velocity, however.

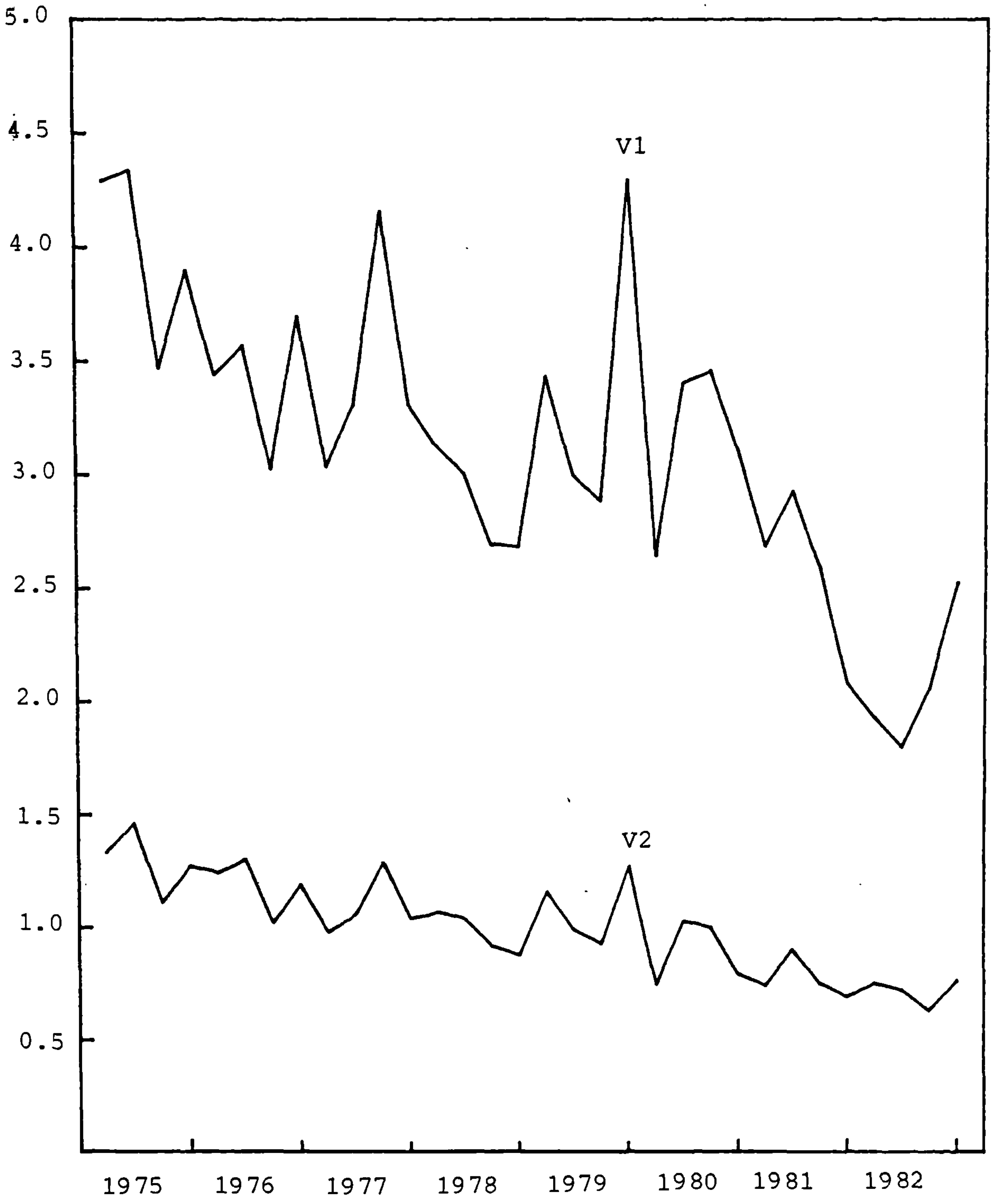
Short estimated various velocity equations for Malaysia and Singapore using annual data over the period 1951-66. As explanatory variables he used -in addition to per capita income- the number of bank offices as a proxy for the change in monetary habits, interest rate, and rate of change of prices as a proxy for the opportunity cost of holding money. He found evidence in favour of the negative relationship between velocity and per capita income, but he qualified his results by stating that "the negative impact of per capita real income upon velocity was overpowered by the change in monetary habits which the increase in bank offices caused." He concluded that since greater use of the banks' services raises velocity, it is possible that closer observation of underdeveloped economies, where velocity has paradoxically risen with per capita income, might reveal institutional changes which have overwhelmed the inverse relation between per capita income and velocity. Indeed, such a phenomenon has been noticed in developed countries. For example, Goodhart (1969) and Breton (1969) have located a shift in velocity in Canada caused by an institutional change originating from revised banking legislation.

For Kuwait, Mansour (1983) points out that in the short run and at times of heightened economic activity, income grows faster than the money stock, which results in higher velocity. Alternatively, when economic activity slackens, the money stock grows more rapidly than income, which results in lower velocity. Therefore, velocity is an increasing function of per capita income in the short run. Figure 4.13 shows the behaviour of the velocity of circulation for narrow money V1 and broad money V2.

Empirical evidence in support of Mansour's hypothesis has been found. Analysis of quarterly data for the period 1977-82 revealed statistically significant positive correlation between velocity of narrow and broad money stocks on the one hand, and real per capita GDP on the other, where velocity is defined as the ratio of non-oil GDP (measured at annual rates) to the money stock. Oil GDP was excluded from the definition of velocity because the bulk of it is not traded in local currency, but it is included in the definition of real per

Figure 4.13

Income Velocity of Circulation



capita income. Two equations were estimated for the velocity of narrow money V1 and broad money V2 in which two explanatory variables were used: real per capita GDP (Y*/N) where N is population, and interest rate r which is the end-period 3 month interbank rate. The following results were obtained using log-log formulations:

$$\log V1 = -5.25 + 0.85 \log (Y^*/N) - 0.34 \log r$$
$$(-5.3) \quad (6.9) \qquad (-4.4)$$
$$R^2 = 0.720 \quad SE = 0.121 \quad DW = 2.04$$

$$\log V2 = -4.35 + 0.62 \log (Y^*/N) - 0.40 \log r$$
$$(-4.6) \quad (5.2) \qquad (-5.5)$$
$$R^2 = 0.682 \quad SE = 0.116 \quad DW = 2.33$$

Attempts to incorporate other explanatory variables such as the number of bank branches and the inflation rate did not improve the results. Unfortunately, there is no proper quantitative measure of attitude towards the use of banking services in Kuwait (Ghuloum (1984)) which could have been used as a further explanatory variable in the two equations. It may be that the absence of such a variable is partly responsible for the relatively low R^2 and the paradoxical negative sign of the interest rate. Yet another explanation for this negative sign is that aggregated monetary variables, M1 and M2, were used to calculate V1 and V2. We shall see later (Chapter 6) that only the demand for demand deposits produces a significant negative response to changes in interest rate. The demand for currency is not significantly affected by interest rate, whereas the demand for quasi-money (the bulk of M2) is positively related to it. Thus, the use of aggregated monetary variables in the demand for money equations, together with the existence of time trend, produce a positive sign in the interest rate coefficient implying a negative sign in the velocity equations, since velocity is the ratio of income to money.

4.8. Time-Series Analysis of Monetary Growth

Time-series techniques are sometimes useful for analysing the money growth process. A typical case arises when there is no reliable behavioural model for the central bank and when a time series forecasting model has a better track record than a behavioural model, provided that the sole purpose of such a modelling exercise is forecasting rather than hypothesis testing.

Rutledge (1981) argues that the central bank is subject to so many pressures that it is difficult to get sufficient observations on its behaviour to make firm statements about the structure and stability of the factors affecting monetary growth. He gives several examples of the sources of pressure on the central bank, including the proximity of next elections (the political business cycle), unemployment, trade unions, interest rates, inflation, foreign exchange markets, and public opinion in general. However, the central bank is subject to these pressures only to the extent of its (lack of) autonomy from the government, because it is the government that is subject directly to these pressures. If the central bank is autonomous and follows a monetary rule, then it will not be subject to these pressures.

Rutledge proposes a much simpler hypothesis whereby monetary gorwth is approximated by an autoregressive process of the form

$$M_t = \sum_{i=1}^{m} a_i \, M_{t-i} + e_t$$

where a_i denotes parameters and e_t represents the error term. Applying this methodology to U.S. quarterly data over the period 1963-78 using a maximum lag of 7 quarters, he found the coefficients at t-1, t-2, t-5 and t-6 to have contributed significantly to the process deriving M_t. He further presented several estimates of the money growth process over different historical periods in order to isolate structural shifts in the process determining monetary growth; he found that the U.S. money growth has been rather stable in the post-1963 period.

It is not justifiable to use such methodology to study monetary growth in Kuwait because although the Central Bank of Kuwait is subject to pressures of the kinds stated by Rutledge, it is not the only -or the major- determinant of the money supply. Rather, money supply is determined by the combined actions of the Central Bank, Ministry of Finance, commercial banks, the public, and the outside world. Indeed, it can be demonstrated that the behaviour of the Central Bank can be incorporated in an econometric model that explains the money supply process.

It remains true, however, that time-series models can be used to forecast the money supply and other macroeconomic variables for that matter. Lilleberg (1980), for example, used a seasonal ARIMA model to forecast the six-month Libor (London interbank offered rate). However, he admitted that while univariate time-series models can quite accurately predict a few steps ahead, they cannot understandably give us information about the trend changes in the future, and more complex models utilising the past history of related variables (e.g. multivariate ARIMA) are needed. But still, time-series analysis of economic variables can be useful. Geisst (1980), for example, has demonstrated that issuers of floating rate notes can benefit from detecting seasonal variations in Libor by time-series methods.

Indeed, the earliest known forecasting service used time-series methods. From 1876 to 1907, an Ohio farmer named Samuel Benner published 16 editions of "what years to make money on pig-iron, hogs, corn and provisions." He plotted data series and noticed regularities in their fluctuations which he attributed to some regular, but unexplained, meterological cycles. Thus, his predictions were based on a simple univariate analysis of the past regularities in a particular economic time-series (Benner (1892)).

In Granger's (1981) words, the time-series analyst's basic strategy is to try to let the data suggest the appropriate specification of a model. Because time-series analysts are not constrained by any theory, their models are usually either reduced forms or triangular recursive forms which may be estimated by OLS. Granger makes a further interesting comparison between econometricians and time-series analysts; he states that "when a time-series analyst finds that his model is not forecasting very well, he is inclined to add further lagged terms, but when an econometrician is unhappy with his model, he adds further equations."

Ashley and Granger (1979) attempted a synthesis of the two approaches by subjecting the residuals from equations of an econometric model (the St. Louis Model) to time-series analysis, both for individual series of residuals and for pairs of such series. They suggested, on the basis of their results, respecification involving a more complicated residual temporal structure, greater use of lagged dependent and independent variables and re-classification of variables between endogenous and exogenous.

The main argument against time-series models is that they are based on extrapolating past data into the future without any underlying theoretical structure. In his criticism of the work of Burns and Mitchell (1946), Koopmans (1947) argued that without resorting to theory, the findings cannot be used for policy decisions or other useful tasks because the underlying structural relationships are unknown. Vining (1949), in a reply to Koopmans, suggested that until several methods have been tried and tested, it is an unnecessary restriction on economic research to insist on one method instead of another. Evans (1969), who is a practicing econometrician, argues that if a group of economists, or other scientists for that matter, wish to develop a method for prediction without the use of theory, the main issue in such a case would be whether in fact this method is successful on a true ex-ante basis. If such a method has a better record than another one based on theory, then for strictly predictive purposes the former method is to be preferred. The conclusion is, therefore, that for strictly predictive purposes, a method is to be preferred if it has a lower mean square error on ex-ante basis, irrespective of whether or not it is built on economic theory. Indeed, Sims (1980) found a very powerful forecasting device in estimating large-scale macro models as unrestricted reduced forms, treating all variables as endogenous without restrictions based on supposed a prior knowledge.

Howrey et al (1981) point out that time-series models are irrelevant for policy considerations. Granger (1981) admits that this is true, but he emphasises that exactly the same remark can be made about a poorly specified econometric model. Indeed, he argues that the latter is even more dangerous because it may appear to have something to say about alternative policies and yet may, actually, be very misleading. Moreover, Granger criticises the econometricians' classic assumption that their residuals are either "white noise" or AR(1), and argues that such autoregressive processes are found only rarely in empirical research. He also argues against attempting to explain one variable only in terms of other variables, ignoring the past values of the dependent variable. Ando (1981), on the other hand, rejects the "absolutist" position in some of the propositions put forward by time-series analysts, but he acknowledges their contribution to applied empirical research and admits that econometric models are changing for the better because of them.

There are two advantages of time-series models. To begin with, the problem of assigning ex-ante values for exogenous variables -not an easy task- is not encountered when preparing forecasts from reduced form equations. In the case of time-series models, all that is needed to be known is past values of the dependent variable. Second, they can be very useful as a standard for evaluating the predictive performance of econometric models. Differences in exogeniety may impede cross-model comparisons, and that can be overcome by comparing various econometric models with a common time-series model that requires no exogenous information. Moreover, with time-series models there is no need to find empirical proxies for theoretically important concepts such as expectations, capacity, wealth and permanent income (McNees (1981)).

Perhaps the earliest evaluation of the forecasting capacity of econometric vis-a-vis time-series models was Christ's (1951) study of predictions generated by the Klein (1950) model for the year 1948. Christ (1956) also produced a similar evaluation of the forecasts generated by the Klein-Goldberger (1955) model for the years 1951 and 1952. These two studies showed that very simple naive models outperformed the two econometric models. Some more recent studies (e.g., Cooper (1972), Cooper and Nelson (1975)) also revealed that simple time-series models outperformed structural econometric models for most variables. However, Hirsch et al (1974) reached the opposite conclusion of the superiority of econometric model forecasts, especially over a long forecast horizon. In a more recent study, Christ (1975) also found that the ex-post forecasts of the well-known U.S. econometric forecasting models outperformed ARIMA models in the period 1956-70. Shapiro and Garman (1981) conclude that the ability of econometric models to outperform time-series models represents a change from the early post-war period, they attribute this to a combination of improved model-building techniques, improved data, and improved understanding of the economic system itself.

The author has constructed a time-series model to forecast the broad money supply in Kuwait, having noticed the poor record of the Central Bank's econometric model whose structure is not made public (Moosa (1982)). The starting point was attempting to detect seasonal variations in monthly money supply figures over the period 1977-81; and by examining the ratio of actual to trend values, no seasonal variation was detected but the money supply was found to follow an exponential growth function. The comparative out-of-sample predictive power of the model was tested against that of the Central Bank's model over the six months from October 1981 to March 1982. Forecasts were obtained by estimating an exponential growth function using the most up-to-date data, and extrapolating one month into the future, and by repeating this procedure, forecasts were obtained for the six months. When compared with the published ex-ante forecasts of the Central Bank, this simple time-series model yielded a substantially lower mean square error (714.8 against 5925.7).

McNees (1981) has raised a very important point in this respect, namely the difference in dimensionality between time-series and structural econometric models. He points out that most macroeconometric models consist of a system of (sometimes hundreds) interdependent relationships. Therefore, each time-series model is not compared with a single equation from the econometric model but with the model solution which reflects the interaction among all the variables in the model. In this context, Kmenta and Ramsey (1981 p.461) argue that although, under some circumstances, time-series models outperform structural econometric models, the former are not valid competitors for the latter because they do not provide any economic knowledge.

While this may seem an endless debate, recent writings have shown a convergence of views on the propositon that it is useful to combine the traditional structural econometric models with modern time-series approaches in building, analysing and using models. Granger (1981) points out that the eventual objective of both econometricians and time-series analysts is to produce a good approximation to the true underlying generating process for the macroeconomy, and so both sides have something to contribute to the discovery of such a model, assuming that it exists.

4.9. Applications for Kuwait

In this section, a more sophisticated time-series analysis of monetary growth will be presented. The purpose of this analysis is to test for randomness, stationarity and seasonality using a time-series for M2 of 96 monthly observations covering the period 1975-82. These tests are based on the behaviour of autocorrelation coefficients, i.e. the correlation coefficients between the money supply and its lagged values. If R_1 denotes the autocorrelation coefficient between M_t and M_{t-1}, then

$$R_1 = \frac{\text{Cov}\ (M_t,\ M_{t-1})}{\sqrt{\text{Var}\ (M_t)\ \text{Var}\ (M_{t-1})}}$$

and, in general, if R_i denotes the autocorrelation coefficient between M_t and M_{t-i}, then

$$R_i = \frac{\text{Cov}\ (M_t,\ M_{t-i})}{\sqrt{\text{Var}\ (M_t)\ \text{Var}\ (M_{t-i})}}$$

Using the above formula and a maximum lag m of 12 months, autocorrelation coefficients were calculated for the sample of 96 monthly observations. As shown by Anderson (1942) and others, the autocorrelation coefficients of random data have a sampling distribution that can be approximated by a normal curve with mean zero and standard deviation $1/\sqrt{n}$, where n is the sample size. Therefore, the data series is random if

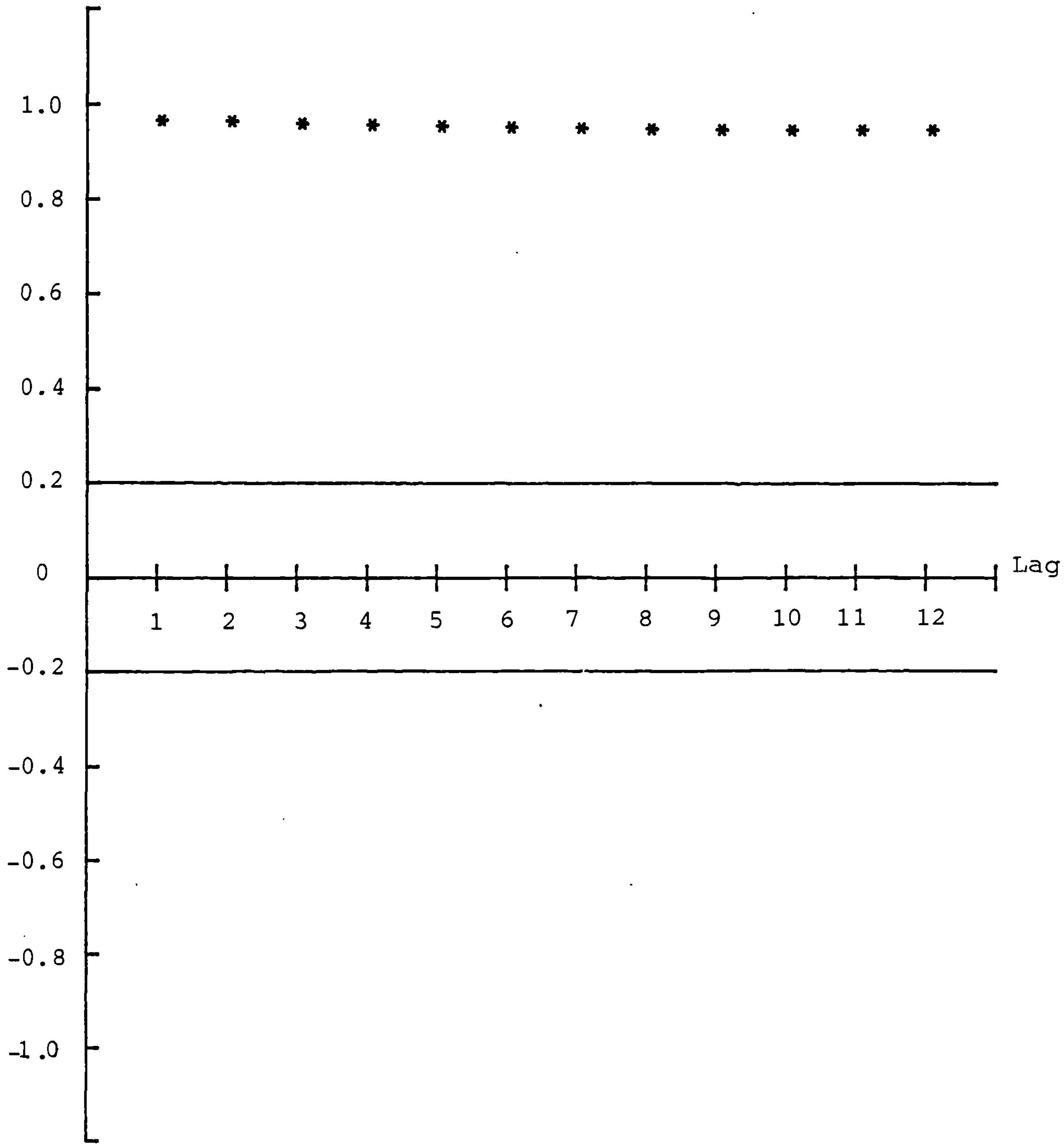
$$-\frac{1.96}{\sqrt{n}} \leqslant R_i \leqslant \frac{1.96}{\sqrt{n}}$$

where the value of 1.96 is found from the area under the normal curve. This also means that for R_i to be significant, its absolute value must exceed 1.96 times $(1/\sqrt{n})$, which in our case equals 0.20. Therefore, all of the autocorrelation coefficients are statistically significant at the 5 percent level because they were found to range between 0.985 and 0.999. Figure 4.14 plots the autocorrelation coefficients against the lag length, the two horizontal lines parallel to the x-axis marking the area out of which the autocorrelation coefficient is significant at the 5 percent level. Obviously, all of them are highly significant because they are far away from the area and very close to 1; moreover, their pattern indicates a strong time trend.

A better test of the randomness of data series has been suggested by Box and Pierce (1970) employing what has come to be known as the Box-Pierce

Figure 4.14

Autocorrelation Coefficients of Level Data of Money Supply with AR(12)



Q-statistic, which is defined as follows:

$$Q = n \sum_{i=1}^{m} R_i^2$$

whereby the null hypothesis of randomness is rejected at the a significance level if

$$Q > \chi_a^2(m)$$

In this case, Q = 95.8, therefore the data series -as it is- is not random.

To test for seasonality, the time trend must first be eliminated, i.e. transforming the data into a stationary series by taking first differences. Autocorrelation coefficients are then calculated for the new series. In this case, R_1 is the autocorrelation coefficient between ΔM_t and ΔM_{t-1}, where

$$\Delta M_t = M_t - M_{t-1}$$
$$\Delta M_{t-1} = M_{t-1} - M_{t-2}$$

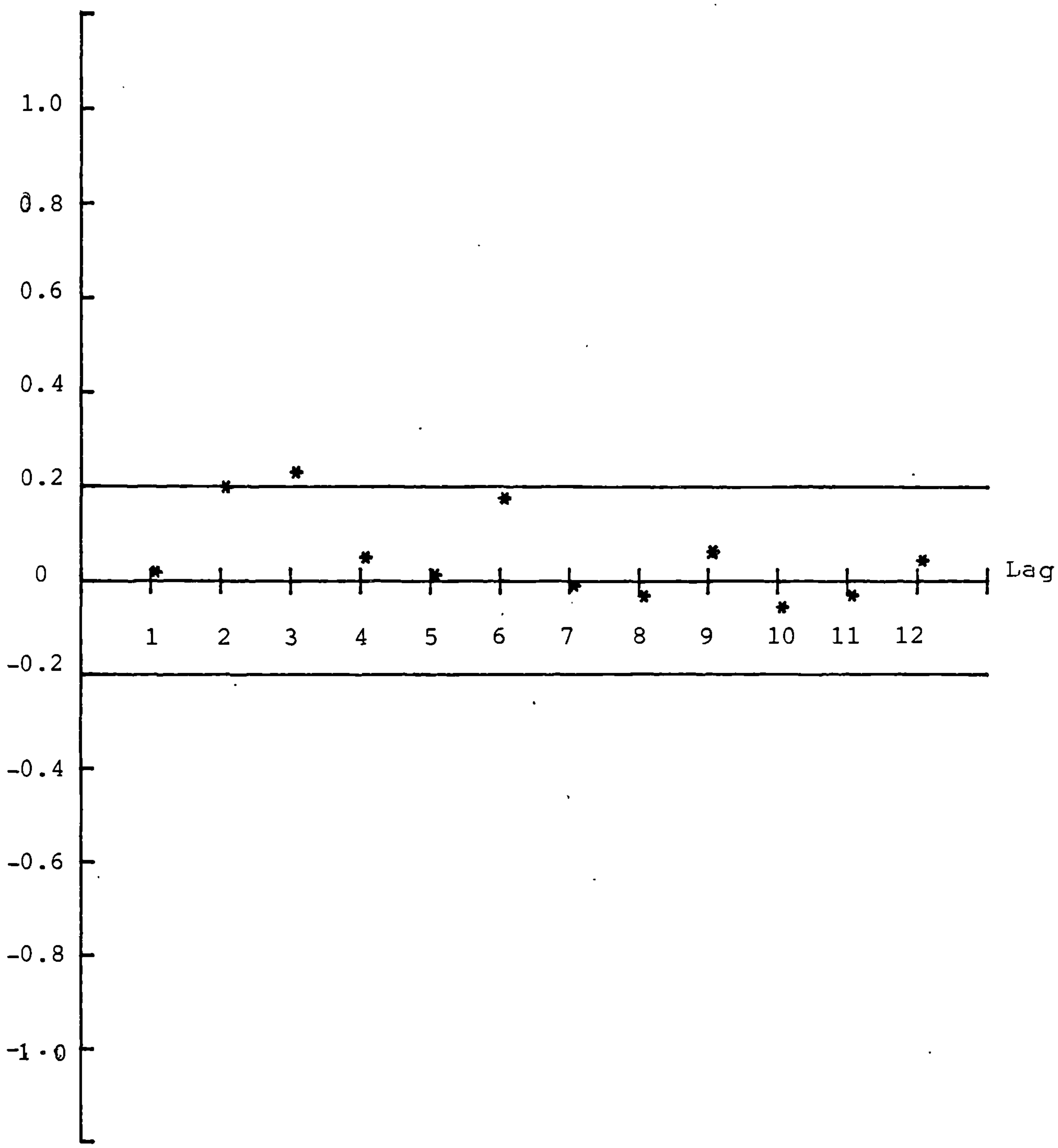
Autocorrelation coefficients for the new stationary series are plotted in Figure 4.15, this shows that the only significant autocorrelation coefficient is that at lag 3, because it lies outside the area. For seasonality to be present, there must be significant autocorrelation coefficients at more than two or three time lags such that the longer the lag the smaller the coefficient. In this case R_3, R_6, R_9 and R_{12} are all positive such that

$$R_3 > R_6 > R_9 > R_{12}$$

Had R_6, R_9 and R_{12} been significant, we would have concluded that data have a seasonal pattern; since they are not, we conclude that seasonal variation is not present.

Figure 4.15

Autocorrelation Coefficients of First Differences of Money Supply with AR(12)



Leaving causality and determining factors aside, if monetary growth can be approximated by the following autoregressive process

$$M_t = a_1 M_{t-1} + a_2 M_{t-2} + \ldots\ldots + a_m M_{t-m} + e_t$$

then it is possible to forecast the money supply at period t+1 from the following equation

$$M_{t+1} = a_0 M_t + a_1 M_{t-1} + a_2 M_{t-2} + \ldots. + a_{m-1} M_{t-m+1} + e_{t+1}$$

provided that the a_i's are known. Rutledge estimated the a_i's by OLS, this is not strictly appropriate here, since the basic assumption of independence of residuals is violated as the independent variables, in this case, depend on each other. Another estimation technique is the method of "steepest descent", or what is generally known as the technique of "adaptive filtering" (see for example Wheelwright and Makridakis (1973), (1977)). According to this method, we start with arbitrary values for the a_i's and adjust them according to the forecasting error until the minimum value of the mean square error is obtained. Adjustment is done using the following equation:

$$a_i' = a_i + 2ke_t + M_{t-i+1}$$

where

i	$= 1, 2, \ldots\ldots., m$	(m is maximum lag)
t	$= m + 1, m + 2 \ldots\ldots., n$	(n is sample size)
a_i'	= adjusted parameter	
a_i	= old parameter	
k	= adjustment constant	
e_{t+1}	= error of forecast at t+1	
M_{t-i+1}	= observed value at t-i+1	

This method is very expensive, however, in terms of computer time and the reduction in the mean square error becomes successively smaller as more iterations are performed. Therefore, the process of adjustment is stopped after a certain number of iterations and the final set of parameters is then used for forecasting.

This method can be used to forecast monetary growth in Kuwait, assuming the following:

(i) equal initial parameters with value $1/m$;

(ii) $k = 1/m$;

(iii) maximum number of iterations is 100.

Assumption (i) and (ii) are frequently used when applying this method. Wheelwright and Makridakis (1973 p.67) have suggested other criteria for fixing the initial a_i's and k.

Initially, an autoregressive order (AR) of 12 is assumed, i.e. the maximum lag used is 12. Hence

$$M_t = \sum_{i=1}^{12} a_i M_{t-i} + e_t$$

and

$$M_{t+1} = \sum_{i=1}^{12} a_i M_{t-i+1} + e_{t+1}$$

In this case $a_1 = a_2 = \ldots\ldots\ldots = a_{12} = 0.083$, $k = 0.083$

Table 4.4 and Figure 4.16 illustrate how the values of the parameters and the mean square error change after 100 iterations using AR(12). The final values of the parameters listed in Table 4.4 can be used to forecast the money supply within the sample. Figure 4.17 plots the actual and predicted money supply using AR(12) over the period 1975-82.

Figure 4.16

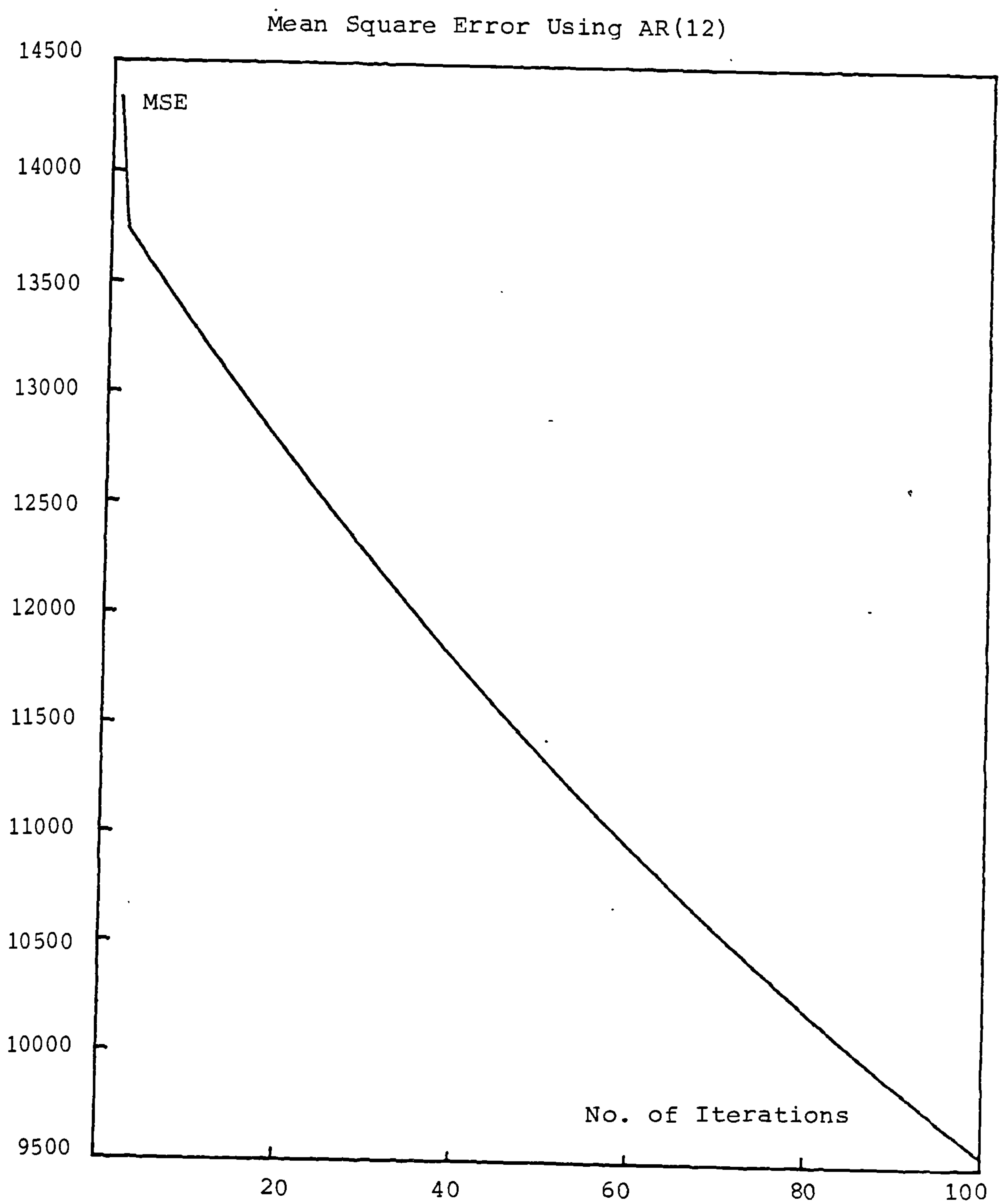

Mean Square Error Using AR(12)
14500
14000
13500
13000
12500
12000
11500
11000
10500
10000
9500
MSE
No. of Iterations
20
40
60
80
100

Figure 4.17

Within-Sample Predictive Power of AR(12)

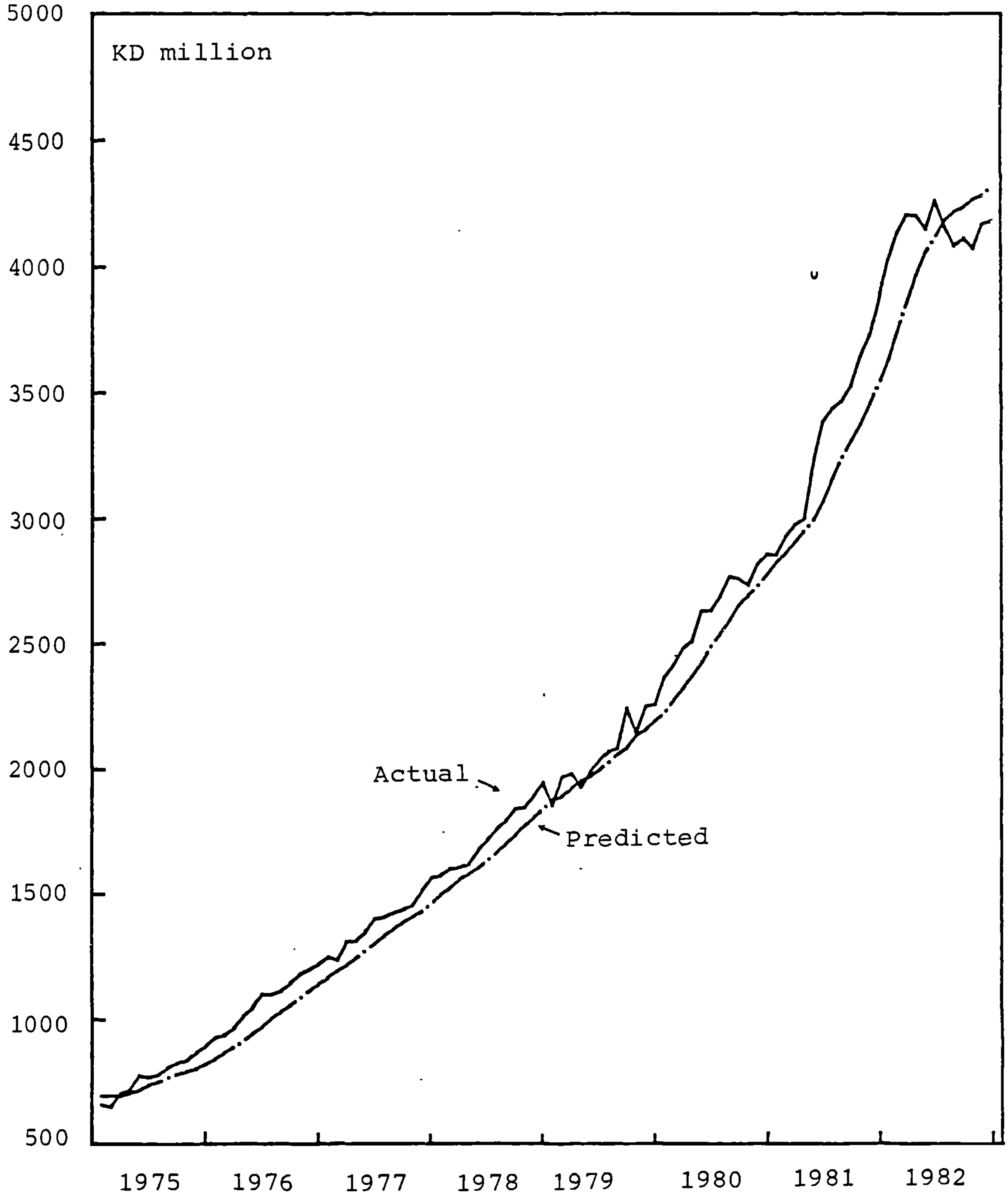


Table 4.4: Results of 100 Iterations Using AR(12)

Parameter	Initial Value	Iteration (1)	Iteration 100 (final value)
a_1	0.083	0.091	0.196
a_2	0.083	0.090	0.156
a_3	0.083	0.090	0.119
a_4	0.083	0.089	0.087
a_5	0.083	0.089	0.065
a_6	0.083	0.089	0.062
a_7	0.083	0.088	0.052
a_8	0.083	0.088	0.053
a_9	0.083	0.088	0.059
a_{10}	0.083	0.088	0.060
a_{11}	0.083	0.088	0.064
a_{12}	0.083	0.088	0.074
Mean Square Error		14327.8	9552.1

It was found that using an autoregressive process of order 6, i.e. AR(6), improves the forecasting power of the model. In this case the model is written as

$$M_t = \sum_{i=1}^{6} a_i \, M_{t-i} + e_t$$

therefore

$$M_{t+1} = \sum_{i=1}^{6} a_i \, M_{t-i+1} + e_{t+1}$$

and $a_1 = a_2 = \ldots\ldots = a_6 = 0.167$, $k = 0.167$. Results of the new model are presented in Table 4.5 and Figure 4.18. It is obvious that with AR(6), better results are obtained because the mean square error drops to 4604.7 after 100 iterations, whereas in the case of AR(12) it only drops to 9552.1. Figure 4.19 plots the actual and predicted money supply using AR(6) over the period 1975-82.

Table 4.5: Results of 100 Iterations Using AR(6)

Parameter	Initial Value	Iteration (1)	Iteration 100 (final value)
a_1	0.167	0.168	0.242
a_2	0.167	0.168	0.205
a_3	0.167	0.167	0.161
a_4	0.167	0.167	0.127
a_5	0.167	0.167	0.113
a_6	0.167	0.167	0.156
Mean Square Error		5301.4	4604.7

It was also found that AR(6) produced better out-of-sample forecasting results. Figure 4.20 shows the actual money supply over the period January-December 1983 as well as the predicted values using AR(12) and AR(6).

It must be said at this stage that such types of models indicate ignorance of the true forces that determine monetary growth. This is why the main objective of this study is to test for the factors that determine the money supply in the context of an econometric model. However, it is incorrect to conclude that

Figure 4.18

Mean Square Error Using AR(6)

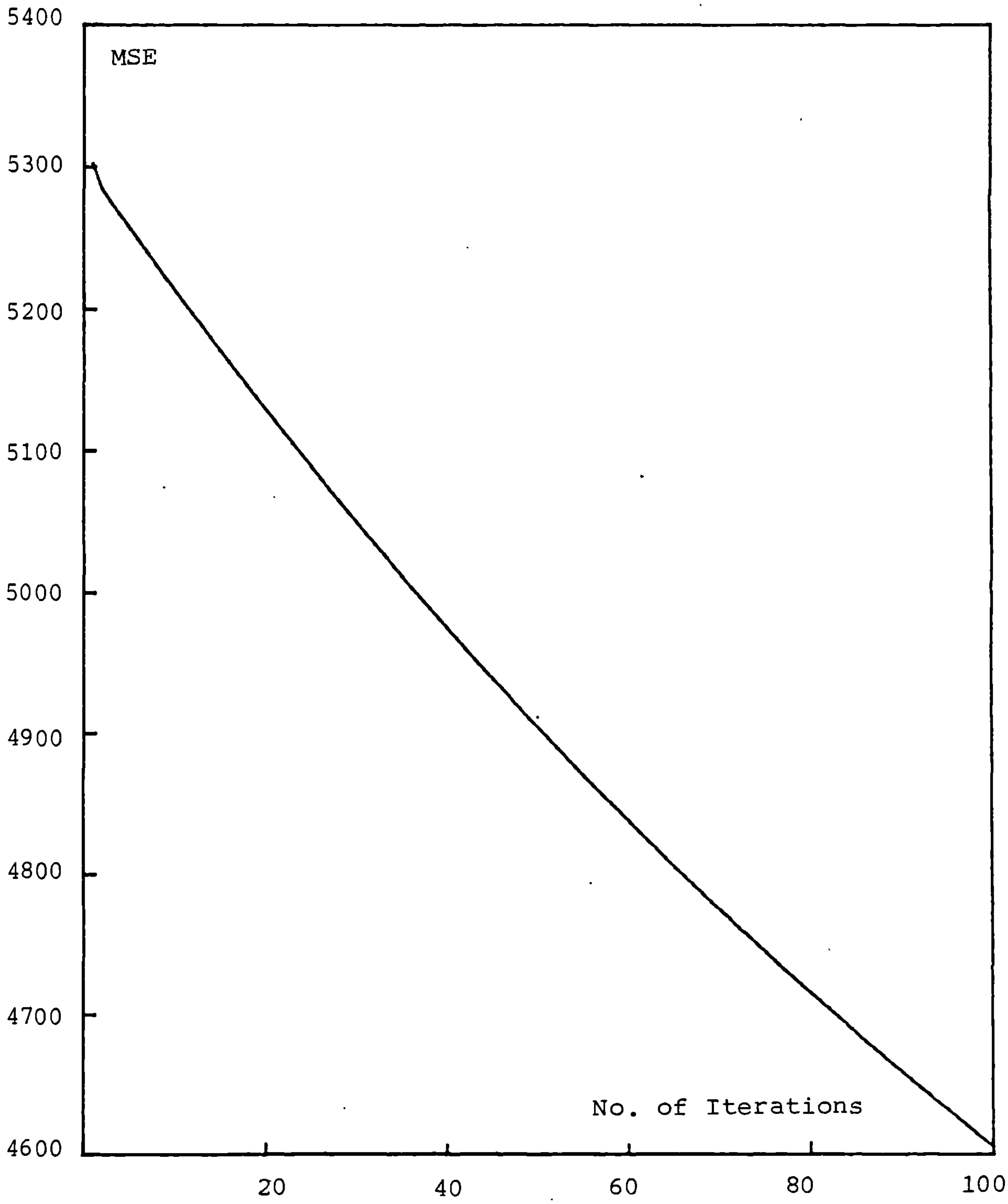


Figure 4.19

Within-Sample Predictive Power of AR(6)

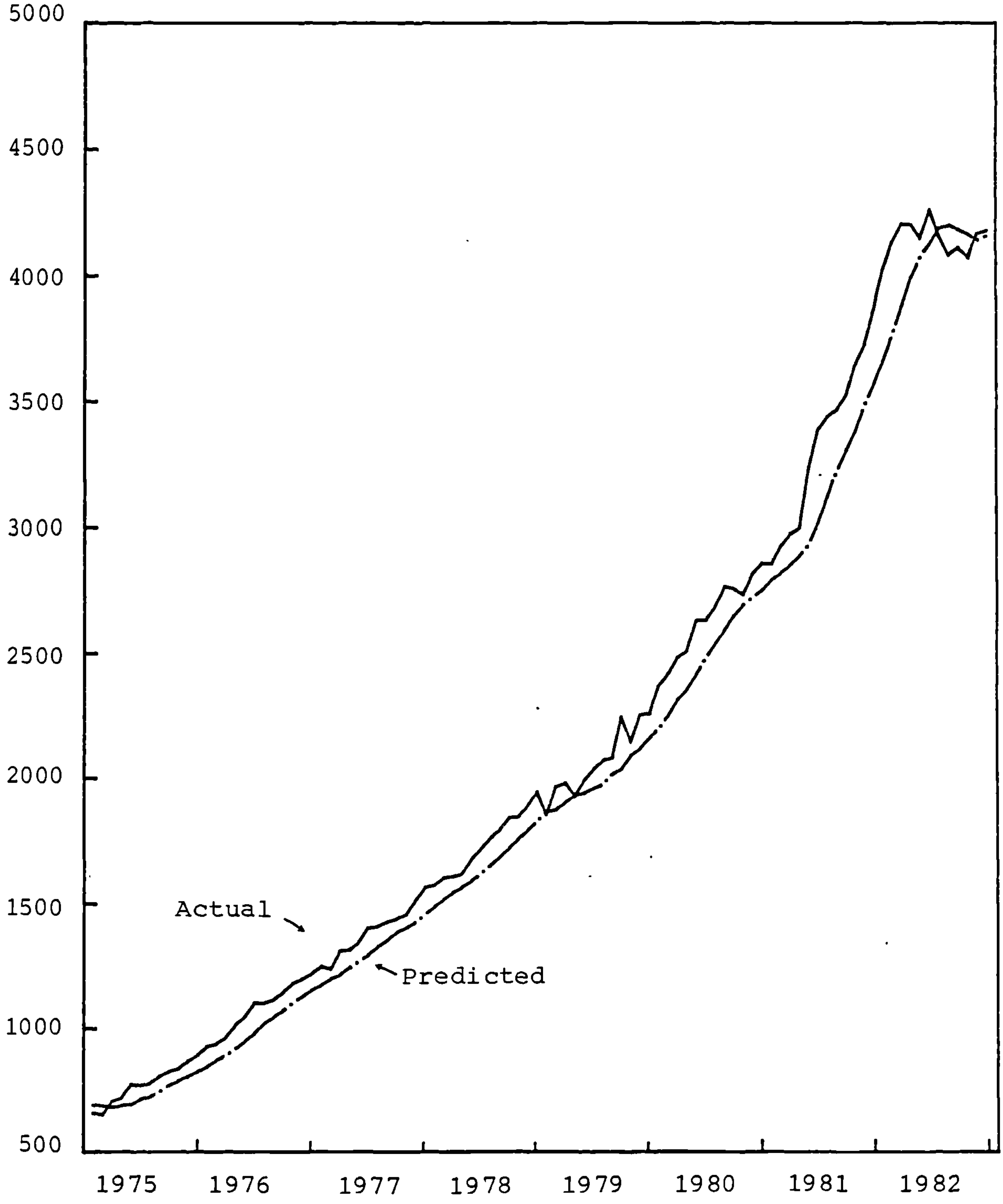
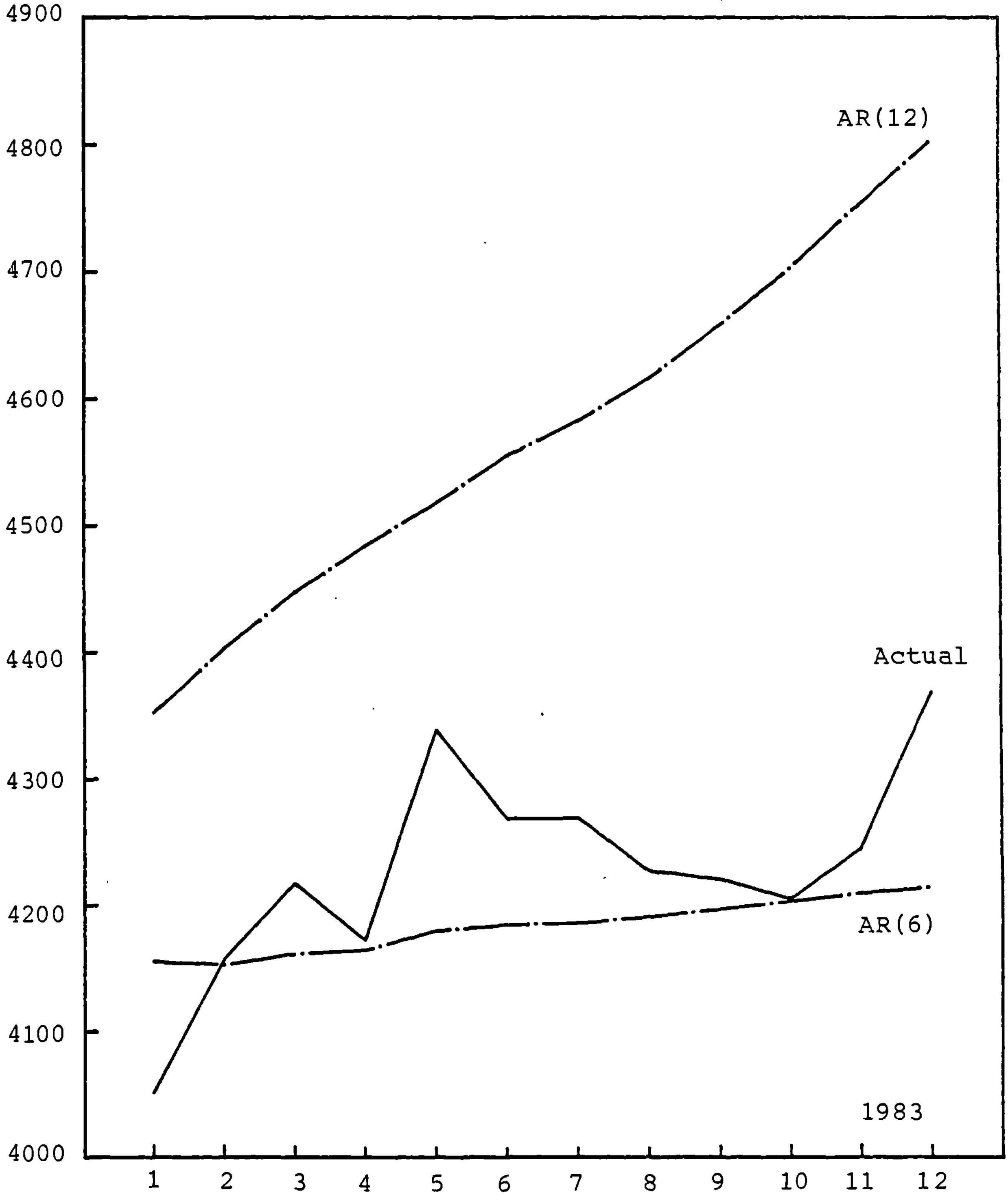


Figure 4.20

Out-of-Sample Predictive Power of Autoregressive Model



trying to analyse and forecast monetary growth by time series methods is without any practical importance. It has been demonstrated that the integration of econometric and time-series approaches has led to better forecasting models.

The debate between proponents of both approaches has been fruitful in the sense that it has resulted in the development of multivariate ARIMA models (see Makridakis et al (1983)), and, more recently, the Bayesian vector autoregression models* which were developed by research economists at the Federal Reserve Bank of Minneapolis (see Litterman (1984) and Todd (1984)). Therefore, it would certainly be a setback to the development of economic science if we "black list" a particular technique just because we feel slightly in favour of another.

* It is claimed that these models forecast well without subjective adjustment, thus allowing them to answer questions about future events and probabilities, that subjectively-adjusted models cannot address so convincingly. The motivation behind the development of these models was the suspicion that exclusion restrictions derived from imperfect economic theories could be a barrier to improved forecasting. The main difference between structural models and Bayesian vector autoregression models is that whereas economic theory is the main source of prior beliefs in the former, it is often secondary to statistical theory and observations in the latter. This kind of modelling is based on earlier work by Sims (1980), (1981), on what are called "unrestricted vector autoregression models."

CHAPTER 5

MONETARY POLICY

5.1. Introduction

Commercial banks operating without restrictions tend to have procyclical tendencies, simply because they are profit maximisers. They find it profitable to expand the money supply by extending credit in inflationary booms, because loans are interest-earning assets with little risk (of default) under those circumstances. Conversely, they restrict the money supply by shrinking credit during deflationary recessions, because they tend to seek liquidity for fear of a large-scale withdrawal of deposits, and due to scepticism about the ability of borrowers to repay their debts, even though that involves the sacrifice of interest income. Such behaviour intensifies the cyclical downswing (as happened in the Great Depression of the 1930s), and contributes to excess aggregate demand on the upswing, thus resulting in inflationary pressures. This phenomena was recognised by Wicksell in his writings on the cumulative process (see for example Wicksell (1907) and Laidler (1972)). In his writings on the subject, Wicksell shifted the emphasis of monetary economics away from comparative statics of an economy in full equilibrium situations, and towards the dynamics of the process whereby such an economy moves from one full equilibrium situation to another.

In Kuwait, similar behaviour of commercial banks has indeed contributed to the emergence of inflationary pressures, the collapse of the stock market on two occasions (1977 and 1982), and the recession of the first half of the 1980s. Therefore, countering banks' procyclical tendencies should be an obvious objective of monetary policy in Kuwait. Moreover, since Kuwait is still in the early stages of economic and financial development, monetary policy should have the additional objective of creating the proper environment for the allocation of financial resources in a manner consistent with sectoral development priorities.

Theoretically, monetary policy is an aspect of overall macroeconomic policy, a particular form of the State's intervention in the economic process with a set of subsidiary objectives. In the short run, the objective of monetary policy is to achieve economic development in an environment of reasonable price stability. In the long run, the objective should be the efficient mobilisation of resources and their effective investment. In general, the functional responsibility of monetary policy is the creation of conditions that are conducive to the desired volume of monetary expansion and the means to bring it about.

It is sometimes argued (for example, Collyns (1983)) that there are difficulties involved in short-run stabilisation, particularly in small open economies, that warrant the direction of monetary policy towards establishing the financial conditions required by the long-run development strategy of the economy. This is achieved, for example, via the allocation of credit in accordance with development priorities rather than permitting commercial banks, and other financial institutions, to carry out this task in the manner that is appropriate from their point of view. One of the problems facing policy makers when they consider stabilisation policies in small open economies with a high degree of export specialisation, is the limited size of the impact multiplier of monetary injections. This is due to the limited size of sectors producing non-traded goods and services (the bulk of non-oil GDP in the case of Kuwait). In such an economy, production (total GDP) and real income are mainly influenced by the costs of domestic supply and by world -rather than domestic- demand. Other problems include information and response lags, together with uncertainty about the link between policy instruments and domestic output. These problems may, indeed, have been responsible for the extremely volatile monetary growth in Kuwait as we saw in Chapter 3. They may also explain why monetary policy is aimed at the regulation of interest rates, credit availability and its allocation, rather than at short-run monetary control.

5.2. Theoretical Background

Formulating policy in terms of the money stock requires the determination of:

(i) the most appropriate definition of money in the economic and institutional setting of a particular country;

(ii) the relationship between the money stock defined in (i), and real and price variables;

(iii) the process by which the stock of money is determined;

(iv) the role played by the central bank's policy instruments in that process.

Points (i) and (ii) have already been discussed for the special case of the Kuwaiti economy. In this chapter we shall be concerned with (iii) and (iv).

Stabilisation policies via monetary control are based on the monetarist proposition that changes in the money supply, relative to its demand, result in spending adjustments in an effort to re-establish the desired money holdings, and that will affect aggregate demand and the price level. The fundamental question arises as to whether or not the monetary authorities can effectively control the money supply.

The equilibrium money stock is the product of the complex interaction of the behaviour of various economic decision makers, rather than the result of the operations of the monetary authorities. In a more technical language, the money stock is part of the simultaneous solution for all variables in the financial and real sectors of the economy. Three decisions are particularly important for the determination of the money stock:

(i) the decision by monetary authorities concerning the volume of the monetary base;

(ii) the decision by commercial banks concerning the composition of their asset portfolios, particularly the volume of credit and excess reserves;

(iii) the decision by the public concerning the allocation of their funds among currency, demand deposits, quasi-money and other assets.

This process can be simply expressed as the relationship between money stock M and monetary base B in a multiplier framework which views money as some multiple m of the base:

$$M = mB$$

The money stock in its broad and narrow concepts is larger than the base because a fractional-reserve banking system has a multiple credit and deposit creating capacity.

Now the question is: since B represents the monetary liabilities of the monetary authorities, is it possible to control M by controlling B? Monetarists, in general, argue that it is possible because the multiplier m is stable and predictable and, therefore, the impact of changes in B on M can be estimated very accurately. Other economists argue that the multiplier is not stable but rather depends on the behaviour of the public and commercial banks which is not stable or predictable. Moreover, it is also argued that there is a strong feedback from changes in the base to the multiplier. This issue is obviously empirical and some tests are, therefore, required for the case of Kuwait.

Both Mansour (1983) and Ghuloum (1984) have demonstrated that there is no stable relationship between the monetary base and money supply in Kuwait, and that the money multiplier fluctuates sharply. But, whereas Mansour attributes the instability of the multiplier to the behaviour of commercial banks, in particular, the holding of excess reserves, Ghuloum attributes it to financial, demographic and social changes, in the sense that the emergence of new financial assets together with the influx of expatriate labour with high demand for currency have influenced the public's portfolio composition. However, neither of them tried to find empirical evidence to support his own hypothesis.

Analysis of monthly data over the period 1970-82 revealed that the money multiplier fluctuated between a minimum of 1.10 and a maximum of 2.96 for narrow money M1, and between 3.34 and 8.48 for broad money M2. Both multipliers showed significant fluctuations, particularly in the period 1974-78 in which the coefficients of variation for narrow and broad money multipliers were 20.0 and 19.8 percent respectively. It is worth noting, however, that from a policy point of view these fluctuations do not matter as long as they are predictable.

A more rigorous test of stability is the Chow test which has already been used to test the stability of the demand for money. It shall be used in this situation to test the stability of the relationship between the monetary base and money stock (narrow and broad). Monthly data for the period 1970-82 are used to conduct the test, and two sub-samples are obtained by breaking the total sample at the end of 1975. The following results are obtained by regressing money stock (M1 and M2) on monetary base.

<u>The period 1970-75</u>

$$M1 = 54.28 + 1.19\ B$$
$$(11.4) \quad (25.1)$$
$$R^2 = 0.900 \quad SE = 17.48 \quad DW = 0.856$$

$$M2 = 228.60 + 3.22\ B$$
$$(15.0) \quad (21.4)$$
$$R^2 = 0.867 \quad SE = 55.89 \quad DW = 0.621$$

<u>The period 1976-82</u>

$$M1 = 125.59 + 1.59\ B$$
$$(2.2) \quad (12.1)$$
$$R^2 = 0.640 \quad SE = 218.08 \quad DW = 0.194$$

$$M2 = 458.30 + 4.767\ B$$
$$(3.1) \quad (13.9)$$
$$R^2 = 0.702 \quad SE = 569.36 \quad DW = 0.180$$

<u>The period 1970-82</u>

$$M1 = 27.83 + 1.77\ B$$
$$(1.3) \quad (27.5)$$
$$R^2 = 0.830 \quad SE = 164.48 \quad DW = 0.222$$

$$M2 = 123.26 + 5.41\ B$$
$$(2.2) \quad (31.3)$$
$$R^2 = 0.864 \quad SE = 439.83 \quad DW = 0.219$$

The regression results show the following:

(i) The constant term is significant in five of the six equations implying that no direct and proportional relationship exists between the money stock and monetary base.

(ii) DW statistics have low values, indicating the presence of autocorrelation resulting from missing variables, this in turn implies that specifying the money supply function as M = M (B) is inadequate.

Table 5.1: Residual Sums of Squares for the Chow Test

Money Concept	Residual SS 1970-75	Residual SS 1976-82	Residual SS 1970-82	F*
Narrow	21398	3899713	4166149	4.8
Broad	218639	26582011	29790959	8.5

Table 5.1 shows data required for conducting the Chow test. Since $F_{0.05}$ (2,152) = 3.07, the null hypothesis of stability is rejected in both cases because $F^* > F_{0.05}$ (k,n-2k). This empirical evidence supports the hypothesis that the relationship between the money stock and monetary base in Kuwait has not been stable. Figures 5.1 and 5.2 illustrate the hypothesis graphically by showing significant shift from one sub-period to the other.

We cannot, however, tell from the result of the Chow test the reason for, or source of, instability; this requires an analysis of the components of the multiplier. The following presentation is restricted to the broad money aggregate M2, but results using M1 have been found to be very similar. Since

$$M = C + TD$$

$$B = C + R$$

where C is currency in circulation, TD is total deposits, and R is reserves of commercial banks, then

$$\frac{M}{B} = \frac{C + TD}{C + R}$$

If c = C/TD and r = R/TD, where c is the public's currency to deposits ratio and r is banks' reserve to deposits ratio, then

$$M = \left[\frac{c + 1}{c + r}\right] B$$

Figure 5.1

Instability of the Relationship Between M1 and B

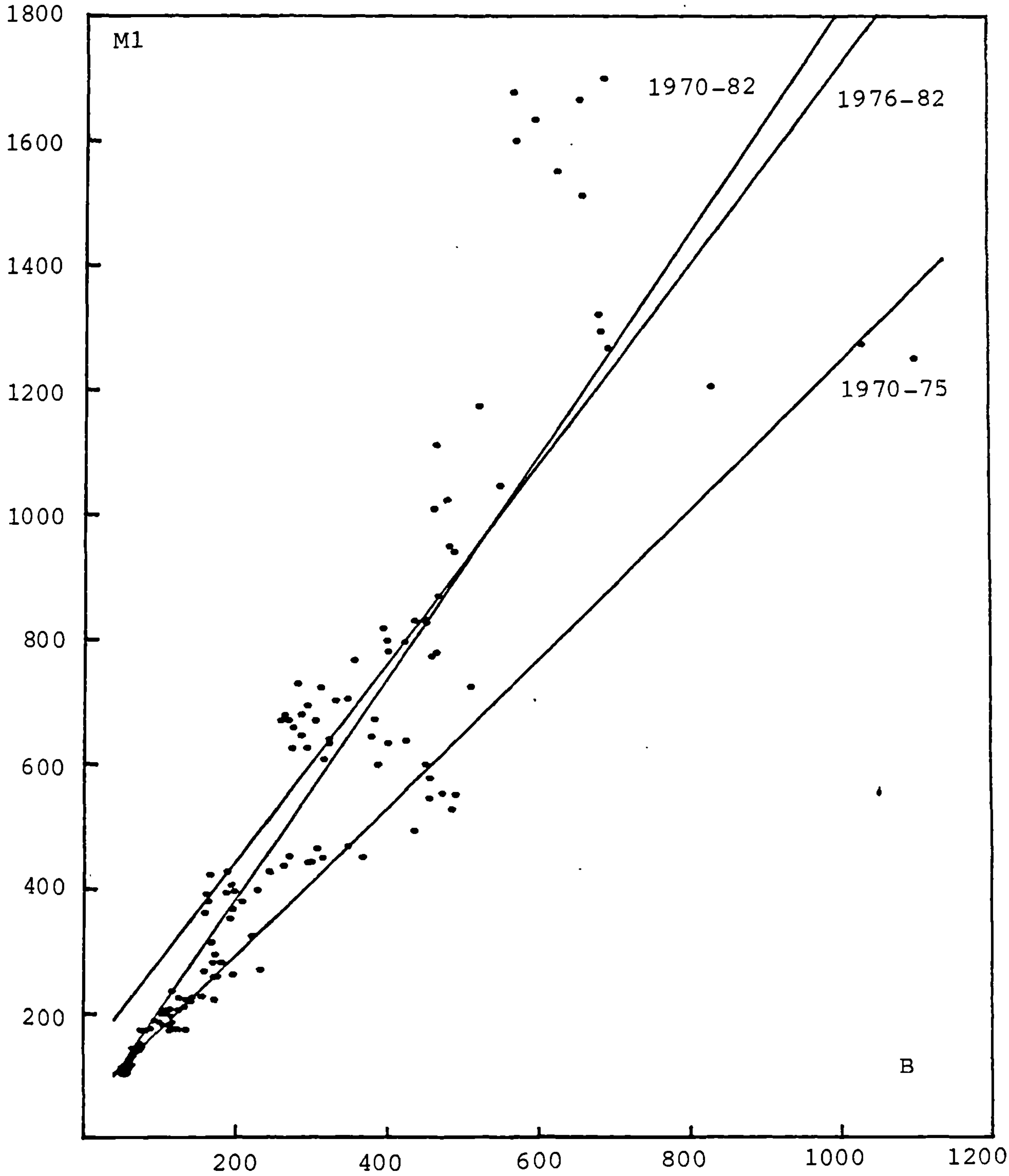
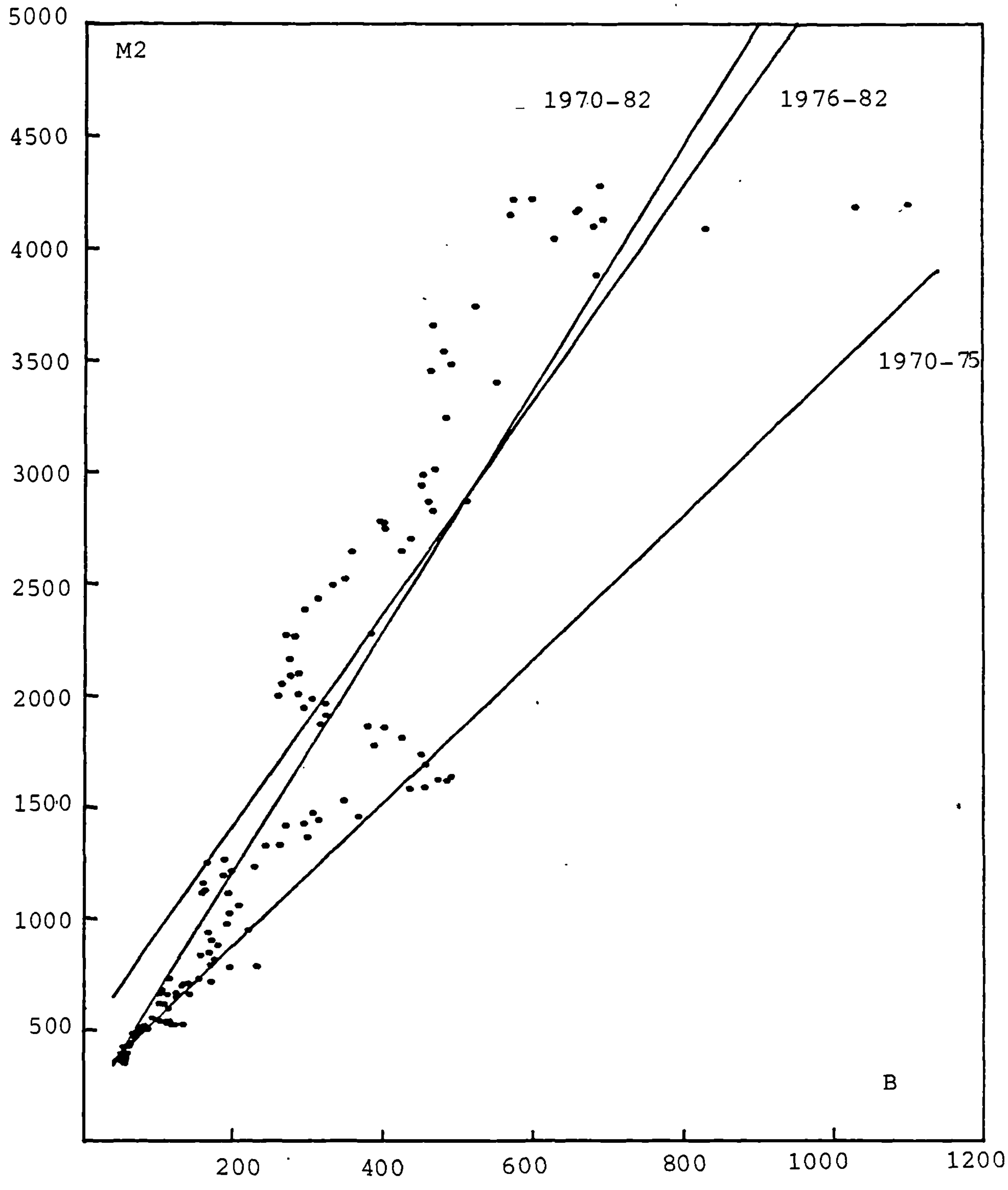


Figure 5.2

Instability of the Relationship Between M2 and B



Alternative specifications can be derived for the multiplier formula, first of all by disaggregating total deposits into demand, saving, time and foreign currency deposits. But, this disaggregation is of little practical importance in the case of Kuwait where there are no differential reserve requirements according to the type of deposit and also, from the demand point of view, saving, time and foreign currency deposits react in a similar manner towards changes in interest rates. Reserves can also be split into required and excess reserves such that the reserve ratio is split into required reserve ratio, which is a policy tool and excess reserve ratio, which is a behavioural variable. Again, this split is of little importance because the required reserve ratio (3 percent of total deposits) was introduced in June 1980 and has not been changed since then. Moreover, and as will be formally shown, the introduction of the required reserve ratio has not affected banks' demand for reserves because they have always held substantial excess reserves. These points will be elaborated later on in this study; however, the main point to be emphasised at this stage, is that the reserve to deposits ratio is a behavioural rather than a policy variable, because banks' behaviour, with respect to holdings of reserves, has dominated and overwhelmed policy measures. Goodhart (1975) has asserted that more complicated multiplier identities sacrifice the one great virtue of the multipler approach, its simplicity, without obtaining equivalent benefits in the area of its greatest deficiency, the lack of behavioural content. He goes on to say that more complicated formulations do not illuminate the process whereby people and institutions adjust their overall portfolios to arrive at some general equilibrium.

Given the formula

$$M = \left[\frac{c + 1}{c + r}\right] B$$

the controversy between monetarists and non-monetarists would concern (i) which of the variables on the right hand side of the equation (i.e. c, r and B) can be controlled by the monetary authorities and (ii) whether the functions explaining these variables are stable and predictable. In general, the money multiplier equation can be used to forecast the effect of a change in the monetary base on the money stock provided that the following two conditions are satisfied:

(i) the components of the multiplier c and r are stable;

(ii) the base and multiplier are not affected by each other.

It is sometimes argued that changes in the monetary base tend to affect the multiplier, with interest rates serving as the channel for transmitting the influence. For example, increasing the base by injecting liquidity in the banking system will lead to changes in interest rates, thus leading to changes in currency and reserve ratios which consequently result in changing the value of the multiplier. In Kuwait, there are legal constraints on the free movement of most key interest rates, so such effect on the currency ratio does not always materialise and the ratio tends to be more influenced by income rather than interest rates. Moreover, the reserve ratio is not influenced as much by domestic interest rates as by foreign rates. Hence, the effect of changes in the base on the multiplier tends to be minimal. Using monthly data over the period 1975-82, the following regression equation was fitted:

$$m = 5.96 - 0.00149 \ \Delta B$$

$$(43.6) \quad (-2.5)$$

$$R^2 = 0.062 \quad SE = 1.31 \quad DW = 0.327$$

Where m is the broad money multiplier. The equation shows that changes in the monetary base bring about changes (in opposite direction) in the multiplier, but because of the factors mentioned earlier, the effect tends to be very small as indicated by the low value of the coefficient of ΔB.

Changes in the money stock can be brought about by changes in the monetary base B, changes in the currency ratio c, and changes in the reserve ratio r. Firstly, higher B would result in larger currency holdings as well as reserves of commercial banks (since $B = C + R$). The increase in reserves allows banks to lend more and generate additional deposits. Mathematically, this is expressed as

$$\frac{\partial M}{\partial B} = \frac{c + 1}{c + r} > 0$$

Secondly, lower currency ratio (ceteris paribus) will increase the money stock, since it implies a smaller public's share and higher banks' share in the unchanged base. As long as the required reserve ratio is less than one, higher reserves will result in an increase in bank lending and deposits. Hence, the overall effect will be an increase in the money stock, i.e.

$$\frac{\partial M}{\partial c} = \frac{B(r-1)}{(c + r)^2} < 0$$

because $r < 1$

Thirdly, lower reserve ratio will provide commercial banks with excess reserves for lending that will be accompanied by the creation of additional deposits and an increase in the holding of currency outside the banking system, the result is a higher money stock, i.e.

$$\frac{\partial M}{\partial r} = -\frac{B(c + 1)}{(c + r)^2} < 0$$

Thus, control of the money supply requires accurate prediction of the multiplier by estimating c and r, and the control of the base.

In LDCs, the currency to deposits ratio tends to have some seasonal patterns, whereas its secular behaviour depends on such variables as income and interest rates as well as the pace of monetisation, growth of the banking habit and convenience of bank offices. Coats and Khatkhate (1980) argue that the currency ratio also depends on changes in the magnitude of illegal transactions (or tax avoidance), as cash payments are easier to hide than payments by cheques. The reserve ratio depends on reserve requirements and the level of excess reserves which is mainly determined by interest rates. Many empirical studies have been done on the behaviour of these ratios, for example Bhatt (1961), Narvekar (1963), Khazzoom (1966), Imam (1970), and Bhatia (1971). These studies revealed substantial variability of the ratios around the time trend and instability in the short run.

Indeed, empirical evidence for Kuwait suggests substantial instability. Using quarterly data over the period 1975-82, the coefficient of variation of the currency ratio was found to be 17.4 percent, whereas it was found to be 65.4 percent for the reserve ratio. This implies average variation around the mean of 17.4 and 65.4 percent respectively, which is quite high. It was also found that the public's currency ratio is negatively related to income

$$C/TD = 0.15 - 0.00009\ Yn$$

$$(31.48) \quad (-10.15)$$

$$R^2 = 0.744 \quad SE = 0.009 \quad DW = 0.68$$

As Khatkhate et al (1974) have shown, this is so because individuals and companies tend to become more efficient in their cash management as income rises.

As for the reserve ratio, Park (1973) has pointed out that in LDCs it depends very much on the reserve requirements for demand and time deposits, since commercial banks in LDCs are likely to expand their loans to the maximum level permitted by their reserves. In Kuwait, this is not the case as banks tend to hold substantial excess reserves. Therefore, the opportunity cost of holding reserves is a very important variable in determining the reserve ratio. If banks view foreign assets as the alternative to holding reserves, then the return on foreign assets is the opportunity cost of holding excess reserves.

If the return on foreign assets is proxied by the 3-month Eurodollar rate ^{r}f, then the reserve ratio is a function of this rate. The following equation was fitted using quarterly data for the period 1977-82

$$R/TD = 0.094 - 0.0023\ {}^{r}f$$
$$(3.15) \quad (-0.99)$$
$$R^2 = 0.044 \quad SE = 0.043 \quad DW = 1.46$$

The relationship is obviously insignificant. This may be due to the fact that reserves are composed of heterogenous assets that react differently to interest rate variations. Reserves are composed of cash, balances with the Central Bank (both of which are non-interest bearing) and Central Bank bills which are interest-bearing. Banks may, therefore, think of different opportunity costs for the three assets. Results of correlation analysis which are presented in Table 5.2 show that the ratio of cash reserves to deposits Rc/TD is more strongly correlated with domestic interest rate ^{r}k (3-month interbank rate) and foreign rate ^{r}f (3 month Eurodollar rate) than with either the ratio of balances with the Central Bank to deposits Rb/TD or total reserve ratio R/TD. Moreover, all of the ratios are more strongly correlated with the foreign interest rate than with the domestic rate, which implies that banks view foreign assets more than domestic interbank deposits as the alternative to holding excess reserves.

Table 5.2: Correlation Between Reserve Ratios and Interest Rates

Ratio	Correlation with ^{r}k	Correlation with ^{r}f
Rc/TD	-0.684	-0.697
Rb/TD	-0.294	-0.416
R/TD	0.049	-0.211

The analysis of reserve holdings will be considered in more detail at a later stage. The important point to remember here is that there is some evidence in support of the influence of changes in the monetary base on the multiplier (though very small), and the instability of currency and reserve ratios. These factors explain the instability of the relationship between the monetary base and the money stock. However, it is possible to predict the value of the multiplier by predicting the values of currency and reserve ratios through their response to income and interest rates.

This task can be accomplished by improving the specification of the equations explaining the currency-deposits ratio and the reserve-deposits ratio. Thus, the former is specified to be negatively related to the 3-month Eurodollar rate ${}^{r}f$, in addition to non-oil GDP, whereas the latter is made a function of the interest rate differential (3-month Eurodollar rate minus 3-month KD interbank rate), as well as a seasonal dummy D that reflects the seasonal increase in reserve holdings in the fourth quarter. If the two equations are estimated using 24 quarterly observations over the period 1977-82, the following results emerge:

$$C/TD = \underset{(27.49)}{0.136} - \underset{(-5.01)}{0.00005}\,Yn - \underset{(-2.39)}{0.00083}\,{}^{r}f$$

$$R^2 = 0.755 \qquad SE = 0.0057 \qquad DW = 1.42$$

$$R/TD = \underset{(6.44)}{0.073} - \underset{(-2.37)}{0.00578}\,({}^{r}f - {}^{r}k) + \underset{(3.72)}{0.05595}\,D$$

$$R^2 = 0.480 \qquad SE = 0.03193 \qquad DW = 1.30$$

Both of the estimated equations show that better statistical results are obtained by improving the specification, although R^2 for the equation explaining the reserve-deposits ratio is still low, again due to the heterogeneiety of the reserve components. Thus, this equation can still be improved by disaggregating R and estimating a behavioural equation for each component. However, this will only be feasible when a longer time series on Central Bank bills, which were introduced in 1979, is available.

It is important to note that adding a behavioural content to the multiplier framework, by analysing the components of the identity in terms of behavioural equations, has been criticised by Goodhart (1975) on the grounds that it leads back towards specifying the full structure of the system. He argues that if this is necessary to understand why the multiplier works as it does, then it is difficult to see what advantage is to be gained from using it as an analytical tool in the first place. On the whole, Goodhart is sceptical about the multiplier approach, largely because its informational content is remarkably slight, so simplicity is only achieved at the cost of less information. In particular, he points out that the multiplier approach gives little or no indication of the behavioural process involved in the quantitative adjustments, and that most of the accounts of the dynamic process of adjustment which are derived from this approach are at best misleading and often wrong. In short, he puts his argument as follows: "Multipliers may reveal the result of rational choice, but they do not illuminate the process." In my view, Goodhart's point is quite valid and is in line with Otani and Park's (1976) criticism of the reduced form approach in monetary economics. The alternative of full structural specification will be presented in Chapter 6.

Now, since

$$m = \frac{c + 1}{c + r}$$

and

$$M = mB$$

then the two estimated equations for C/TD and R/TD can be used to forecast the multiplier m and subsequently the money supply M for any given level of monetary base B. Figures 5.3-5.6 show the actual and predicted values of the ratios, the multiplier and the money supply. The forecasting exercise was carried out within-sample over the period 1977-82.

We now turn to the control of the monetary base. Coats and Khatkhate (1980) have suggested that short-run variations in the money multiplier have a somewhat larger role in money's behaviour in LDCs than in developed economies, but they contend that it contributes very little to monetary changes over longer periods of time. In the long run, they argue, money's behaviour is almost always overwhelmingly dominated by changes in the base. This, however, is not the case in Kuwait as implied by the empirical evidence found by Ghuloum (1984). He regressed the rate of change of money supply on the rates of change of monetary base and rates of change of the components of the multiplier, which in his formulation were: currency to demand deposits ratio, reserve to demand deposits ratio and quasi-money to demand deposits ratio. Using quarterly data for the period 1970-82, he found that all of the explanatory variables were significant but the overall fit was not good (R^2 = 0.379). What is more important for us here is that he found that the reserve ratio had a larger coefficient than the monetary base. He attributed the low coefficient of the base, as compared with those of the reserve and currency ratios, to the high demand for currency by the public and high demand for reserves by banks.

The multiplier remains, however, the determinant of how changes in the base are transmitted to the money stock. But the effect on the money stock of the multiplier and the uncontrollable components of the monetary base can be offset by changes in the controllable components of the base. So, it is

Figure 5.3

Currency-Deposits Ratio: Actual and Predicted

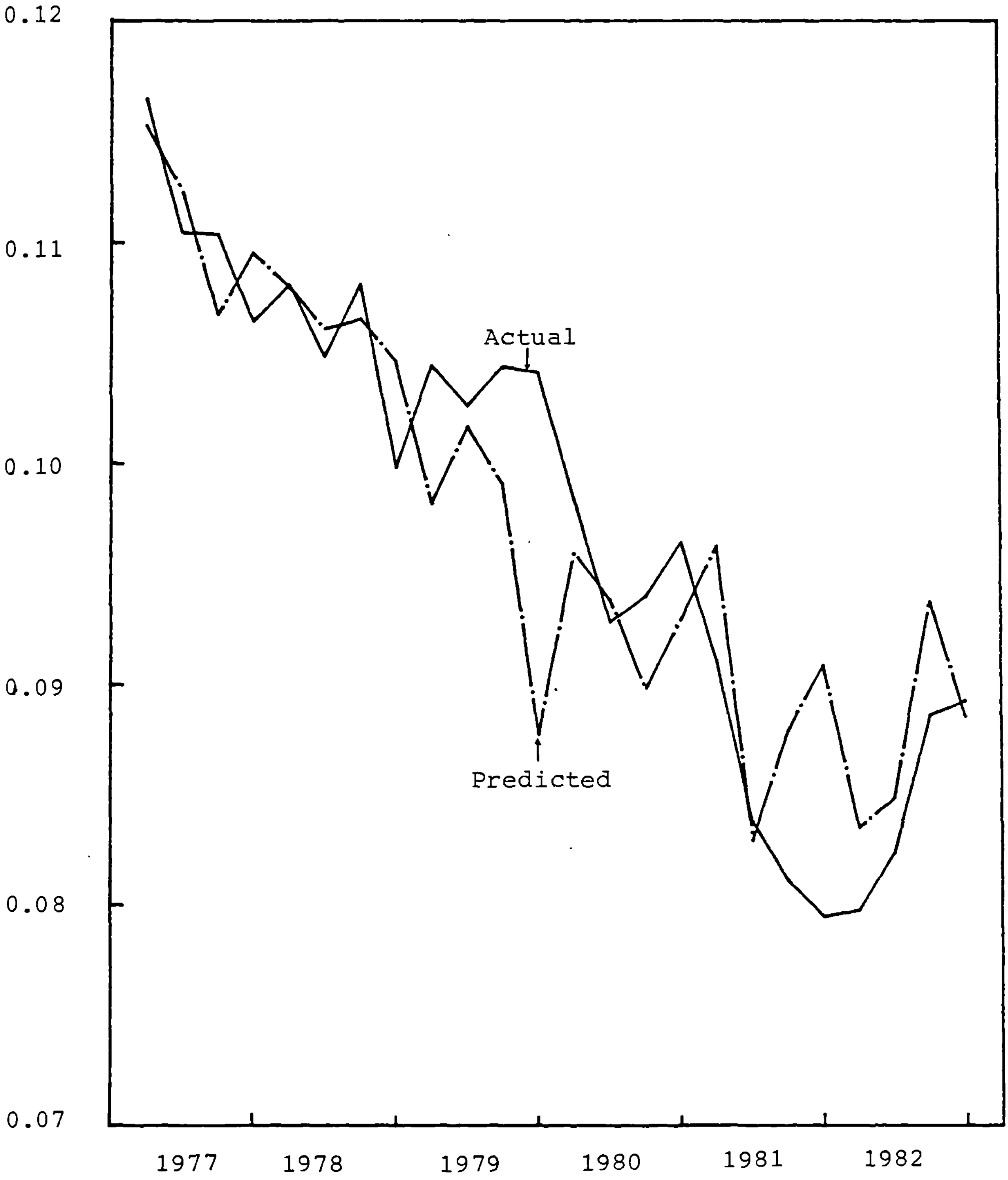


Figure 5.4

Reserve-Deposits Ratio: Actual and Predicted

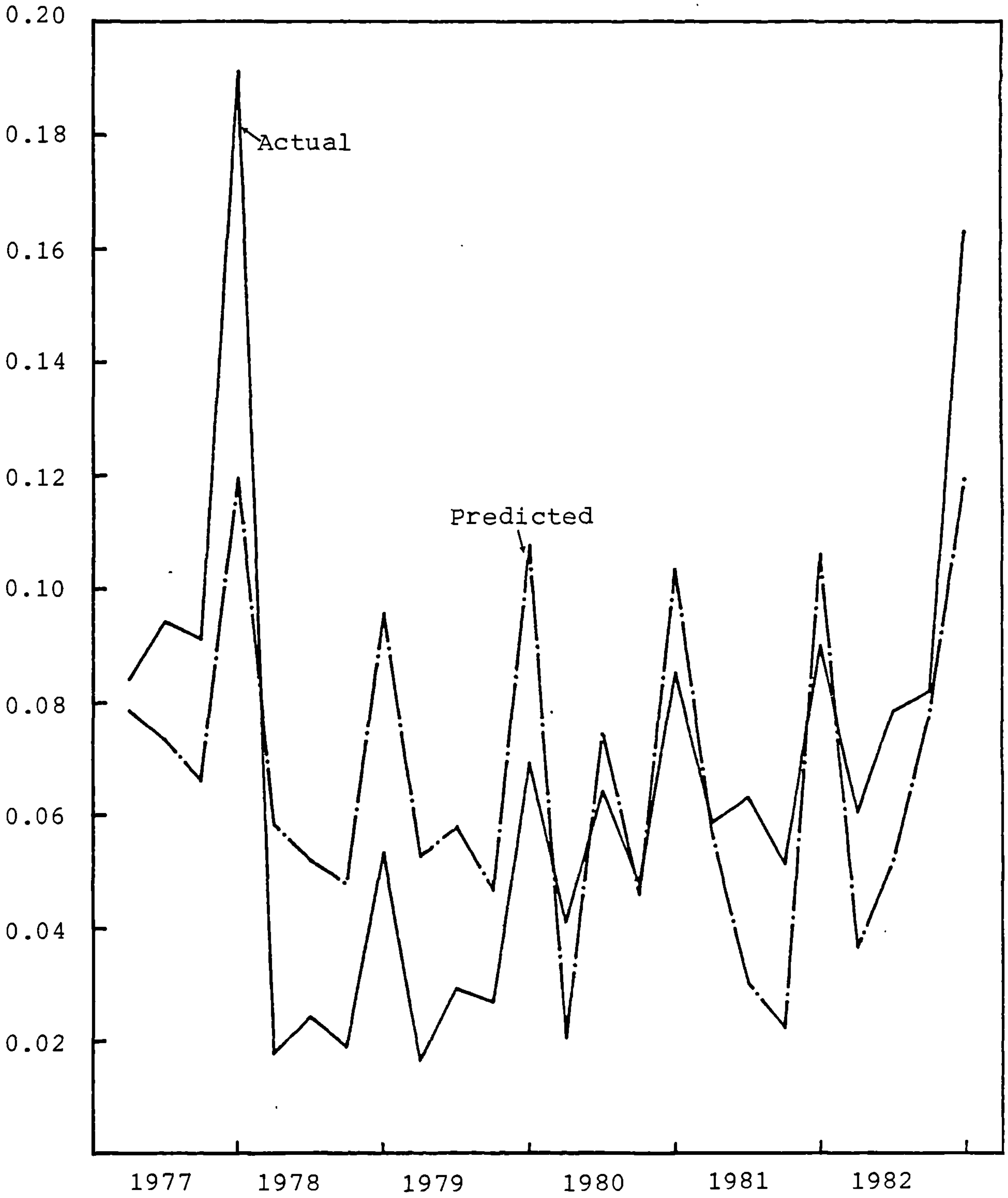


Figure 5.5

The Money (M2) Multiplier: Actual and Predicted

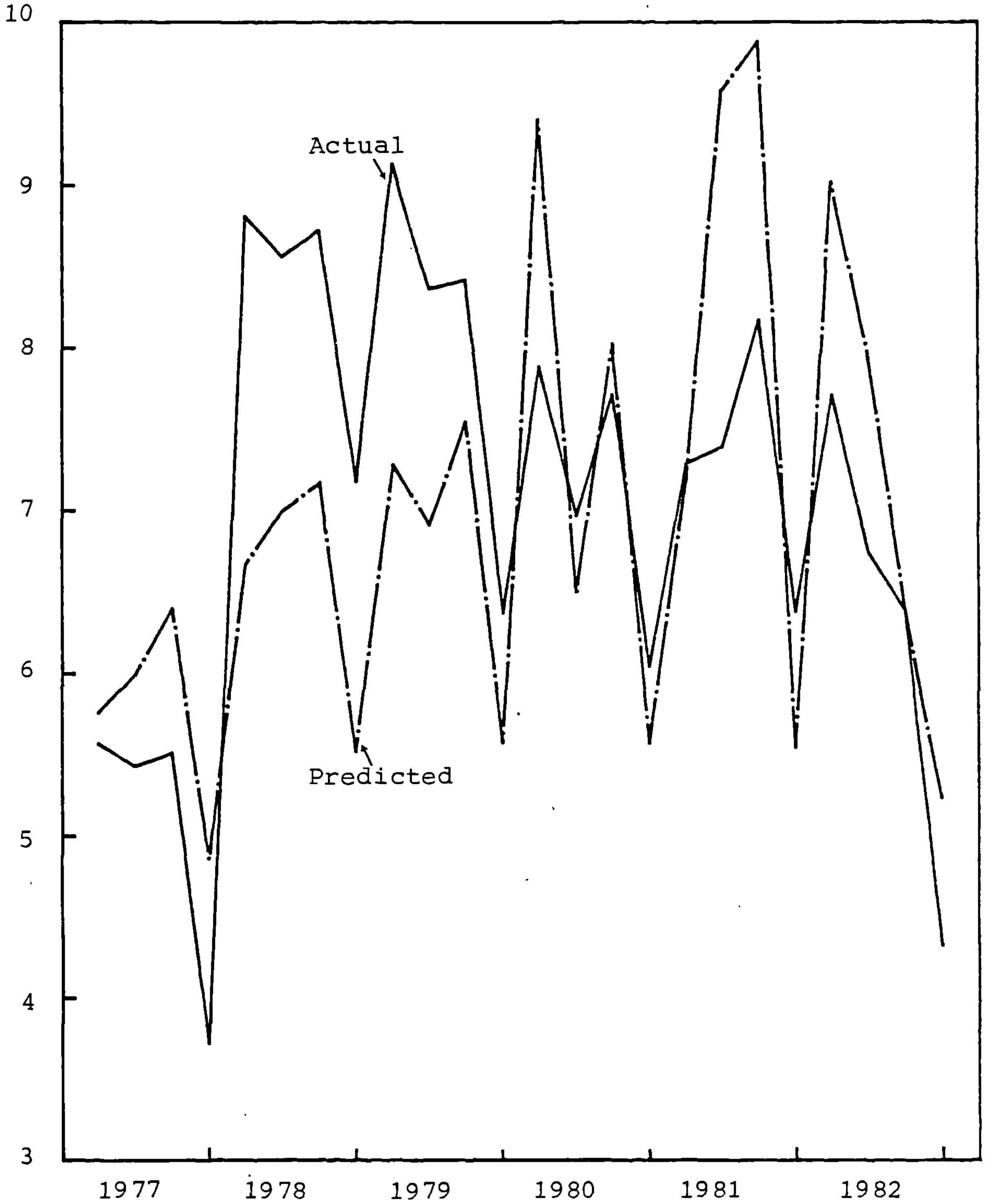
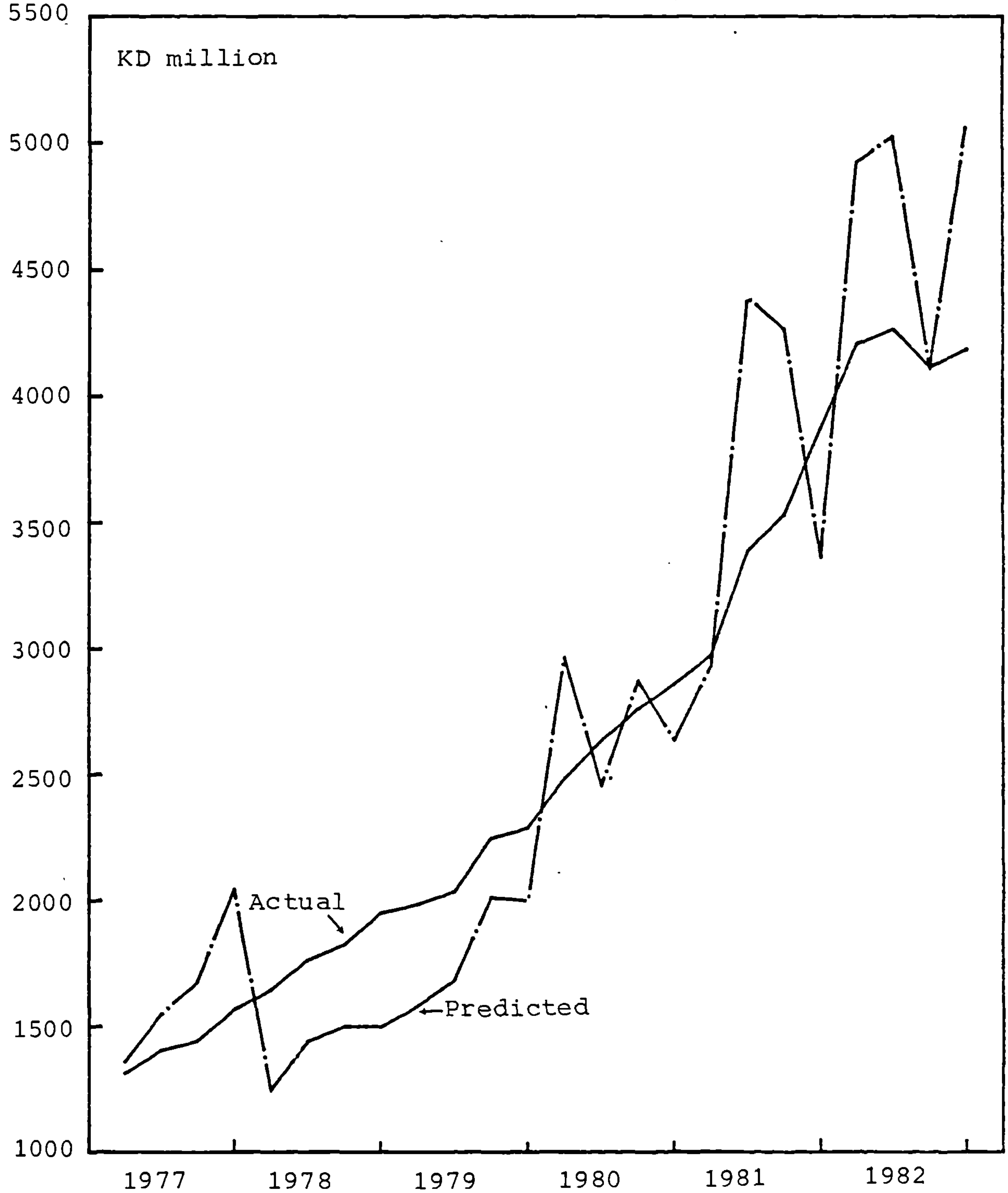


Figure 5.6

Money Supply (M2): Actual and Predicted



important for the control of the money stock to identify these components and the means to control them.

In general, the sources or components of the monetary base include central bank credit to the government, central bank credit to commercial banks, and central bank net holding of foreign assets. In Kuwait, the government has not yet resorted to borrowing from the Central Bank to finance public expenditure. On the contrary, the government is a net creditor to the Central Bank through its deposits, which appear as a major item on the liabilities side of the Central Bank's balance sheet. So, the main components of the monetary base in Kuwait are:

(i) government deposits;

(ii) discounts;

(iii) net foreign assets.

The effect of item (i) on the base is negative, whereas that of items (ii) and (iii) is positive. Obviously, item (i) is not under the direct control of the Central Bank but rather the Ministry of Finance, whereas item (ii) is under its direct control. Foreign assets are mainly influenced by variations in the external balance, i.e. fluctuations in exports, imports and capital movements. Park (1973) argues that LDCs which have a high specialisation of exports are likely to be more susceptible to externally generated swings in the balance of payments, and thus, subject to larger fluctuations in their foreign assets than advanced countries. This is true in the case of Kuwait; the only stable determinant of the external balance is imports (insignificant determinant of the trade balance as has been shown), whereas exports and capital flows have been highly volatile and determined by external forces such as the international demand for oil, yield differentials between domestic and foreign assets, and attitude towards foreign risk. Therefore, the external balance and consequently foreign assets, have been highly volatile and difficult to control.

Kuwait follows an exchange rate system of managed floating. Under such a system, the external balance influences the monetary base through two channels:

(i) transfer of the surplus into the domestic economy by exchanging foreign currency oil proceeds for local currency at the Central Bank, this results in an increment in the foreign assets of the Bank;

(ii) intervention by the Central Bank to maintain the exchange rate, which in the case of surplus on the external balance takes the form of selling local currency, again leading to an increase in the Bank's foreign assets.

It is sometimes argued that the commitment to a fixed exchange rate precludes an independent monetary policy. The core of the monetary approach to the balance of payments is that monetary authorities cannot, simultaneously, control the money supply and exchange rate. This is because for a given exchange rate, domestic prices must conform to world prices in order to maintain the external balance. This means that domestic money supply must conform to the public's demand at that price level, and efforts to make it otherwise (e.g. by changing domestic components of the base) will ultimately lead to changes in the Central Bank's net foreign assets sufficient to swamp all other factors. Eventually, the monetary authorities must give up their efforts to control either the money supply or exchange rate.

Keran (1975) has shown that central banks of Western Europe and Japan experienced limitations on their freedom of action during the 1970-73 period when fixed exchange rates were prevailing. A fixed exchange rate system requires that the central bank purchases all foreign assets presented to it at a fixed price in domestic currency. During that period, central banks of Western Europe and Japan were forced to purchase large amounts of dollar-denominated assets which led to a parallel increase in the monetary base. Because the volume of dollars involved was large, it was impossible to offset the impact and, as a result, domestic money supply in each of the major industrial countries increased at an unprecedented rate which contributed to the world-wide inflation of 1973/74.

However, substantial evidence is now available suggesting that monetary adjustments occur with some lag. Aghevli and Khan (1976) found such evidence from their policy simulation experiments using a short-run continuous time-dynamic model (see Wymer (1976), (1979)). The model was estimated for eight developing countries namely: Argentina, Brazil, Colombia, Ecuador, Mexico, India, South Korea, and the Philippines. Simulation experiments revealed a significant short-run effect of monetary policy on the behaviour of income and prices. Additional evidence was found by Connolly and Taylor (1976) and Blejer (1977). If, indeed, the effect of the balance of payments is felt after a time lag, then there is some scope for short-run manipulation of the money supply before the balance of payments forces readjustments.

In Kuwait, domestic money supply is independent of the effect of the external sector in the short run. This, however, is not due to a formal active sterilisation policy, but due rather to the fact that there is no one-to-one relationship between government revenue and government expenditure. This is a hypothesis for which empirical evidence was presented earlier. This means that government's foreign currency earnings (mainly proceeds of oil and gas sales) are not transferred to the domestic economy automatically, but in a discretionary manner. They are transferred to the State reserves which are invested abroad, and portions are channelled to the domestic economy -whenever the need arises- by exchanging foreign currency at the Central Bank for local currency to finance domestic expenditure. Ghuloum (1984) expresses the idea by saying that "unlike many other economies where the flow of foreign currency earnings is a continuous process, the conversion of Kuwait's foreign currency earnings into local currency is done by the public sector over discrete intervals. The result is a weak relationship between money supply and the payments surplus in the short run." Ghuloum has also presented empirical evidence supporting this hypothesis. He used the balance of trade as an explanatory variable in a short-run money supply function. Several specifications were tried using other explanatory variables such as the change in domestic credit, government expenditure, a weighted average of deposit rates and change in discounts. In all of the formulations, the balance of trade was insignificant, and the most important factor was found to be government domestic expenditure. Indeed, it is a general proposition that if a capital-surplus country depends on the sale of a primary product (oil) in foreign currency (dollar), then the balance of payments does not affect the money supply in the short run.

If there is a scope for monetary policy as a stabilisation tool in the short run, how can the money supply be controlled? We have seen that the determinants of the money supply are the components of both the multiplier and the monetary base, namely:

(i) public's currency to deposits ratio;

(ii) banks' reserve to deposits ratio;

(iii) Central Bank's net foreign assets;

(iv) Central Bank's discounts to commercial banks;

(v) Government deposits with the Central Bank;

(vi) Central Bank's other domestic assets.

Item (i) is a behavioural variable beyond the control of the Central Bank. Item (ii) is partly behavioural (the excess reserve component) and partly a policy variable (the required reserve component) but the behavioural component tends to overwhelm the policy component. Item (iii) is not within the control of the Central Bank as has been shown. Item (iv) is a policy variable, as the Central Bank can manipulate the volume and price (discount rate) of funds obtainable through the discount window. Item (v) is determined by the government's fiscal actions and is not, therefore, within the control of the Central Bank. Item (vi) is negligible.

Having identified the controllable and uncontrollable components of the money supply, we now turn to the tools of monetary control. Different countries employ different tools according to their institutional orgnisation. In the United States, for example, the Treasury issues various kinds of securities to finance the budget deficit, so the Federal Reserve's main tool is buying and selling government securities in the open market (i.e. open market operations), which affect commercial banks' holdings of reserves, and, therefore, the reserve ratio, as well as the net domestic assets component of the monetary base. In Japan, which has a relatively small government debt, the dominant tool is lending to commercial banks through the discount window. The German Bundesbank, on the other hand, uses reserve requirements because of the absence of a large national debt and the limited indebtedness of commercial banks to the Central Bank.

In LDCs, the most serious institutional factor that limits the role and scope of monetary policy is the lack of development of financial and capital markets. This shortcoming makes the traditional tools of monetary policy subject to many technical limitations. Open market operations are particularly influenced by the lack of financial development because their effectiveness requires the existence of a sufficiently deep market in high-quality securities. But the flexibility of this tool has led several LDCs to authorise their central banks to issue their own securities and use them to conduct open market operations.

5.3. Monetary Policy in Kuwait

The Kuwaiti Currency Law of 1960, which was in operation before the foundation of the Central Bank of Kuwait, did not mention commercial banks and their activities. They were, thus, conducting business at their own discretion until the Central Bank of Kuwait came into existence.

There is no doubt that the effectiveness of the monetary policy of the Central Bank of Kuwait has increased since it first commenced operations in 1969. This is due to a greater understanding of the working of the banking system, and is also attributable to the legal amendments of 1976 and 1977 which vested the Bank with wider powers. The process of familiarisation with the banking system was essential in order to devise and develop the tools necessary to accomplish the objectives of monetary policy, these were stated in the 1981 Economic Report of the Central Bank as being:

(i) Protection of the domestic economy in general, and the financial system in particular, from outside effects, mainly those originating from fluctuations in interest and exchange rates.

(ii) Support of domestic liquidity which is often subject to pressure resulting from the conversion of the local currency into foreign currencies (particularly the U.S. dollar), as a means of benefiting from an interest rate differential.

(iii) Maintenance of the local interest rate structure -particularly lending rates which are subject to a legal ceiling- in the face of strains resulting from higher interest rates in foreign markets.

(iv) Maintenance of the stability of the KD exchange rate.

(v) Rationalising credit policy of commercial banks in such a way as to limit any resulting inflationary pressures or speculation.

(vi) Controlling monetary growth such that its rate is compatible with that of real growth.

Objectives (i)-(iv) are interrelated in the sense that the combination of (iii) and (iv) causes capital outflows and liquidity strains as shall be explained in detail later. Objectives (v) and (vi) probably pertain to short-run stabilisation through the control of money supply, although objective (vi) sounds more like a long-run monetary rule.

A brief historical survey of the development of monetary policy in Kuwait now follows. In the early 1970s i.e. shortly after its foundation, the Central Bank concentrated on understanding the activities and operations of commercial banks. That task was carried out by analysing statistical data received from banks and also by holding regular meetings with them. In a way, the only tool of monetary policy was moral suasion which was conducted on an informal basis and without official directives. It worked well then, firstly because of the simplicity of the banking system and secondly, because the economy had not yet felt the "shock" of the oil price increase and the consequent phenomena.

Complications began to appear in 1973: excessive aggregate demand, rapid monetary growth, inflationary pressures and growing speculative activity.

Moral suasion became inadequate and the Central Bank had to devise new tools. Indeed, the period 1973-76 was a period of innovation for the Central Bank as the bulk of tools currently used were devised then. These include the liquidity system, the discount window and credit controls.

In the period 1977-79, the Central Bank became more powerful following the major legal amendments of 1976 and 1977. In November 1976, Article 166 of the Commercial Law was amended by Decree 102/76, in such a way as to empower the Central Bank to fix the interest rate ceiling subject to the approval of the Ministry of Finance, after it had previously been fixed at 7 percent. The Central Bank exercised this prerogative and set a new interest rate structure in which the ceiling was raised to 10 percent. In late 1977, one of the amendments of the Central Bank Law allowed the extension of the maturity of discountable or rediscountable commercial papers from 3 to 12 months. In April 1979, the Central Bank started issuing its bills which were originally intended to replace commercial banks' time deposits held with it. Later in the year, a complementary step was taken in the area of credit control whereby the ratio of overdraft to total credit facilities was reduced. This step was necessary to relieve strains on banks' liquidity resulting from the inability to completely control overdrafts. It was implemented in 1980, when the Central Bank issued a directive instructing commercial banks to shift gradually from lending through overdrafts to loans of definite terms. The maximum overdraft to total credit ratio for the initial stage was set at 55 percent. There was another important development in June 1980, when an amendment to the liquidity system was enacted whereby banks were required to hold a minimum reserve ratio (3 percent of total deposits) in the form of cash, deposits with the Central Bank or Central Bank bills. In 1981 and 1982, the maximum overdraft to total credit ratio was set at 45 percent and 40 percent respectively.

This brief historical survey of the development of monetary policy shows that tools were devised and adapted in the course of time. The following tools are now at the disposal of the Central Bank of Kuwait.

5.3.1. Lending Policy

In using this tool, the Central Bank performs the traditional function of lender of last resort and very often lender of primary resort. This activity influences banks' liquidity and consequently their ability to extend credit. Lending to banks is carried out mostly through the discount window and sometimes directly.

Lending policy of the Central Bank can affect the price and quantity of commercial banks' credit. The price of credit or interest charged on bank credit, though subject to a maximum limit, can be affected by the discount rate which is the interest rate charged to banks for borrowing through the Central Bank's discount window. There is also another lending rate and that is interest on loans against Central Bank bills. These lending rates affect the whole structure of interest rates. Moreover, the volume of funds that the Central Bank is willing to provide through discounts or direct lending affects the reserves of commercial banks and, therefore, their ability to provide credit.

In reality, the Central Bank is subject to political and social pressure to provide reserves, which means that it tends to be "accommodative" more often than not. One source of pressure is the government's commitment to, and concern over, the health of the banking system. The government has traditionally striven for a banking system that is always capable of satisfying the demand for credit by the private sector, and the demand for currency by depositors. However, there have been occasions when the Central

Bank has been unable, or unwilling, to fully satisfy commercial banks' needs. This is verified by the recurring liquidity shortages (see Moosa (1985b)) and also the rapid growth of two sources of funds for commercial banks: foreign liabilities and the interbank market.

The system of discounting and rediscounting commercial papers was put into operation in February 1975, and was intended to assist banks to overcome the shortage of KD funds which they encountered for the first time in 1974. Initially, the discount rate was fixed at 5.5 percent and discounts were limited to commercial papers maturing within three months from the date of discount. Later, the Law was amended to extend maturity up to 12 months, and new discount rates were fixed for each maturity. In April 1979, the discount rate was raised for all maturities as Table 5.3 shows.

Table 5.3: Discount Rates for Various Maturities

Date Effective	Maturity Within			
	3 months	6 months	9 months	12 months
1/2/1975	5.50	—	—	—
30/10/1977	5.50	6.00	6.26	6.50
3/4/1979	6.00	6.25	6.50	6.75

The principal importance of lending policy is its effect on the level of borrowed reserves and, therefore, the monetary base. In Kuwait, this tool has not been considered in these terms, and never used for the purpose of short-run stabilisation through monetary control. It has just been used as a tool to counter any liquidity shortage and boost banks' ability to grant credit. Moreover, the discount rate has not been used to affect the price of credit or the structure of interest rates. As we can see from Table 5.3, it has only been changed once since 1975.

5.3.2. Opening Interest-Bearing Accounts with Banks

This tool was used only once in late 1974 when banks faced a KD liquidity shortage. Provision is made for it in article 40 of the Central Bank Law, but the Central Bank has, since 1974, looked upon it as a tool of last resort to be employed only if all other tools fail.

5.3.3. Opening Interest-Bearing Accounts for Banks

This tool works in only one direction. It can be used to absorb surplus liquidity from the banking system but not the other way round, i.e. not to provide liquidity when there is a shortage.

It was used for the first time in 1973 following the collapse of the Bretton Woods System and the resulting uncertainty in the international financial markets. This, coupled with the absence of short-term assets in the domestic financial markets, forced banks to approach the Central Bank requesting the opening of interest-bearing deposit accounts. The Central Bank agreed -in accordance with article 40 of the Central Bank Law- to open deposit accounts for a period of not less than one month but not more than three months, carrying interest at half a percentage point over the rate applicable to saving deposits of commercial banks. This tool became obsolete in April 1979 when the Central Bank introduced its own bills to replace the deposit accounts.

In effect, this tool -and its successor, the Central Bank bills- actually equate to paying interest on reserves, which is sometimes desirable for its positive effect on the growth and development of the financial system. An important factor for financial development is the rate of return earned from holding financial assets, mainly money and quasi-money in LDCs. Payment of interest on reserves raises the return that can be offered by banks to depositors and contributes positively to monetary and financial development, e.g. by encouraging individuals to use less cash and more banking services.

5.3.4. Liquidity Ratios

In April 1974, the Central Bank introduced a liquidity system requiring banks to maintain 25 percent of the total of deposit liabilities and liabilities to the Central Bank in the form of liquid assets, provided that the ratio of KD liquid assets should not be less than 7.5 percent of total liquid assets. According to the system, liquid assets include cash, deposits with the Central Bank, interbank deposits and certificates of deposit maturing within one month.

In March 1978, the Central Bank introduced a more comprehensive liquidity system which was to be applied to specialised as well as commercial banks (see Appendix 5.1). The 25 percent liquidity ratio was replaced by different ratios depending on deposit maturities. Liquidity ratios were set to range from total exemption for time deposits of more than one year, to 35 percent for demand deposits. Table 5.4 illustrates the structure of the liquidity ratios.

Table 5.4: Structure of the Liquidity Ratios (1978 system)

Type of Deposit	Maturity in months (m)	Percent
Demand Deposits	—	35
Other Deposit Liabilities	—	35
Saving Deposits	—	30
Time Deposits	$m \leqslant 1$	30
Time Deposits	$1 < m \leqslant 3$	20
Time Deposits	$3 < m \leqslant 6$	10
Time Deposits	$6 < m \leqslant 12$	5
Time Deposits	$m > 12$	0

For demand deposits and other deposit liabilities, the liquidity requirements can be satisfied by the following assets:

(i) cash;

(ii) demand deposits with the Central Bank;

(iii) demand deposits with other banks;

(iv) time deposits with the Central Bank (before 1979);

(v) Central Bank bills with maturity not exceeding 3 months (after 1979).

Liquid assets which may be held against other types of deposits include the following:

(i) time deposits with other banks with maturity of not more than one month;

(ii) certificates of deposit issued by other banks and payable within one month;

(iii) treasury bills payable within three months;

(iv) bankers' acceptances issued by other banks and payable within one month.

The system also requires that KD liquid assets should not be less than one third of total liquid assets.

The main objective of the liquidity system is to ensure that banks would not default in the case of unexpected mass withdrawal of deposits. Thus, liquidity requirements constitute a constraint on banks' supply of credit and deposits. Up to June 1980, there was no required reserve ratio which made the system limited in usefulness as a controlling device. Usually, liquid asset ratios are used to reinforce the effect of changes in the reserve ratio, because without the former, commercial banks can offset changes in the latter by liquidating some of their liquid assets.

An important amendment to the system was made in June 1980, requiring banks to hold a minimum reserve ratio (3 percent of total deposit liability) in the form of cash, deposits with the Central Bank and Central Bank bills. The amendment gave the Central Bank a new tool whereby it could exert some control over the liquidity of the banking system by adjusting the ratio upwards or downwards. Moreover, raising the ratio does not drastically affect the profitability of commercial banks because they can meet the required reserve ratio by holding interest-bearing Central Bank bills.

The reserve ratio is usually regarded as the most important instrument of monetary control in LDCs (Coats (1976)). As we have seen, the reserve ratio has a profound effect on the size of the multiplier and hence the money supply. In Kuwait, reserve requirements have not been used effectively. Since its introduction in June 1980, the required reserve ratio has not been changed from the original 3 percent. Moreover, in the absence of developed financial markets, banks tend to hold large amounts of excess reserves. Therefore, changes in the required reserve ratio may be absorbed by excess reserves and thus result in little or no effect on total reserves, especially if the required reserve ratio is as low as 3 percent (see Moosa (1985a)). Usually, this instrument works best if commercial banks are fully loaned up which has not been the case in Kuwait. We have already seen that since the introduction of reserve requirements, the behaviour of the reserve ratio has been dominated by changes in excess, rather than required reserves.

5.3.5. Swap Operations

In May 1978, the Central Bank started to execute swap operations with commercial banks to help them increase their KD funds when they faced a shortage, or alternatively, to absorb surplus KD funds from the banking system.

The mechanics of the swap operation is as follows: the Central Bank sells/purchases foreign currency (usually dollars) to/from banks against KD at the prevailing exchange rate, provided that the transaction is reversed after an agreed period (not exceeding three months) at a rate which, while fixed by the Central Bank, is sufficiently attractive for commercial banks to enter these operations. This exchange rate is usually less than the forward rate as dictated by the interest rate differential between the dollar and the KD. The swap system was initially (June-October 1978) used to absorb excessive KD liquidity. Later, it was used to inject KD funds into the banking system.

5.3.6. Central Bank Bills

In April 1979, the Central Bank started to issue its bills, originally intended to replace time deposits of commercial banks. The 1980 amendment to the liquidity system made the bills very attractive as they provided the means of holding interest-yielding reserves. Central Bank bills are also attractive to banks because they can be used as a collateral against Central Bank loans. Interest charged on these loans is a quarter of a percentage point over the discount rate.

Two types of Central Bank bills are now issued and offered to banks weekly: one maturing in 28 days and the other in 91 days. In the beginning, interest paid was 5.25 percent for the 28-day bills and 5.5 percent for the 91-day bills. These rates were raised in December 1979 to 5.75 and 6 percent respectively.

Central Bank bills are eventually intended to be the vehicle upon which open market operations are conducted, just like Treasury bills in other money markets. This, however, will not be effective in influencing bank reserves because bills are themselves part of the reserves, and there is also no minimum required cash reserve ratio. Al-Baker (1983) has suggested that the listing of KD denominated bonds and other financial instruments on the Kuwait Stock Exchange would create a multi-instrument market, that will consequently open new horizons for monetary policy by utilising open market operations. Open market operations cannot be effective if they are based on Central Bank bills.

5.3.7. Directives

From time to time the Central Bank issues directives of direct impact on banks' lending policies. Two of these directives are the following:

(i) Fixing a maximum limit for unsecured credit which any bank may give to any single person at 10 percent of the bank's own equity. This was put into operation as of July 1976.

(ii) Fixing a maximum limit for the ratio of overdraft to total credit facilities.

These arrangements were made primarily to curb speculative activity in the stock market which was chiefly financed by unsecured credit and overdrafts.

5.3.8. Interest Rate Policy

Interest rate policy may be defined as any official action designed to influence the level and structure of money rates of interest through statutory means, money market intervention or moral suasion to attain given ends of credit policy, and to help in the mobilisation of savings through financial media (Chandavarkar (1971)). Official actions may take the form of:

(i) statutory ceilings;

(ii) statutory or voluntary interbank agreements on deposit and loan rates;

(iii) open market operations and bank rate changes;

(iv) subsidisation or regulation of specific rates.

Since 1961, the structure of interest rates in Kuwait has experienced more or less all of the above-mentioned forms of official action. In December 1969, banks agreed informally on interest rates payable on deposits and loans within the 7 percent ceiling set by the Commercial Law in 1961. This agreement remained operational until late 1976 when the interest rate structure came under the jurisdiction of the Central Bank. Given this power, the Central Bank set a new interest rate structure and raised the ceiling to 10 percent. Interest rate on foreign currency deposits was left to be determined by market forces as reflected in the Euromarket. Two more ceilings were set within the 10 percent general ceiling: 7 percent on secured loans with maturity of not more than one year given to productive sectors, and 8.5 percent on unsecured loans with maturity of not more than one year. Domestic interest rates on deposits and loans fluctuate -within the ceiling- in line with international interest rates, these have constituted a source of pressure on the structure, particularly because there are no restrictions on converting the KD into other currencies. To maintain the structure when there is such pressure, the Central Bank reacts by injecting liquidity into the system through discounts, swaps and direct lending.

Interest rate policy in Kuwait is concerned primarily with the role of interest rate as a loan rate, i.e. the means of regulating the cost and availability of credit as well as its sectoral distribution. However, it overlooks other aspects or functions of interest rate, namely:

(i) to act as the instrument for more effective mobilisation of savings (i.e. as deposit rates) through the offering of realistic rates on savings, i.e. on saving and time deposits;

(ii) to act as a social rate of discount to determine the optimum allocation of savings between consumption and investment.

Moreover, interest rate policy in Kuwait has also failed in diverting resources to productive sectors via the imposition of a lower ceiling on interest paid on credit granted to these sectors, thus reducing the overall cost of credit. In the period between 1977 -when the present interest rate structure was established- and 1982, the percentage of bank credit going to the agricultural and construction sectors declined from 1.9 and 18.9 percent to 1.1 and 17.3 percent respectively; whereas that going to the industrial sector increased only marginally (from 4.6 to 5 percent). These changes were the outcome of both supply and demand factors. The then availability of "astronomical" rates of return on investment in the domestic stock market strongly discouraged investment in productive sectors, and prohibited higher demand for and supply of credit to those sectors.

An optimum interest rate policy should serve to reconcile the conflicting requirements of rates that are appropriate to the desired level, composition of investment and, at the same time, attractive enough to stimulate savings. This triggers an important question regarding the optimum level of interest rates. Chandavarkar (1971) has suggested two criteria in this respect:

(i) Interest rate or rate of return in other sectors of the same economy. In the case of Kuwait, the alternative to investing in the money market is the stock or real estate market. Rates of return in these two markets have historically been extremely high (particularly 1978-82), and especially in the case of the stock market where, at one time, an annual rate of return of 400 percent was not uncommon. After the collapse of the parallel stock market in 1982, rates of return reversed in a negative direction. In general, rates of return in the real estate and stock markets could not have been used as a viable criterion for the appropriate level of interest rates in Kuwait, because they have been extremely volatile, reflecting an element of monopoly profit and high risk. Another non-economic reason is that high interest rates are regarded as usurious, this makes them unacceptable for religious reasons.

(ii) Interest rates in developed foreign money markets. This is more appropriate for Kuwait because it has an open economy with freedom of movement of capital.

Interest rate policy in Kuwait views interest rate as the cost of investment. Therefore, if real investment is to be encouraged, then interest rate must be kept low. This, in essence, is the core of the argument put forward by Raj (1948), but described by Coats and Khatkhate (1980) as self-defeating. They argue that a policy that aims at lowering interest rates with the associated increase in the money supply will eventually trigger inflationary pressures, this -in the course of time- will raise nominal interest rates economy-wide. Amuzegar (1983) has criticised low-interest-rate policies on the grounds that they are likely to have only limited success in promoting investment, partly because a precondition for success is the interest elasticity of real investment. He goes on to say that in any case it is difficult to discriminate between desired and undesired projects from the development point of view. Amuzegar also argues that a further disadvantage of low interest rates is that, regardless of capital mobility, investment may be unduly constrained by the limited availability of savings, and the allocation of investible funds may be suboptimal. The failure of interest rate policy in Kuwait has, more or less, been due to such a policy of cheap money fuelling speculation in the stock market and raising nominal yields, thus diverting resources away from productive sectors into speculative activity.

5.3.9. Exchange Rate Policy

There are three alternative systems of exchange rates that a developing (or any country) may adopt: (i) pegging to a single currency, (ii) pegging to a basket of currencies and (iii) free floating.

Since Kuwait started issuing its own national currency, it has adopted (i) and (ii) above, both of which constitute a system of fixed exchange rates. Such systems were adopted in order to accomplish the Central Bank's stated objective of securing the stability of the KD, and its free convertibility into other currencies. The accomplishment of this objective was not much of a problem under the Bretton Woods System of fixed exchange rates and its amendments under the Smithsonian Agreement. But the collapse of the Bretton Woods System and the floating of major currencies made the task more difficult for the Central Bank of Kuwait, which was from then on required to intervene more actively by buying and selling currencies to secure the stability of the KD exchange rate.

As has been said before, a system of fixed exchange rates makes the simultaneous achievement of maintaining the exchange rate and controlling the money supply impossible in the long run, as the position of external balance will alter the monetary base, and hence the money supply, until the exchange rate is abandoned or the money supply is made compatible with prevailing rates. Therefore, the major drawback of fixed exchange rates is that the central bank's ability to neutralise external influence on the money supply is limited by its capacity to lose foreign reserves, or willingness to accumulate them.

Because of the above-mentioned reason, a system of genuinely fixed rates in a world of general floating is not possible, and Kuwait, like most LDCs, resorted to pegging. Prior to March 1975 -when the present system was introduced- Kuwait pegged its currency to sterling as did the rest of the sterling area. Following the floating of sterling and the abolition of the sterling area, the KD was pegged to the dollar until March 17th 1975.

Pegging to a single currency means that the value of local currency will change vis-a-vis the rest of the world with changes in the value of the currency to which it is pegged. The consequence of adopting such a system is that the domestic economy will be subject to undesired, and largely unpredictable, inflationary and deflationary impulses transmitted through the foreign sector. Al-Sabah (1982) discredits the system of pegging the KD to one currency on the grounds that it imposes fluctuations in exchange rates (vis-a-vis other currencies) that are not justifiable by domestic economic developments. The system is also not desirable for Kuwait from the regional point of view, unless all countries in the Gulf area -which have always aimed at promoting trade and economic co-operation amongst themselves- peg to the same currency. Otherwise, exchange rates between their currencies will be subject to variations which will be an obstacle to promoting intra-regional trade. In general, pegging to a single currency creates preference for bilateral trade, forgoes the benefits of multilateral trade, and causes a less than full exploitation of comparative advantages (International Monetary Fund (1984a)).

In order to limit the problems associated with pegging to a single currency, some countries opt to peg to a weighted basket of currencies that takes into account the geographical distribution of trade. Whereas pegging to a single currency aims at stabilising the exchange rate against the currency of the major trading partner, pegging to a weighted basket of currencies aims at stabilising the effective exchange rate. Theoretically, it is possible to offset the impact of exchange rate changes on the balance of payments position, if it were possible to arrive at the "ideal" effective exchange rate that truly reflects trading relationships. Crockett and Nsouli (1977) argue that an import-weighted index of the exchange rate is the best approximation for effective exchange rates of developing countries. Other alternatives are the export-weighted index and the bilateral trade index, the latter is the average of import-weighted and export-weighted indices.

Since March 1975, Kuwait has adopted an exchange rate policy whereby the KD is pegged to a basket of currencies whose components are not publicly known. This secrecy is thought to be important to create some sort of uncertainty that would curb speculative tendencies of foreign exchange dealers. Using this system, the Central Bank fixes the KD exchange rates daily against the U.S. dollar and other major currencies, on the basis of the most up-to-date data available in the market on the exchange rates of those currencies concerned. The exchange rates announced by the Central Bank are the basis for calculating interbank exchange rates. There are two more rates: the "over-the-counter rate" quoted by banks for the average customer, and the "corporate rate" quoted for corporate and "big" customers.

Observation of the movement of exchange rates of the KD against major currencies over a long period, following the establishment of the new system, shows that the KD/dollar exchange rate is significantly more stable than either the exchange rates of major currencies against the dollar or the KD exchange rates against major currencies. Figure 5.7 clearly shows that the KD/dollar rate is more stable than the KD and the dollar rates against a basket of currencies. Table 5.5 shows the year-on-year changes in exchange rates of the KD and four major currencies against the dollar, as well as the exchange rates of the four major currencies against the KD.

Table 5.5: Exchange Rates (Percentage Change Over Previous Year)

	1980	1981	1982	1983	Coefficient of Variation (1980-83)
KD/Dollar	-2.0	+3.4	+3.3	+0.3	3.2
Sterling/Dollar	-7.2	+20.4	+19.1	+11.7	16.7
Mark/Dollar	+11.1	+14.7	+10.33	+10.0	13.5
Yen/Dollar	-12.7	+0.7	+14.8	-5.8	6.9
Swiss Franc/Dollar	+9.0	+2.0	+18.3	+2.6	10.0
Sterling/KD	-5.2	+16.5	+15.3	+11.4	13.8
Mark/KD	+13.4	+10.9	+6.8	+9.7	10.7
Yen/KD	-10.9	-2.6	+11.1	-6.0	5.6
Swiss Franc/KD	+11.2	-1.4	+14.5	+2.4	7.5

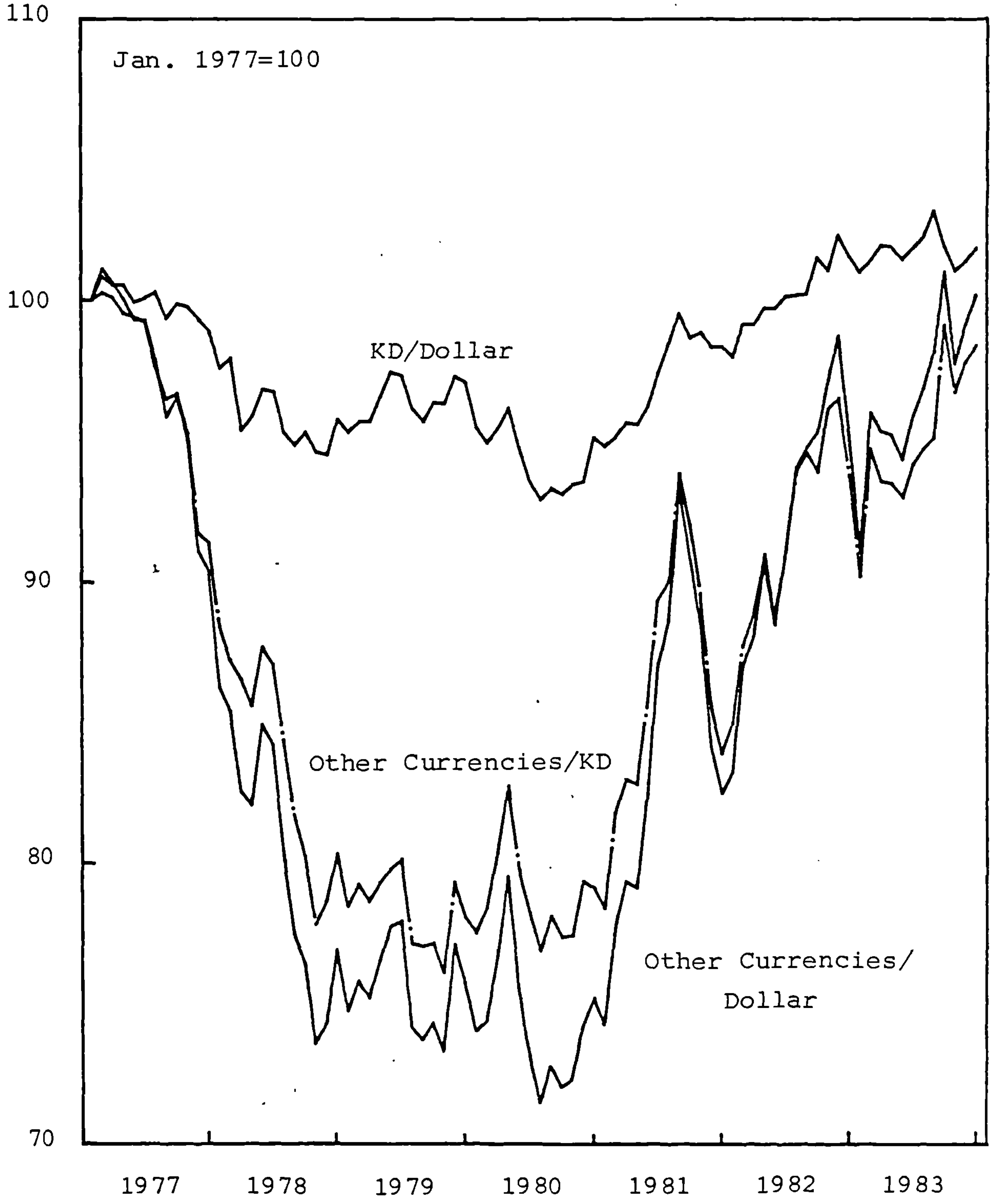
Figure 5.7 and Table 5.5 provide verification of the hypothesis that the dollar is more heavily weighted in the basket than all of the other currencies combined. This hypothesis was formally tested by the author (Moosa (1983c)) using a sample of 61 monthly observations over the period July 1976 - July 1981. The following results were found:

(i) If the dollar appreciates by 10 percent against other currencies (as proxied by the European Unit of Account), the KD appreciates by 7.7 percent against them.

(ii) If other currencies appreciate against the dollar by 10 percent, the KD appreciates against the dollar by 2.3 percent.

Figure 5.7

Movement of the KD and Dollar Exchange Rates (1977-1983)



(iii) A 10 percent appreciation of the KD against other currencies is associated with a 2.4 percent depreciation of the KD against the dollar.

These results demonstrate that the dollar accounts for over three quarters of the basket to which the KD is pegged, implying that when the dollar appreciates (or depreciates) against other currencies, it also appreciates (or depreciates) against the KD, though less than proportionately. This finding contradicts Jebara's (1983) prediction in early 1983 that the KD would depreciate against the dollar and other major currencies, implying that the KD can move in the same direction against the dollar and other currencies. This view was disputed by the author (Moosa (1983d)) on the grounds that it was neither substantiated by theoretical reasoning nor supported by empirical evidence. Subsequent events proved Jebara's predictions totally wrong as the KD depreciated against the dollar by 0.3 percent but appreciated against sterling, German mark and Swiss franc by 11.4, 9.7 and 2.4 percent respectively, year-on-year.

The ensuing evidence shows that the current exchange rate policy of Kuwait does not aim at controlling the effective exchange rate by pegging the KD to either an import-weighted, export-weighted, or a bilateral basket. It rather gives a very heavy weight to the dollar, perhaps because the bulk of Kuwait's foreign exchange earnings come from oil sales which are paid for in dollar, and from investment in dollar-denominated financial assets. This system, therefore, is different in its consequences from a system of pegging to the dollar -which was abandoned in the first place- only to the small extent of the weights of other currencies in the basket. It also provides the stability of the KD/dollar rate which reduces foreign exchange risk and thus encourages capital outflows to take advantage of any interest rate differential between the KD and the dollar, consequently placing pressure on domestic liquidity.

The third alternative of floating has not yet been tried. Al-Sabah (1982) argues against this system for Kuwait on the grounds that the success -or otherwise- of floating requires an active international market for the currency concerned. Moreover, a study by the International Monetary Fund (1984b) has shown that although under floating rates countries have had more control over the money supply than under fixed rates, the difference is somewhat less marked than early supporters of floating rates had anticipated (see also Mussa (1981) and Emminger (1982) for a discussion of this issue). It is also felt that such a system is not appropriate for a developing country because it creates some problems for domestic economic policy.

If the KD were floated, it would eventually appreciate rapidly against the dollar and major currencies as governed by such fundamentals as balance of payments position and inflation differentials. Al-Nakib (1980) argues that for a capital surplus country such as Kuwait, with considerable financial resources relative to its size and a continued current account surplus, appreciation of its currency is not a problem. However, he argues that appreciation which results from floating of the KD is not desirable for the following reasons:

(i) At any given price and production of oil, any appreciation of the KD against the dollar will increase the ratio of government expenditure to revenue which is politically, and socially, unacceptable in a country that aims -or should aim- at maintaining an adequate governmental saving ratio, in view of its extreme dependence on a depletable asset.

(ii) Appreciation of the KD results in income distribution which will not reach different groups of beneficiaries in the proportions desired.

(iii) It may be at odds with the objective of creating and developing industrial or service sectors that can earn foreign exchange at some stage in the future.

(iv) At a given level of oil prices and production, an appreciation of the KD results in a shrinkage of GNP in local currency terms which is politically unacceptable.

On the other hand, floating can be beneficial for Kuwait, because it creates the foreign exchange risk that will deter attempts to take advantage of the interest rate differential which has produced capital outflows and severe liquidity shortages.

In conclusion, it may be said that the present exchange rate policy in Kuwait has been inadequate, self-defeating, and even harmful. The objective of achieving KD stability has only been partially accomplished in the sense that the KD is stable against the dollar only, but against other currencies it is nearly as volatile as the dollar. Furthermore, keeping the components of the KD basket as a secret in order to create uncertainty and curb speculation is no longer effective, as in the course of time foreign exchange dealers became acquainted with the behaviour of the KD/dollar relationship just by the intuitive observation of exchange rate monvements. A system of pegging the KD to a basket of currencies that reflects import-weighted effective exchange rate will overcome most of the shortcomings of the present system.

5.4. Liquidity Crises

We have seen that the ratios of reserves to total private deposits and reserves to KD deposits fell drastically in 1978 reflecting a deteriorating liquidity position of the banking system. The ratios improved between 1979 and 1981, but remained low until the end of 1982 when they rose to near the 1977 levels, indicating a much improved position. These changes reflect the fact that since the end of 1978, higher foreign interest rates, particularly those on dollar deposits, triggered outflows of capital which resulted in liquidity shortages in the banking system, making banks unable to satisfy the demand for credit (see Moosa (1985b)).

Three factors are responsible for capital outflows:

(i) Interest rate policy of imposing a ceiling on KD loan and deposit rates, thus creating a positive differential in favour of the dollar.

(ii) Exchange rate policy that results in the stability of the KD/dollar rate and, therefore, the minimisation of foreign exchange risk which would otherwise deter capital outflows.

(iii) The absence of any restrictions on foreign exchange transactions or capital transfers.

The Central Bank has created the right environment for capital outflows which usually accelerate in times of depressed domestic economic activity and political or military upheaval in the region, e.g. the Gulf War. On the other hand, the Central Bank has persistently tried to rectify the situation by injecting KD funds into the banking system via loans, swaps and discounts. Indeed, this, rather than monetary control, has been the prime objective of monetary policy in the past few years.

The net position of commercial banks with the Central Bank is a good measure of the liquidity situation. The term "net position" pertains to changes in the flow of funds between the Central Bank and commercial banks. It is calculated as the difference between claims of banks on the Central Bank and claims of the Central Bank on banks, i.e.

$$\text{Net Position} = \text{Claims of banks on Central Bank} - \text{Claims of Central Bank on banks}$$

where

Claims of banks on Central Bank = Deposits with Central Bank + Central Bank bills.

and

Claims of Central Bank on banks = Swaps + Discounts + Loans against bills

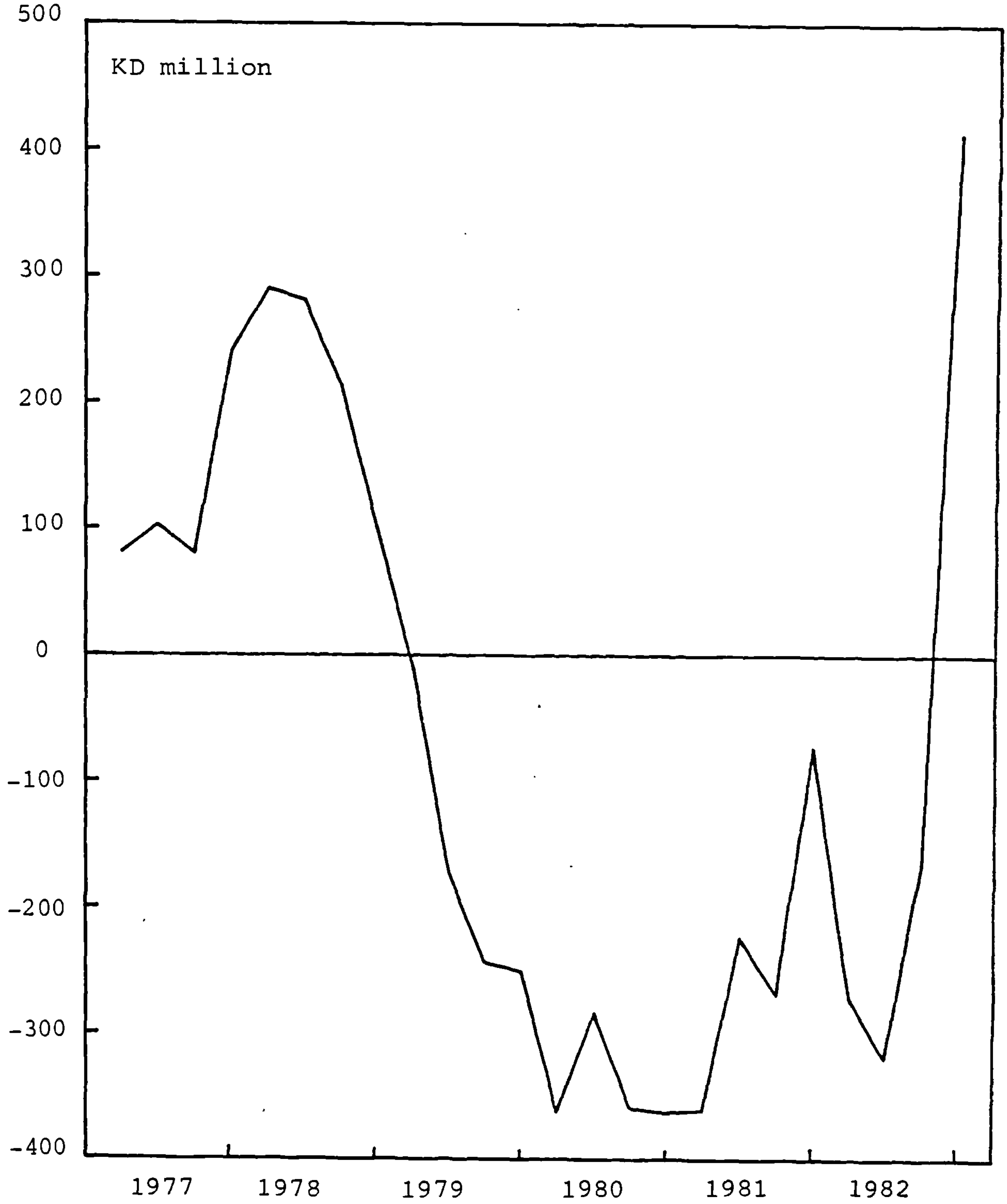
Net position can be positive or negative; a negative value implies net injection of KD funds into the banking system, whereas a positive value implies net absorption. Table 5.6 shows that in the period 1978-82, net position changed from positive to negative and to positive again (see also Figure 5.8). In 1978 the effort of the Central Bank was concentrated on absorbing excess KD liquidity. In the subsequent three years, the banking system was suffering from a shortage of KD liquidity. In 1982 the situation was reversed again.

Table 5.6: Net Position of Commercial Banks with the Central Bank (KD million)

	Claims on Central Bank			Claims on banks			Net Position
	Deposits	Bills	Total	Swaps	Discounts	Loans	
1978	130.4	—	130.4	-0.5	30.6	--	100.4
1979	136.2	13.5	149.7	204.4	195.3	--	-250.0
1980	129.5	108.0	237.5	301.3	298.6	--	-362.4
1981	208.4	167.4	375.8	166.6	282.4	--	-73.2
1982	244.2	488.0	732.2	42.8	276.7	--	412.7

Figure 5.8

Net Position of Commercial Banks with the Central Bank



Several solutions have been suggested to overcome the recurring liquidity shortage, but none has been formally adopted. The following are the most important:

(i) Abolition of the rigid interest rate structure to make domestic rates competitive with foreign rates. This was felt to be inappropriate because high rates could retard real domestic investment besides, high interest rates are looked upon as usurious, and thus unacceptable for religious reasons. However, this argument is not valid because high interest rates already exist despite the interest rate ceiling. Banks, for example, can circumvent the 10 percent ceiling on interest charged on loans to the private sector by charging extras in the form of commissions and administrative fees. Another way of avoiding the ceiling -often adopted by hire purchase companies on consumer credit- is charging interest against the full amount of credit, not against the remaining balance as the loan is amortized. Yet another method is deducting the full amount of interest payment in advance. For example, if a bank agrees to grant a client a loan of KD 1000 to be repaid in full one year later with interest of 10 percent per annum, the client will only receive KD 900 after deducting KD 100 for interest payments. In this case the effective interest rate is 11.1 not 10 percent. So, usurious and above-ceiling interest rates already exist.

(ii) Exchange controls have also been suggested but are unacceptable in a country where economic freedom is the prevailing doctrine. They are also believed to involve some constitutional violations as article 2 of the Central Bank Law states that the Central Bank should ensure the KD's free convertibility. Furthermore, exchange controls could undermine the status quo of the financial system and its future prospects. However, if "full" exchange controls are not desirable for these reasons, "partial" or "selective" exchange controls may be more appropriate. Indeed, the Central Bank of Kuwait resorted to such measures in April 1984 to curb excessive and speculative dollar purchases (see Muehring (1985)).

(iii) The third suggested solution is that if capital outflows are inevitable, then credit rationing must be introduced. This again is felt undesirable because of its possible long-term effect on real investment, and thus, economic development. But it is true that the credit policy of commercial banks has not been conducive to economic development as much as it has fuelled speculation and generated inflationary pressures. So, some sort of credit rationing, or to be more precise, selective credit controls may be desirable even if liquidity is available, as they may be important from the view point of monetary control.

(iv) Another solution, which has not yet been formally suggested but mentioned earlier here, is the introduction of foreign exchange risk that will deter operations of interest rate arbitrage and cut back capital outflows. The risk can be introduced by abandoning the current exchange rate policy and adopting, instead, a policy of pegging the KD to an import-weighted basket of currencies that reflects its underlying effective exchange rate. Such a policy will also make the KD relatively stable against the currencies of its trading partners, rather than being highly stable against the dollar and highly volatile against other currencies.

(v) The final solution can be so effective that if it is applied in its extreme form, the interest-rate-arbitrage motive for capital outflows will completely vanish. The extreme form of this measure is imposing a

100 percent tax on the interest rate differential. Although "tax" is traditionally a very unpopular word in Kuwait, recent years have witnessed some tendency to impose taxes, if not for the purpose of boosting government revenue, then for the purpose of rationalising consumption of free and subsidised services and preventing waste of resources. Perhaps a capital-gains tax on investment in foreign assets will be just as effective.

5.5. Policy Evaluation and Alternatives

Monetary policy of the Central Bank of Kuwait has failed, particularly as a short-run stabilisation tool. Its main contributions or achievements have been two: fostering the development of financial markets and institutions, and providing KD liquidity to the banking system in times of shortage. The latter ironically results from the policy itself or, more specifically, from the combination of interest rate and exchange rate policies. It also failed in diverting resources to the productive sectors in a manner conducive to economic development.

The policy's prime or most significant failure has been in short-run stabilisation via the control of the money supply. The outcome of this failure has been the emergence of inflationary pressures, mounting speculative activity in the stock and real estate markets, the collapse of the stock market on two occasions (1977 and 1982), and the recession of the 1980s. There are three important reasons for the failure of monetary policy in this respect:

(i) Lack of understanding of the relationship between the monetary base and money supply, in particular the stability of the multiplier and the behaviour of currency and reserve ratios. This is an issue that was considered earlier, but further in-depth studies are required especially when longer time-series are available. A model is required to predict the value of the multiplier via its behavioural ratios along the lines suggested in this study and by Khatkhate et al (1974).

(ii) Inadequacy and misuse of some policy tools, in particular the discount rate, required reserve ratio and Central Bank bills.

(iii) The commitment of the Central Bank to the monetary accommodation of fiscal expansion. This means that the monetary base can only be influenced through the combined action of the government (Ministry of Finance) and the Central Bank. This point is crucial, because it means that for the purpose of short-run monetary control, monetary policy cannot be viewed in isolation from fiscal policy. Its significance is augmented by the fact that the government has limited flexibility in determining domestic expenditure. Some components of expenditure tend to increase over time (e.g. wages), whereas discretionary components are influenced by political and social considerations. This means that freedom of action in stabilisation policy constrained by long-term development objectives (Ghuloum (1984)).

An important question arises in this context: how does government expenditure affect the money supply? The answer is that it affects both the domestic and foreign components of the monetary base. Government expenditure financed by the exchange of foreign currency for local currency leads immediately to a rise in foreign assets and government deposits, and since these influence the monetary base in opposite directions, the immediate effect is negligible. As funds are spent, government deposits decline and the base rises, leading to an increase in the money supply. Similarly, imports and capital transfers lead to increased purchases of foreign currency from the Central Bank and, thus, reduce its foreign assets and consequently the monetary base. This is how the multiplier approach to the determination of the money supply is compatible with the identity frequently used by the Central Bank, showing that a change in the money supply is equal to the sum of net government domestic expenditure, net private sector's transactions with the outside world, change in claims on the private sector and change in the equity position of the banking system (see Chapter 3).

Apart from discounts, the control of the monetary base requires the control of foreign assets or government deposits in the Central Bank's balance sheet. Given that the accumulation of foreign assets by the Central Bank is inevitable, because the bulk of government domestic expenditure is financed by oil revenue, the monetary base can be controlled by encouraging or discouraging the private sector to hold foreign assets. Foreign asset acquisition by the private sector requires that the private sector exchanges local currency for foreign currency at the Central Bank, thus reducing Central Bank's foreign assets and, therefore, the monetary base. Disposition of foreign assets by the private sector has the opposite effect.

Keran and Al-Malik (1979) do not consider the manipulation of the private sector's holding of foreign assets a "fine tuning" technique of controlling the monetary base, because it requires the voluntary co-operation of the private sector on a continuing basis. However, they argue that the control of government deposits can be fine-tuned in a way analogous to open-market operations in the U.S., because the government can unilaterally determine the level of its deposits at the Central Bank. One approach to control government deposits is to reduce the "domestic deficit" by a combination of lower domestic expenditure and higher domestic revenue, although neither would be popular in a tax-free welfare state like Kuwait. Another approach involves partial financing of domestic expenditure by borrowing from the public through the issuance of government securities. Such a measure will have the additional advantage of creating a new market instrument which can be used as a vehicle for conducting open market operations. Ghuloum (1984) argues that government securities are superior in this respect to the already-existing Central Bank bills, in that they can be held and traded by a wider sector of the economy, unlike Central Bank bills which can only be acquired by financial institutions.

Kuwait's monetary policy also lacks effectiveness in the field of credit control. The Central Bank of Kuwait has traditionally aimed at enhancing commercial banks' ability to grant credit by extending loans and discounts on the belief that a policy of cheap money is conducive to economic development. But as inflationary pressures intensified and speculative activity mounted, the Central Bank decided to fix a maximum limit for unsecured credit and for the ratio of overdraft to total credit facilities.

Not many people would dispute the proposition that credit policy of Kuwaiti commercial banks has contributed to excessive monetary growth and monetary contraction, because it is the extension of bank credit that generates the multiple expansion of bank deposits. Neither would many disagree with the fact that the sectoral distribution of bank credit has not been appropriate from the normative point of view as warranted by economic development. In order to rectify the situation, some measures of credit control are required to prevent the occurrence of excessive monetary growth, provided that they do not inhibit economic development. Such measures may include a general credit ceiling and selective credit controls.

A general credit ceiling -which in effect is putting direct limits on commercial banks' credit or its rate of growth- forces banks to hold, as idle reserves, any deposit inflows that would otherwise be used to finance credit beyond the ceiling. As such, the ceiling would be similar in effect to a 100 percent marginal reserve requirement. However, a general credit ceiling may be criticised on the grounds that it tends to be too blunt, or that it fails to discriminate between a "good" and a "bad" credit. In this case, selective credit controls are more appropriate. Indeed, selective credit controls have been used to supplement credit ceilings in many LDCs.

The case for selective credit controls -which in my view is absolutely valid for Kuwait- is that the process of financial intermediation does not, by itself, ensure the socially optimum use of resources; This is due to the divergence (with respect to loans granted to various sectors) between private profitability (of commercial banks) and social profitability. Fostering economic development and achieving diversification of sources of income requires considerable investment in productive sectors. However, banks and financial institutions in general usually undertake investment of this sort only to a limited extent, because the short-run profitability is small owing to high costs of production, among other factors. Patel (1954) argues that there is an institutional bias in LDCs in favour of investment in construction and trade vis-a-vis more productive sectors like industry and agriculture, and that is why credit policy should be selective in the sense of providing specific encouragement or discouragement to certain types of investment and expenditure. Johnson (1974) suggests that one of the reasons why private profitability of loans to productive sectors differs from social profitability is the underestimation by commercial banks of the "true" credit worthiness of the particular user of funds, or the overestimation of the "true" risk associated with extending loans to those sectors.

Khatkhate and Villanueva (1978) advocate the use of selective credit controls in developing countries because, as they put it, economic development means not a marginal but a total change in economic relationships. They argue that the relative neglect of selective policies may be justifiable in developed countries which are mainly concerned with the stability of growth and control of inflation, but in developing countries, selective policies should constitute an integral part of the overall economic strategy for development and diversification of the economic base.

Selective credit controls are also viewed as an adjunct to a well-balanced development plan in which planned investment is reconciled with planned savings. Financial planning requires that real resource requirement of planned investment must be consistent with the financial flows by which claims on resources are transferred (Bhatt (1971)). It follows that for attaining given investment plans, it is necessary for the authorities to use measures to help match savings flows with the demand for credit by investors, or else imbalances will develop in the economy.

Selective credit controls have been subject to some criticism. Firstly, Patel (1954) points out that if investment priorities are not in conformity with the lending policy of commercial banks, but in conformity with the investment preference of borrowers, it is sufficient to control banks and this is a comparatively easy task. But if selective credit controls are intended to modify the investment decisions of borrowers, as well as to alter the lending policy of banks, it becomes necessary to check on the actual use made of bank credit. Patel argues that more often than not, the bias in favour of "undesirable" investment is on the part of borrowers as well as lenders and this situation requires something more than selective credit controls. Silber

(1973) argues along these lines by stating that it is necessary to know where the selective credit controls are applied, i.e. on lenders, borrowers, or credit instruments as the conditions governing effectiveness vary according to where the controls are imposed.

Secondly, classification of bank loans is bound to be, to some extent, arbitrary. A loan for commercial purposes, for example, cannot be distinguished easily from a loan to industry for raw material requirements. Therefore, the monetary authorities would have the burdensome administrative task of deciding whether particular loans conform to the official classification.

Thirdly, a large part of total real investment in any economy is self-financed or financed through the capital market or through private borrowing. These would be untouched by efforts to modify the pattern of bank credit. Therefore, the possibility of substitution between bank borrowing and other modes of finance could reduce the significance of any selective controls over banks.

It seems that these criticisms are trivial in comparison with what selective credit controls can achieve. So, the next issue concerns their implementation. In general, selectivity can be introduced in credit policy in four ways: (i) moral suasion; (ii) directives as regards amounts, interest, maturities, collateral, ... etc.; (iii) indirectly through inducements to the banking system in terms of cost and availability of liquid funds, i.e. through the discount system; and (iv) through reserve requirements.

Selective credit controls may work through the discount mechanism as follows. The Central Bank may charge preferential rates in discounting or rediscounting papers originating in certain sectors, to provide an added incentive for commercial banks to increase lending or at least to reduce the cost of funds to these sectors. From time to time, it may also alter, in a discretionary manner, the list of eligible types of papers in order to push credit into the desired sectors.

Selective credit controls may also operate through differential reserve requirements depending on the composition of commercial banks' portfolios. Banks whose portfolios conform to the requirements of certain prescribed percentages of loans to the "high-priority" sector, are allowed to maintain lower cash or liquidity ratios than that required to be maintained by other banks. Alternatively, very high reserve ratios are imposed and banks are given the choice between keeping these reserves idle or investing them in certain assets or sectors. Furthermore, if required reserves are related to deposits, some preferred assets may simply be deducted before calculating the required reserves. If, on the other hand, required reserves are related to assets, then different requirements may be set for different assets.

Another means of directing credit to "high-priority" sectors involves the setting up of specialised credit institutions. Almost all developing countries have, in recent years, set up specialised institutions to meet the special needs of agriculture or new industries. Kuwait is no exception as three specialised banks have been formed to provide loans to finance industry, real estate, and housing. This, in itself, is indicative of the fact that the credit needs of the community have not been met adequately by commercial banks. The government can, in fact, impose its own pattern on credit by centralising much of the credit activity in official or semi-official agencies. Alternatively, the government can direct credit policy of commercial banks through its membership of the boards of directors. The Kuwaiti government, or more precisely the Ministry of Finance, is now a major shareholder of commercial banks following open-market purchases of local shares which were primarily conducted to support the stock market in the aftermath of the 1977 and 1982 crises. Representation of the Ministry of Finance on banks' boards of directors, therefore, is not a problem. This is another example of how the Ministry of Finance can enhance the effectiveness of monetary policy in Kuwait.

Finally, the traditional fears of commercial banks concerning medium-term or long-term loans to productive sectors can be allayed by appropriate government guarantees, discount facilities, or through joint loans by commercial banks and state-managed development finance institutions.

In conclusion, selective credit controls are important in the case of Kuwait in order to accomplish the objective of diversifying the economic structure, thus ensuring that bank credit is used in accordance with a certain order of priorities. They are also important in periods of inflation since these are usually characterised by excessive investment in unproductive luxury construction, for example. Of course, it would be better to deal with inflation directly than trying to cure some of its symptoms by selective credit controls.

So much for selective credit controls, what other specific policy tools can be potentially effective in Kuwait? Two measures automotically come to the fore:

(i) The Central Bank should be empowered to specify the margin requirement in transactions involving the sale and purchase of shares. This means that the Central Bank should be able to fix the minimum percentage down payment which purchasers of shares must make. The requirement should be raised when it is desirable to restrict speculative buying, and lowered to revive sluggish markets. This measure is particularly important in Kuwait because speculative activity in the stock market has always precipitated economic difficulties.

(ii) The Central Bank should be given the power to act in the field of consumer credit control. A typical measure of consumer credit control is the introduction of special non-interest bearing deposits as percentage of any increase in the total amount of credit.

5.6. Discretionary Policy Versus Monetary Rule

The issue of discretion versus rules in conducting monetary policy has been the subject matter of an old debate with frequent appearance in the economic literature. Many economists have suggested theoretical pros and cons of monetary rules, the following are examples:

Two extreme views have been put forward by Sayers (1957), and by Sargent and Wallace (1975). Sayers argues that the essence of central banking is discretionary control of the monetary system and working to rule is the antithesis of central banking. Conversely, Sargent and Wallace proclaim that "there is no longer any serious doubt about whether monetary policy should be conducted according to rules or discretion. Quite appropriately, it is widely agreed that monetary policy should obey a rule."

Generally speaking, economists who advocate the use of monetary rules base their argument on the assumption that there are long and unpredictable lags between the recognition of the need for changing monetary policy, implementing the change and its ultimate effect on the economy. Coats (1980) argues that the difficulties arising from these lags are more serious in LDCs than in developed countries because in the former economic data are less plentiful, less accurate and less quickly available. Two more problems in LDCs are cited by Coats. Firstly, the shortage of highly trained and sophisticated monetary analysts who can accurately diagnose the prevailing economic situation in order to move monetary policy in the right direction; any mistake in the diagnosis will result in actions that are more disruptive than stabilising. Secondly, the lack of independence of the Central Bank limits its ability to take effective discretionary measures.

Bryant (1980) lists the following reasons for the desirability of monetary rule:

(i) Existing knowledge about macroeconomic behavioural relationships and about the impact of policy actions is so meagre that discretionary decisions are likely to do as much harm as good.

(ii) Announced policy rules may be more conducive to stable and desirable private-sector behaviour.

(iii) In a democratic society, government officials are exposed to irresistable political pressure to pursue incorrect policies. Thus, discretion tends to generate deficient macroeconomic policies.

(iv) Rules reduce the likelihood of human mistakes.

Friedman (1960) has proposed the use of a constant money growth rule whereby the money supply is allowed to grow at a constant rate year after year with no attempt to offset cyclical movements in velocity. He advocates the use of such a rule on the grounds that counter-cyclical measures or "fine-tuning" is at best ineffective and at worst destabilising, and that the demand for money is sufficiently stable to make such efforts unnecessary. Friedman and Schwartz (1963a),(1963b) point out that erratic gyrations in the money supply have been the dominant factor in major business contractions and inflation, and that a constant growth rule would provide protection against such gyrations.

Critics of the simple rule base their view on the technical and political ability of central bankers to deal with the types of problems cited by Friedman. Sayers (1957) argues that the proclaimed inherent weaknesses in central banking can, at any rate in most countries, be kept within manageable bounds. The same view is expressed more forcefully for the United States in Lerner's (1962) review of Friedman's "Program for Monetary Stability." Lerner points out that of the 23 cases of policy errors listed by Friedman, there are only three cases where the mistake is one that might be repeated and even that does not seem too likely. Coats (1980) argues that this view is discredited by the turbulent 1970s.

Perhaps the most compelling reason for the use of a constant growth rule in developing countries is the tendency of the governments to monetise the budget deficit, i.e. to finance domestic expenditure by borrowing from the central bank. The adoption of such a rule thwarts the ability of governments to borrow from central banks, and would force adjustment in government expenditure when borrowing from the private sector or abroad is not possible, or desirable. Since financing government expenditure by selling foreign currency to the central bank, as in the case of Kuwait, produces a similar outcome, the adoption of such a rule could be beneficial for Kuwait in the short run. Ghuloum (1984) has suggested a constant growth rule for government expenditure on the grounds that it would impose discipline to prevent and avoid the monetary explosions that Kuwait experienced since the mid-70s. In the long run, a rule of constant monetary growth is not possible for Kuwait because with an exchange rate system of managed floating, domestic money supply is determined by the balance of payments position. Coats (1980) has suggested that a country choosing to fix its exchange rate vis-a-vis a basket of currencies, must pick a rule that is compatible with that fixed rate. This rule must allow or facilitate the adjustment of domestic prices to world prices in order to achieve international payments equilibrium.

We cannot reach a clear-cut conclusion on the efficacy, or otherwise, of a monetary rule for Kuwait without further empirical research on all issues pertaining to the rules versus discretion controversy.

APPENDIX 5.1

RULES AND REGULATIONS OF THE 1978 LIQUIDITY SYSTEM

ITEM 1

Banks subject to the liquidity regulations shall maintain adequate liquid assets to enable them to meet their short-term commitments.

ITEM 2

The amount of liquid assets held shall not, at any time, be less than the equivalent of the total product of multiplication of the creditor deposits by specific percentages as defined hereinafter. For liquidity purposes, creditor deposits shall be divided into five categories against which banks shall maintain liquid assets not less than the following ratios:

1. 35 percent of sight deposits and other deposit liabilities.
2. 30 percent of saving deposits and time deposits, the maturity of which is within one month from the date of computation of liquidity.
3. 20 percent of time deposits, the maturity of which is more than one month but does not exceed three months from the date of computation of liquidity.
4. 10 percent of time deposits, the maturity of which is more than three months but does not exceed six months from the date of computation of liquidity.
5. 5 percent of time deposits, the maturity of which is more than six months but does not exceed one year from the date of computation of liquidity.

ITEM 3

The provisions of Item (2) with respect to time deposits shall apply also to certificates of deposit issued by banks subject to liquidity regulations.

ITEM 4

The minimum requirement of liquid assets held against category (1) deposits shall be maintained in the form of one or more of the following assets:

1. Liquid assets in the form of cash and cash items.
2. Balances of sight (demand)deposits with the Central Bank of Kuwait.
3. Balances of current and sight deposits with other banks.
4. Balances of time deposits with the Central Bank of Kuwait.
5. Kuwaiti Dinar bills issued by the Central Bank of Kuwait for a maturity not exceeding 3 months.
6. Other assets which the Central Bank may define from time to time as liquid assets under this group of assets.

ITEM 5

Liquid assets held against the other four categories of creditor deposits may be maintained in any form of liquid assets specified in Item (4) or in the form of one or more of the following assets:

1. Balances of time deposits with other banks, provided that they are payable within one month from the date of computation of liquidity.
2. Certificates of deposit issued by other banks, provided that they are payable within one month from the date of computation of liquidity.
3. Treasury bills, provided that they are payable within three months from the date of computation of liquidity.
4. Bankers acceptances issued by other banks provided that they are payable within one month from the date of computation of liquidity.
5. Other assets which the Central Bank may define from time to time as liquid assets under this group of assets.

ITEM 6

Liquid assets in Kuwaiti Dinar shall not be less than one third of the total liquid assets required to be held under Item (2) of these regulations.

Liquid assets in Kuwaiti Dinar, which represent sight and upto 1 month time deposits with banks, shall be maintained with banks operating in Kuwait.

ITEM 7

Balances of current accounts, sight deposits and time deposits maintained with other banks, as well as certificates of deposit and bankers acceptances issued by other banks, shall not be considered among liquid assets unless they represent genuine claims on other banks and should not be contestable.

ITEM 8

In the event banks subject to these regulations borrow from the Central Bank of Kuwait against their time deposits with it,or against Kuwaiti Dinar Bills issued by it, only the net balance of time deposits with the Central Bank and the net balance of the Kuwaiti Dinar bills issued by it, (e.g. after deduction of the amounts borrowed), shall be counted as part of the liquid assets held against category 1 of deposits.

ITEM 9

Central Bank deposits with and loans extended to the banks subject to these regulations shall be exempt from liquidity requirements.

ITEM 10

Re-investment transactions may be exempt from liquidity requirements, if the banks so desire. Re-investment transactions are meant to be time deposits re-invested with one or more other banks.

Time deposit acquired, and time deposit or deposits re-invested shall be identical in so far as the total amount, date of maturity and currency are concerned.

If re-investment transactions are in Kuwaiti Dinar, exemption from liquidity requirements shall prevail only where the acquired deposit is re-invested in the form of deposits with one or more local banks.

In the event the deposit required is re-invested in a currency other than that of the acquired deposit, the bank concerned shall enter into a forward arrangement for the purpose of obtaining the currency of the acquired deposit on maturity.

If the acquired deposit is re-invested in part, the provision of re-investment transactions shall apply to the part re-invested provided that the requirements set in the preceding paragraphs are satisfied.

ITEM 11

Liquidity shall be computed twice per month, i.e. on the fifteenth and on the last day of the month. The form prepared for the purpose should be submitted to the Central Bank of Kuwait within a period not exceeding five days from the date the liquidity is calculated.

ITEM 12

When liquidity is computed in the middle of the month, banks may calculate the maturities of the creditor deposits classified in Item (2) on the basis that the time unit is the month and not the day.

ITEM 13

The terms "sight deposits", "other deposit liabilities", "saving deposits", "cash and cash items" and "banks", as well as other terms mentioned in these regulations, should be understood in the light of regulations and instructions issued by the Central Bank with respect to the financial position of banks.

CHAPTER 6

A QUARTERLY ECONOMETRIC MODEL OF KUWAIT'S MONETARY SECTOR

6.1. Introduction

In this chapter a model of Kuwait's monetary sector is developed and estimated econometrically in order to provide an analytical framework for studying the behaviour of key monetary variables. The model will enable us to quantify the relationship between money, income and prices in a macroeconomic context.

Econometric modelling of LDCs has become a common practice. Park (1973) points out that meaningful monetary analyses in LDCs require a structural model complete with a financial sector in the spirit of the Keynesian income/expenditure theory. However, a straightforward application of models originally built for developed countries to LDCs is not appropriate due to structural and institutional differences. Such differences can also be found amongst LDCs, for example: a major source of the monetary base in most LDCs is government debt to the central bank, resulting from the monetisation of the budget deficit; in the case of Kuwait, however, this item does not exist because the budget is always in surplus. On the contrary, government deposits constitute a major item on the liabilities side of the Central Bank's balance sheet. Thus, while in most LDCs the central bank is a net creditor to the government, in Kuwait the reverse is true. Differences also exist among countries which on the surface appear identical such as Kuwait and Saudi Arabia. They are both classified as oil exporting capital surplus countries, and as such they share the same characteristic mentioned above. However, while discounts to commercial banks comprise a major part of the domestic assets of the Central Bank of Kuwait, this item does not exist in the balance sheet of the Saudi Arabian Monetary Agency, simply because its charter does not allow it to lend to commercial banks or to receive interest.

However, nobody is going to reinvent the wheel! A model designed for one country, irrespective of that country's stage of development, is bound to have some applications elsewhere. Klein (1965), for example, points out that substantial parts of the real sector of the Keynesian system could be carried over to LDCs, although the supply side should be given much greater emphasis. Park (1973) suggests that models that have been successful in advanced countries can be applied to LDCs, provided that they are modified to reflect structural and institutional differences. Furthermore, while he recognises the difficulty of building a model appropriate to all LDCs, he acknowledges the fact that a Keynesian income/expenditure model can be used to explain almost any situation if it incorporates broad characteristics that are common to all LDCs and make allownces for the elements that differentiate these economies from those of advanced countries. Accordingly, he presents a model for LDCs comprising financial and real sectors, but makes no attempt to estimate the model for any particular country. We shall make some use of Park's formulations in our model of Kuwait's monetary sector.

Econometric models designed for LDCs can be classified into three broad categories: (i) Keynesian models of effective demand (for example, Marwah's (1970) model of India), (ii) Chennery's two-gap models (for example, Chennery and Strout's (1966) for 48 LDCs), and (iii) real models based on either Harrod-Domar or on one-sector or two-sector neoclassical growth models (for example, Behrman and Klein's (1970) model of Brazil). Extensive efforts have been made to build models for LDCs, despite the problems of limited reliable data, lack of knowledge of the economic structure of LDCs, and the general scepticism about the usefulness of model building. These problems, however, should not discourage efforts to model the economies of LDCs.

In the case of Kuwait, the data problem has been, and still is, the prime problem facing model builders. El-Mallakh and Atta (1981) describe the data problem in studies on macroeconometric models of developing economies as "the most intractable." For the special case of Kuwait, they point out that difficulties encountered in finding empirical correlates for the analytic model forced them to use proxies. They add that the recent origin of data collection in Kuwait in the form consistent with macroeconomic modelling necessarily gives limited degrees of freedom. They list four specific problems encountered in trying to collect a sample of 16 annual observations to estimate their macro model. These include: reconciliation of series for fiscal years with those for calendar years; inconsistency existing in the pre and post 1970 series on national income variables; the absence of continuous series on labour force (and population); and inconsistency between foreign trade figures in the GDP accounts and balance of payments accounts. We shall see later that the first two problems can be avoided by using quarterly data from the most recent years, though interpolation of GDP series will be necessary because quarterly data are not available. Fortunately, the dearth of data in Kuwait is becoming less acute, due to the fact that the economic authorities (Ministry of Finance, Ministry of Planning and the Central Bank) have realised the importance of accurate and diversified data for policy making. As a result, there has been a notable improvement in data collection and presentation. Indeed, El-Mallakh and Atta acknowledge that the inconsistency in the pre and post 1970 national income series is due to the improvement in the method of data compilation.

Lack of knowledge of the economic structure of LDCs should not discourage model building because there is a two-way interaction between model building and the understanding of economic structure. Whereas some understanding of economic structure is a pre-requisite for model building, in particular the preliminary specification of the model, the latter enhances the former following the estimation stage and the interpretation of empirical results. This is particularly true of models built by the academics for pure research purposes. However, Griliches (1981) argues that the incorporation of economic theory in econometric models is sometimes a "one-way street" in the sense that they produce little feedback to the theoreticians. This, Griliches argues, is particularly true of "sellable economics" which can be profitably sold to outsiders.

It must be borne in mind that econometric models are simplified images of the "true" economy, desinged to highlight certain aggregate relationships for the purpose of generating useful insights into the possible evolution of the economy. Moreover, Ando (1981) argues that if we can effectively and systematically exploit all the information available from sources other than the time series used to test a particular hypothesis, we would begin to make more systematic progress in the accumulation of our knowledge about the functioning of the economy. Such alternative sources include: cross-section data, data for other countries, time series data for earlier periods, and even informal insights obtained by observing and talking with critical decision-making agents in the economy. Ando adds that hypotheses are neither true nor false, but rather a continuum of approximations to reality and that our objective must then be to improve the accuracy of the approximation of hypotheses by accumulating more and more information over time. An initial lack of understanding of the economic structure should not discourage model building as applied to LDCs because, as Ando points out, our procedure as economists normally involves singling out one or two hypotheses at a time and studying them against a set of data, assuming for this purpose that the approximation of the remaining hypotheses is good enough. In the meantime, Ando argues, we must strive to improve the formulation of defective hypotheses.

Criticism of the methodology has led to general scepticism of model building both for developing and developed countries, although other approaches individually have not proved to be more useful for economic analysis. Many observers, both inside and outside the profession, claim that conventional macroeconometric modelling is virtually useless for forecasting or policy analysis and that it would fail in any attempt at cost-benefit analysis. Christopher Sims, who has been critical of conventional macroeconometric model building, states in his "Macroeconomics and Reality" (Sims (1980)) that although large-scale macroeconomic models exist and are by some criteria successful, a deep vein of scepticism about the value of these models runs through that part of the economics profession not actively engaged in constructing or using them. He further asserts that it is rare for empirical research in macroeconomics to be planned and executed within the framework of one of the large models. The other view is that macroeconometric models provide the best of the currently available alternatives for the above-mentioned purposes.

Macroeconometric models have been criticised on the grounds that the conditions for valid aggregation of well defined macroeconomic relationships are not met, and hence stable relationships among economic aggregates will not exist. This, in fact, is the basis for Lucas' (1976) famous critique of econometric policy analysis. Lucas argues that behavioural equations in any econometric model reflect optimal responses of economic agents to a given government policy rule. This implies that the equations must change when the government abandons one rule in favour of another, or, alternatively, the structure of any model formulated before the policy change will not reflect the structure of the economy after the change. Thus, the very structure of behavioural equations is unstable and cannot be used for the purpose of economic policy analysis. Lang (1983) cites an example of a case to which the Lucas critique applies: the Federal Reserve's October 1979 switch from attempting to control the money supply through short-term interest rates to the direct control of bank reserves.

Ando (1981) describes the Lucas critique as "a proposition on the near-impossibility of estimating structural equations in macroeconometric models in the face of changing government policy rules." Whilst he agrees that the argument is true and acknowledges the importance of the problem pointed out by Lucas, he argues that it is not quantitatively serious because the structure of behavioural equations is only very slightly affected by changes in government policy rules. Therefore, the assumption that equations are unaffected is nearly correct, and for most purposes econometric models using such an assumption would be good enough. Furthermore, Ando suggests a practical method to deal with the problem highlighted by Lucas: when major government policy changes occur, we should identify the "small" number of behavioural equations that are likely to be affected, and isolate them from the other equations on which the impact of the policy changes would be minimal. Ando adds that "in this way we can bring Lucas' dilemma from the level of some higher teleological principle where Lucas placed it, and make it another difficult empirical problem like many others that we encounter in econometric research."

Another objection to Lucas' critique comes from Tobin (1981) who stresses that "it is not so devastating that macroeconometric model builders should immediately close shop." He points out that the public's perception of policy rules is not so precise as to exclude considerable room for discretionary policy moves that the public would see neither as surprises nor as signals of a systematic change in the rule. He adds that behavioural "rules of thumb", though not permanent, may persist long enough for the horizons of macroeconomic policy makers. Furthermore, Tobin does not assign special significance to changes in policy rules but considers them to be the same as demographic, technological, institutional, international, and cultural changes, which, he thinks, are all bound to alter structural behavioural equations. This, however, does not warrant abandoning macroeconometric models, but rather having them revised or replaced over time, because the structure of any empirical model reflects the historical experience and environment of the period for which it is estimated.

Finally, some economists (e.g. Lang (1983)) argue that the Lucas critique does not apply to changes in the values of variables used as policy instruments, but rather -and only to- changes in the policy instruments used. The Lucas critique is still being debated and econometricians are testing the sensitivity of their models to policy changes.

Another criticism of econometric models is based on measurement errors in aggregate data; this, as we shall see later, particularly applies to the measurement of the general price level in Kuwait. Morgenstern's (1961) comments indicate that potential measurement errors in aggregate data may be sufficiently large as to defeat the purposes of econometric modelling. Again, measurement errors constitute a problem that has been recognised by theoretical econometricians, but has not been assigned sufficient weight as to warrant the abandoning of econometric model building altogether. This may be justified on the grounds that the behaviour of decision makers in the economy is based on published data, irrespective of whether or not the data suffer from measurement errors. Therefore, equations estimated using published data reflect to a large extent the actual behaviour of economic agents.

Others, such as Cooper (1972), have argued that macroeconometric models do not perform as well in forecasting as simpler univariate time-series models, or judgemental procedures, which implies that as far as forecasting is concerned an econometric model is more complicated than necessary or at least not cost effective. The issue of econometric versus time-series forecasting was discussed in detail in Chapter 4, but we may add here Kmenta and Ramsey's (1981) suggestion regarding the distinction between the objective of forecasting and that of hypothesis testing. They argue that the distinction is false, because one tends to have more confidence in forecasts derived from models utilising economic theory and correct statistical methodology. They argue, therefore, that it is naive to claim that the elaborate structural specification and detailed identification analysis of macro models is of little use if all one wishes to do is merely to obtain good forecasts.

Some economists have been so pessimistic as to claim that the estimation of structural equations is impossible, because some procedures do not conform to reality. To cite some examples: the exclusion assumptions needed for identification, classification of variables into exogenous and endogenous, and the complete exclusion of some variables and hence some equations from the system. Liu (1960) pointed out that most zero restrictions are probably inappropriate and economic equations should have insufficient zero restrictions and are, therefore, technically under-identified. This implies that a unique structure cannot be associated with an observable reduced form, i.e. we cannot separate correlation and causation. These ideas were largely ignored until their recent revival by Sims, Sargent and others (Sims (1977), (1980)). In his 1980 paper, Sims defends Liu's position by casting doubt on "the style in which model builders construct claims for a connection between econometric models and reality, i.e. the style in which identification is achieved for these models." In this respect he defines identification as follows: a model is identified if distinct points in the model's parameter space imply observationally distinct patterns of behaviour for the model's variables. He repeatedly describes this style as "incredible identification" because it is based on false assumptions. Ironically, Sims eventually admits that macroeconomic models are useful tools in forecasting and policy analysis. He reconciles his seemingly two contradictory statements by stating that for forecasting and policy analysis, structural identification is not ordinarily needed, and that false restrictions may not hurt and even help a model to function in these capacities. On the other hand, Desai (1981) describes Liu's ideas as being too unorthodox and argues that if they were correct, they would have impeded the progress of econometrics at the time of its most rapid growth.

Franklin Fisher (1961) was able to show that the properties of estimators are only slightly disturbed when we make close approximations. Simon and Ando (1961) have analysed the dynamic behaviour of nearly, but not exactly, decomposable systems and were able to show that, within a certain time interval, the nearly decomposable system behaved like the corresponding perfectly decomposable system. While for another, longer time interval, they could define an aggregate system in terms of aggregate variables, each of which would represent a non-decomposable subsystem.

Furthermore, Fisher (1961) has justified the estimation of partial economic models without explicit reference to the total macroeconomic system of which they are part of, when omitted variables have small coefficients and when the endogenous variables have negligible direct and indirect effects on the assumed exogenous variables. This approach assists the attempt made in this chapter to estimate a model of Kuwait's monetary sector without a full specification of the real sector. Against this, Coats and Khatkhate (1980) argue that the formulation of monetary policy must place the monetary sector in its proper context as an integral part of the entire economy, because economies are interrelated systems. They describe the use of a single equation, or a subset of equations from a complete model, as "inappropriate or hazardous." But what is desired is not always feasible, this is especially true in the context of macroeconometric modelling of LDCs, due to limitations of reliable data and the lack of understanding of economic structure. Moreover, and as we shall see later, the state of the art of modelling the Kuwaiti economy has reached a stage where the next logical step is a disaggregated model of the monetary sector, because the real sector has received so much attention. In any case, the model presented here will not describe an isolated monetary sector, but will seek to trace out the effects of the monetary sector on real output, imports and domestic price level. It will be demonstrated that such a subsystem satisfies the purpose of determining the money supply, and quantifying its effect on the real sector.

Finally, it is noteworthy that one advantage of econometric modelling is that the procedure can be fully documented, and alternative models can be tested against one another, in the hope of finding better models. Judgemental procedures do not lend themselves to such a process. However, a mixed econometric and judgemental approach is superior to either approach by itself. Econometric models should constitute only a component of the modeller's total knowledge about the economy, and the modeller should be aware of the model's deficiencies (see Howrey et al (1981)).

6.2. Previous Econometric Work on Kuwait

The purpose of this section is to show why a disaggregated model of Kuwait's monetary sector is the next logical step in the development of econometric work on the Kuwaiti economy. Some studies that will be mentioned below have been referred to in more than one part of this thesis. Therefore, I shall only mention points that have not been dealt with previously and elaborate on issues already discussed. Appendix 6.1 lists selected empirical results from these studies.

Econometric work on the Kuwaiti economy is not an old practice. It goes back only as far as the early seventies with the pioneering work of Khouja (1973). He estimated the structural and reduced form specifications of six equations describing the real sector of the Kuwaiti economy, on the basis of the Keynesian income/expenditure approach. He subsequently used the model to calculate the multiplier effect of changes in the only exogenous variable, the difference between exports and net factor payments, on the six endogenous variables of the model, namely: consumption, investment, imports, government expenditure, government revenue and GNP. The model was later upgraded by Khouja and Sadler (1979) to a version that contains four definitional equations and seven behavioural equations with more sophisticated specifications. This version takes account of the monetary sector by including an equation that explains changes in the money supply in terms of government expenditure and the 3-month Eurodollar interest rate. The model also shows some interaction between the monetary and real sectors by incorporating the ratio of the money supply to disposable income as an explanatory variable in the private investment equation. However, this variable was found to be of relatively low statistical significance ($t= 1.73$).

The pace of econometric research has accelerated since the beginning of the 1980s due to improved technical skills in the profession, and the availability of better-quality data with longer time-series and higher frequencies (e.g.

quarterly and monthly for monetary variables). The most important contributions in this field were made by Moosa (1982),(1983a), (1983b),(1983e), El-Mallakh and Atta (1981), El-Beblawi and Fahmi (1981), the Claremont Economics Institute (1983), Ghuloum (1984) and Kuwait International Investment Company (1984). Moreover, the Ministry of Planning is believed to have its own econometric model which is used to forecast manpower needs, whereas the Central Bank has its own econometric model of the monetary sector which is used to forecast the money stock on a monthly basis. It is also believed that some econometric work is being done at the Kuwait Institute for Scientific Research.

The author (Moosa (1982)) developed a simple time-series model that identifies trends of monetary growth and uses them for forecasting as illustrated in Chapter 4. This work came in response to the poor forecasting performance of the Central Bank's model which proved to be inadequate for forecasting the money supply.

In another study by the author (Moosa (1983a)), the method of principal components was used to estimate the portion of GDP originating in the oil sector. The study was motivated by the long time lag between the publication of oil production and prices, and the publication of GDP figures. The method was used to estimate an equation that explains oil GDP (dependent variable) in terms of one principal component (explanatory variable) derived from the monetary value of the production of crude oil, refined oil, liquified petroleum gas, and natural gas. The model worked very well on ex-post basis, and can now be used to arrive at preliminary estimates of oil GDP based on actual or estimated oil statistics.

Two more models were estimated by the author. The first one (Moosa (1983b)) aimed at forecasting the KD exchange rate against eight major currencies. The model rests on the relationship between the KD/dollar rate and the components of the basket of currencies by which this rate is determined. The principal equation explains the determination of the KD/dollar exchange rate E_1 by the dollar rates of "some" other currencies as follows:

$$E_1 = b_1 + \sum_{i=2}^{n} b_i E_i$$

where E_i stands for the exchange rate vis-a-vis the dollar of the currencies (other than the dollar) that comprise the basket. The intercept term b_1 is a measure of the dollar's weight in the basket, since E_1 is measured as KD per dollar. The E_i's are measured as the number of currency units X_i per dollar. Once E_1 is determined, other exchange rates are calculated as cross rates C_i such that

$$C_i = E_1/E_i$$

where $i = 2,3,......,8$. Since its development, this model has proved to have a good track record on ex-ante basis.

The other model (Moosa (1983e)) was designed to estimate the demand for money function in Kuwait, using a single equation approach. Quarterly data for the period 1977-81 were used to estimate functions of various specifications with three different estimation techniques: OLS, GLS and IV. The explanatory variable that proved to be most important in determining the demand for money, was the level of economic activity as proxied by government domestic expenditure.

Another estimation of the demand for money function in Kuwait was done by Crockett and Evans (1980) of the International Monetary Fund. They used data available at the Fund and staff estimates to fit two equations in log-log form, one for real narrow money and the other for real broad money, with real non-oil GDP employed as the only explanatory variable in both cases. The regressions showed good fit, with $R^2 = 0.928$ for narrow money and $R^2 = 0.984$ for broad money. Moreover, a Chow-test indicated the stability of the function.

El-Beblawi and Fahmi (1981) estimated a single-equation econometric model to explain stock prices in terms of the money supply and Eurodollar interest rate. They found that the money supply is an important factor in determining stock prices, whether a narrow or broad definition of money is used. An earlier attempt to model stock prices was made by Khouja and Said (1973) on the basis of company performance using cross-section data.

El-Mallakh and Atta (1981) estimated a block recursive model of the Kuwaiti economy. The model consists of fifteen behavioural equations and twenty five identities including, for the first time, an equation to explain the price level which was incorrectly treated as exogenous by Khouja and Sadler (1979). The model also includes an equation to explain the money supply, defined to exclude foreign currency deposits, but the specification of this equation evidently lacks the theory to back it up. Equations were grouped under three blocks, and those in the first and third blocks turned out to be recursive, and were thus estimated by OLS. It is of significance to this study to mention that the third block in El-Mallakh and Atta's model contains the three monetary variables: money supply, government deposits with the Central Bank and foreign assets of the Central Bank, as well as the price level and GNP. Because of the properties of block recursiveness and within-block equation recursiveness, all of the equations were estimated by OLS except the three that explain the value of oil exports, quantity of oil exports and government oil revenue. However, the authors did not specify which estimation method was used to estimate these three equations, apart from stating that "one should find a procedure other than OLS."

The model was estimated using annual data over the period 1962-77, and empirical results were generally satisfactory in terms of goodness of fit and significance of individual coefficients. However, the model has two shortcomings:

(i) Some coefficients turned out to be less than twice their standard errors, i.e. having t-statistics of less than 2, and yet were left in the specification. This may be justified on the grounds that the model's objective is forecasting rather than hypothesis testing, but this dichotomy of objective has been rejected by Kmenta and Ramsey (1981). Alternatively, it is sensible to leave insignificant coefficients in the specification on the grounds that they are theoretically plausible and that insignificance is due to some statistical problems (see for example Pindyck and Rubinfeld (1976 PP. 377-382). No such explanation is offered by the authors, however.

(ii) Some equations suffer from severe autocorrelation but no attempt was made at correction. For example, the DW for the equation explaining non-oil exports is 3.87!

Nevertheless, considering the model as a whole, it is in many respects superior to that of Khouja and Sadler.

So far we have not described a disaggregated model that primarily deals with the financial or monetary sector. Such a model was estimated by the Claremont Economics Institute (1983), in a project sponsored by the Kuwait Foundation for the Advancement of Science and six major financial institutions. The model was based on the rational expectations approach, whereby exogenous and policy variables of the model were decomposed into anticipated and unanticipated or shock components. These variables include the following: growth rate of real government expenditure, rate of change of the KD/dollar exchange rate, U.S. inflation rate (as a proxy for world inflation), U.S. Treasury bill rate (as a proxy for foreign interest rates) and the price of crude oil. All equations were then estimated in the reduced form with heavy use of the Almon distributed lag scheme. The statistical results were not always satisfactory both in terms of goodness of fit and significance of individual coefficients.

The Claremont model was by all means a good intellectual exercise, but it revealed lack of understanding of the Kuwaiti economy. Methodology was an outright duplication of that used by the Claremont Economics Institute to estimate their U.S. model, which brings about the problem of direct application of models designed for advanced countries. The following are the most important pitfalls in that piece of work:

(1) Using the straight-line method to interpolate quarterly growth rates of non-oil GDP from annual rates. This method is inappropriate in this case because non-oil GDP exhibits some seasonal variation.

(2) Using the U.S. inflation rate as a proxy for world or imported inflation. This again is inappropriate because Japan, and not the U.S., is the major exporter to Kuwait. A better proxy would be a trade-weighted average of inflation rates (or even better, rates of change of the unit values of export) of the top four exporters, i.e. Japan, the U.S., the U.K., and Germany. This, indeed, is what will be used to measure the price of imports in this study.

(3) Using the housing component of the consumer price index as a proxy for real estate prices which is extremely inappropriate.

(4) The model exhibits some econometric loopholes. The study does not specify the structural form of equations, neither is there any discussion of the estimation technique. The model, as presented, looks more like a collection of unrelated equations than an interdependent system. Moreover, there is no discussion of the identification of equations.

some causality testing whereby he found causality running from credit expansion to the money supply. He postulated that the money supply (narrow and broad) depended on credit expansion, government expenditure, interest rate, discounts and balance of payments. Empirical results revealed that interest rate was insignificant, this he attributed to the administrative method of setting the rate. However, he used a weighted average of interest paid on various deposits, which are administered rather than market-determined rates such as the interbank rate which might have given him better results. He also found that the effect of the external sector -as represented by the surplus in the balance of payments- on the money supply to be insignificant in the short run, this he attributed to the discretion of the government in using foreign reserves to finance domestic expenditure. The most important variables in determining the money supply in the short run were found to be government domestic expenditure and domestic credit expansion.

In early 1984, Kuwait International Investment Company presented a quarterly forecasting model for the real sector of the Kuwaiti economy. The model (which was estimated by OLS) contains 8 equations for the oil sector describing the production and export of various oil products. It also includes equations explaining oil and non-oil GDP, public finance and foreign trade. Work on this model was motivated by the inadequacy of the specification of equations describing oil and non-oil GDP in the Claremont model.

The previous discussion gives rise to the following question: what kind of model will constitute the next logical step in the development of econometric work on the Kuwaiti economy? In my view it is a simultaneous equations model of the monetary sector showing the interaction with, but without a full specification of, the real sector. It is realised that this may not be appropriate for proper analyses of the role of money in the Kuwaiti economy, because a full understanding of the issue requires a complete structural model. However, this may not be feasible, given the constraints of data, lack of understanding, and the state of the art. Moreover, the emphasis on the monetary sector in this model is not intended to mean that money can explain everything, but is largely a result of the fact that the real sector has received relatively more attention, particularly in the work of Khouja and Sadler (1979), El-Mallakh and Atta (1981) and in the work that is being carried out at the Kuwait Institute for Scientific Research. It is hoped that the following step will be the construction of a complete macroeconometric model which combines both the monetary sector as will be modelled here, and the real sector as modelled by Khouja and Sadler, to arrive at something resembling a general model for LDCs as suggested by Park (1973).

6.3. Some Preliminary Remarks

Before proceeding with the model, it is important to make some preliminary remarks that should be borne in mind when we evaluate the empirical results.

The first note concerns the approach to econometric research. The choice here falls on a procedure somewhere between the rigid orthodox approach, whereby a model is formulated and adhered to irrespective of the statistical results, and the other extreme where emphasis is placed entirely on the quality of the statistical results. The procedure starts with formulations based on a priori economic considerations, and modifies them in the light of statistical evidence -by adding or deleting variables and equations- to arrive at the best possible results in terms of theoretical plausibility and statistical significance. On the basis of exploratory regressions outside the context of a full model, insignificant variables and those that do not have the correct sign are rejected, and variables are included only if their inclusion can be justified theoretically. Exploratory work, or what may be sometimes termed "fishing for the correct specification", is quite common amongst modern large scale macroeconometric model builders. In the Howrey et al (1981) survey of the practices of model builders*, one of the respondents pointed out that with the advent of inexpensive and easily accessible computer programs and data banks, "fishing" for statistical significance has become increasingly prevalent. He added that "if prior knowledge is absent and there is no way to specify the explanatory variables, exploration of the likelihood surface may be unavoidable." Theil (1971 P. 156) acknowleges the practice of experimentation with potential explanatory variables, but he points out that the standard linear model supposes that experimentation does not take place because it assumes that explanatory variables are fixed and given.

Furthermore, one of the conclusions of the Howrey et al survey is that economic theory is used in a fairly general way in equation specification but dynamics of adjustment, imperfections in markets, legal practices, and periodic political intervention have made it necessary to go beyond strict text-book reasoning. Sims (1980) points out that econometricians may start with a model specification that is fully built on the basis of economic theory, but end up estimating another specification that lacks theoretical reasoning. In particular, he asserts that reduced form equations "are not products of distinct exercises in economic theory", and yet econometricians are frequently forced to estimate the reduced form to achieve normalisation of a simultaneous equations model which is not identified. In this model, economic theory will be used to find reasoning for the inclusion or otherwise of lagged variables, but the length of the lag will be treated as a purely

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* Respondents to this survey included some well-established model builders such as Gerry Adams, Keith Carlson, Gregory Chow, Otto Eckstein, Gary Fromm and Albert Hirsch.

empirical issue to be determined by exploratory regressions. Goldfeld (1981) argues for such a procedure by stating that "model dynamics and lag structures are generally treated as empirical matters with theory providing only limited guidance." Brainard and Tobin (1968) put forward the same idea by stating that economic theory imposes some a priori constraints on specification of models, but has almost nothing to say on mechanisms of adjustment. They further point out that the burden on empirical testing and estimation is very heavy, but it is precisely in the estimation of lag structures and autoregressive effects, that statistical and econometric techniques encounter greatest difficulties.

Unfortunately, the wrong sign or insignificance of some estimated parameters may be due to data deficiency, and their exclusion may render specification errors, i.e. the problem of omitted variables. In this model, the price level variable in particular suffers from measurement errors. The cost of living index or the consumer price index, which is prepared by the Central Statistical Office of the Ministry of Planning, is the best available measure of the general price level in Kuwait. But this index is distorted by at least two factors: sampling errors, and heavy government subsidies of some essential consumer goods. El-Mallakh and Atta (1981) have argued that this index cannot be regarded as a good measure of the movement of domestic prices in Kuwait because of some serious shortcomings. They cite the Central Bank's criticism of the index in its 1976 Economic Report which was as follows:
"It should be emphasised, however, that the dependence on the cost of living index for evaluation of actual changes in domestic prices involves a lot of reservations for several reasons, the main being that: (1) the item of housing, which represents around 18 percent of total overall weight of the index, does not include rents, and (2) the method of calculation of the prices of a number of commodities included in the various groups is not totally reliable. For these reasons, the cost of living index underestimates domestic

prices." Crockett and Evans (1980) describe the consumer price index in Middle Eastern countries as imperfect for at least two reasons: (i) the consumption baskets used often reflect the purchasing patterns of only a particular income segment, and (ii) the items that comprise the basket are often subsidised by the government, this is particularly valid for oil-rich countries like Kuwait. Finally, how can any one construct a consumer price index when, because of bargaining, actual prices paid for goods and services are often less than half of the tag prices?

Measurement errors may also arise from interpolating annual series to get quarterly series, as is the case with oil and non-oil GDP. But this is something that we have to live with as the alternative is either to work with annual data, for which we do not have long series, or drop income from our specifications, which is implausible. The problem of omitted variables that results from measurement errors (or data deficiency in general) can only be tackled in the future, when better-quality data will be available.

One important point to make here, is that the prime objective of this model is analysis or hypothesis testing, rather than forecasting. This means that we assign more importance to the individual structural parameters (standard errors and t-statistics) than to the overall fit (R^2). For the same reason, we assign more importance to the unbiasedness of the parameters than to their efficiency. On this issue, Pindyck and Rubinfeld (1976 P. 315) point out that a model's evaluation must depend on the purpose for which it is built. A model designed for forecasting should have as small a standard error of forecast as possible; while a model designed to test a specific hypothesis or measure some elasticity should have high t-statistics. We have already seen that such a dichotomy of objectives is rejected by some economists. Kmenta and Ramsey (1981) instead advocate a dichotomy between scientific and business-oriented models. They define scientific macro models as those which are basically designed for testing hypotheses and for understanding the operation of economic systems. In this case, forecasts are important only as statistics for testing the hypotheses forming the models' structure, which means that any judgemental manipulation of the estimates by the model builder is "completely destructive." On the other hand, builders of business-oriented models have time constraints, and forecasts and policy evaluation statements should be due at certain dates. In this case, the underlying theory used is assumed to hold and the objective is to get as good a fit as possible, in order to make quick and reasonably accurate forecasts which may necessitate judgemental manipulation by the modeller. This distinction is indeed relevant to Griliches' (1981) argument about the interaction between economic theory and econometric models. Using his terminology, it can be argued that there is a "one-way street" between theory and business-oriented models, but there is feedback to theory from scientific models. Using this distinction, the present model can be described as a "scientific model" because its main objective is to enhance knowledge about, and understanding of, Kuwait's monetary sector.

The hypothesis-testing versus forecasting distinction of one econometric model from another may still be important. It has been argued (for example Christ (1966)) that if the objective is forecasting the dependent variable, then multicollinearity represents no problem, provided that the relationship between explanatory variables is not expected to change in the period of forecast. Moreover, the distinction is important for the issue of whether or not variables with insignificant coefficients should be excluded.

Multicollinearity is another econometric problem that is relevant to this study, particularly with monetary variables that tend to grow secularly. This problem results in distorting the influence of each explanatory variable. For example: on a priori considerations, one might assume that the ability of commercial banks to supply credit depends on the flow of deposits, private and government. However, when private and government deposits are considered as two separate explanatory variables in the supply of credit function, the result is an insignificant coefficient on government deposits, even though a simple regression of credit on government deposits produces a significant coefficient. The choice, then, is either to drop government deposits from the specification of the function or add them to private deposits to form a composite explanatory variable. In this study, the problem of multicollinearity warranted the restriction of the number of explanatory variables in each equation, and put constraints on model specification.

One more issue concerns the model size. The present model contains 11 behavioural equations, and the question arises as to whether or not this model is "small" and consequently needs further disaggregation. Interest in model size rests on the presumed relationship between size and accuracy. On this issue, Howrey et al (1981) concluded that "the evidence on the relationship between model accuracy and size is somewhat thin and inconclusive." What is important is model management because if that is not done properly, it will lead to very serious errors even in large and complex models. In his response to the Howrey et al (1981) survey, Gregory Chow argued that model size should be considered in the light of balancing the costs of having too large a model (in terms of specification errors, difficulties in statistical analysis, and costs of obtaining additional information on an extended list of exogenous variables) and the costs of omitting essential relationships. In the same survey, Gary Fromm replied by stating that model size is a function of data availability, the process being modelled, the uses to which the model is to be applied, the richness of the theory, and the resources available for model construction.

The first factor (i.e. data availability) is the most limiting one as regards larger models for Kuwait. For example, in the present model, three demand functions are specified: currency, demand deposits and quasi-money. It can be argued that the model may become more accurate if quasi-money is also disaggregated into its four components: saving deposits, time deposits, certificates of deposit and foreign currency deposits. This, however, is not possible because although disaggregated data are available on the individual components, no data are available on their yields, and so I felt it was better to leave the function in aggregated form such that the demand for quasi-money as one item is a function of the 3-month Eurodollar rate. The choice of this rate is justified on the grounds that a significant part of quasi-money is foreign-currency (mostly dollar) deposits which actually yield the Euro-deposit rate. It is also justified on the assumption that this rate is correlated with interest rates on other components of quasi-money. This issue will be elaborated later.

The process being modelled is also important in this respect. For example, a supply function will be specified for all deposits without disaggregation because there are no differential reserve requirements by type of deposit. The same is again true of the demand for reserves which will not be disaggregated into required and excess reserves, simply because the required reserve ratio is so low (3 percent) that excess reserves tend to overwhelm required reserves as pointed out earlier in this thesis (see Chapter 3). Therefore, we believe that the model has the "required balance."

Moreover, Kelejian and Vavrichek (1981) did not find strong correlation between model size and predictive performance. They ranked some major models of the U.S. economy (including Chase, DRI and Wharton) according to size and predictive power, and found an average rank correlation coefficient of -0.3

between model size and short-term forecast accuracy for the six variables considered. They also found an average rank correlation coefficient of 0.07 between model size and medium-term forecast accuracy.

Indeed, Franco Modigliani (1981) argues that there is no a priori reason to believe, nor any systematic empirical evidence to suggest, that the size is per se a major determinant of forecasting accuracy, at least beyond some minimum size and complexity. He also argues that for a given accuracy, one would generally prefer a smaller to a bigger model for reasons such as cost of estimation and maintenance, and ease of understanding the working of the model. Modigliani lists the following reasons why models have grown to be large and more disaggregated:

(i) Interest of the user in forecasting subaggregates of subsectors of the economy. Disaggregation is thus induced by user's demand, rather than by the view that a less aggregated model will yield a better forecast of the broad aggregates.

(ii) A certain level of disaggregation is sometimes useful to account for the behaviour of the economy, not as a matter of principle, but in terms of the particular way the economy is modelled.

(iii) Disaggregation sometimes seems the most suitable way of examining the effect of unusual disturbances or innovations and of new types of economic policies.

(iv) Rapid advancement of computer technology provides temptation for enlarging models.

Desai (1981) attributes the growth of model size to the tendency of econometricians to endogenise as many of the variables on which they have information. He argues that what one generation of model builders treats as exogenous gets endogenised by the next generation. So, perhaps some economist will in the future improve the present model by more disaggregation and endogenisation; as time passes more information will become available through the revision of old data and the compilation of new series.

After all, model size is not as a crucial issue as its appropriateness. Griliches (1981) argues that this should be the issue, and that the debate of large versus small models is misleading because much of the objection to large models is motivated by a lack of understanding of the internal mechanisms of large models.

6.4. The Basic Model and Hypotheses

The model developed here is a disaggregated supply-demand model designed to explain how the equilibrium stock of money is determined, and then how the monetary sector affects real output and the price level. The logic of the model runs as follows:

(1) In equilibrium, the supply of monetary base is equal to the sum of the demand for currency by the public and the demand for reserves by banks.

(2) The demand for reserves is determined by foreign interest rate (opportunity cost) and the requirements to meet cash withdrawals. Reserves in turn determine the ability of banks to supply deposits.

(3) Domestic market interest rate is determined by the foreign rate and the liquidity position of the banking system.

(4) Interest rate and income determine the demand for demand deposits and quasi-money, which when added up produce the demand for total deposits. In equilibrium this is equal to the supply of total deposits.

(5) Total deposits influence output and prices which in turn determine the demand for currency.

(6) The sum of currency and total deposits is the equilibrium stock of money.

I shall now illustrate the hypotheses that form the basis of the model specification.

6.4.1. The Effect of Money on Prices and Output

The relationship between money and output or income is based on the hypothesis that in the short run, any excess supply of money which leads to a rise in aggregate demand will be reflected to some extent at least in a rise in real output, rather than wholly in the rate of inflation (Coats and Khatkhate (1980)). The effect runs either directly according to the monetarist doctrine, indirectly through interest rate as the Keynesians believe, or through the unanticipated or shock component of changes in the money supply as per the rational expectations approach. Park (1973) points out that in LDCs, the effects of changes in the stock of money are transmitted to the real sector in part by portfolio substitution but primarily by credit rationing. He adds that money has a larger and quicker effect on income in LDCs than in advanced countries, partly because the transmission process is direct and subject to a shorter time lag.

Ghuloum (1984) seems to prefer the direct (monetarist) approach in the case of Kuwait, and discredits the Keynesian approach on the grounds that the interest rate effect is blurred by a combination of external and institutional determinants of domestic interest rates. Furthermore, he points out that any excess of the money supply over money demand will be reflected in part in an increase in the demand for foreign assets, and in part in an increase in aggregate demand, which means both higher income and higher imports. Both higher demand for foreign assets and imports have a contractionary effect on the money supply, and this coupled with higher demand for money (resulting from higher income) will restore equilibrium.

Moreover, it has been found that money tends to lead income (for example Friedman and Schwartz (1963a)), and that is generally taken to mean a causal relation running from money to income and not the other way round. Coats (1980) argues that this is not always true for small countries with fixed exchange rates and whose money supplies are determined totally by the balance of payments. For these countries, he argues, the correlation between money and income may imply the influence of income on money. He explains this on the grounds that in such countries, domestic output must be consistent with the balance of payments and, therefore, variations in income will tend to generate offsetting and equilibriating changes in domestic money supply, as the central bank buys and sells foreign currency to defend the exchange rate. In Kuwait, this is not the case because the money supply is not influenced by the balance of payments in the short run, though it is the most important factor in the long run, due to the discretionary manner whereby the government transfers funds from foreign reserves to finance domestic expenditure. This hypothesis is supported by the empirical evidence that Ghuloum (1984) found.

Furthermore, empirical evidence seems to support the unidirectional effect of money on income. Sims (1972) found that the hypothesis agrees with the post-war U.S. data; he concluded on the basis of his findings, that the practice of making causal interpretations of distributed lag regressions of income on money is not invalidated by the existence of "feedback" from income to money. In Chapter 4, a test of causality between money and income in Kuwait using the approach suggested by Bhattacharyya (1980), revealed that money causes income, whereas no evidence was found to support the hypothesis of causality in the opposite direction.

Empirical work on the relationship between money and economic activity has been inconclusive, both about the length of lag and the division of effects of a monetary disturbance into price and output effect. Studies employing reduced-form regressions of inflation rates on distributed lags of monetary growth, found that the pattern of the individual lag coefficients and estimated mean of the lag distribution change significantly across time and countries. When government fiscal variables are included as explanatory variables, the results are similar. This dynamic instability has generated various interpretations such as:

(i) It implies that the government should abandon attempts to "fine tune" the economy, since there is no conclusive evidence on the strength and timing of monetary and fiscal stimuli.

(ii) It is indicative of the endogeniety of policy variables, and hence simple reduced-form models should be abandoned in favour of large scale structural models.

(iii) The rational expectations literature associated with Robert Lucas and Thomas Sargent (for a comprehensive survey see Lucas and Sargent (1981)) suggests that the dynamic adjustment of an economy to a change in a policy variable depends on whether it is anticipated or not. If it is, it will be reflected more in prices, otherwise it will be reflected more in output. Therefore, the argument goes, unless there is such a split, dynamic instability will emerge. Rutledge (1981) attributes the instability of the parameters of dynamic adjustment of prices and output to monetary policy to the variability of the accuracy of public's anticipation. As we shall see later, this assumption was used by the Claremont Economics Institute to estimate inflation and output equations for the Kuwaiti economy.

Eduard Bomhoff (1983) has presented some interesting conclusions in his study of the effect of money on output and prices in six European countries:

Germany, Holland, Switzerland, Belgium, Austria, and Denmark. He concluded that the links between the published figures of the money supply and economic activity are not as tight in these countries as it is in the U.S., for the following reasons:

(i) Income velocity of circulation is much less well-behaved in Europe.

(ii) Raw figures of the money supply contain a lot of transient noise, i.e. purely temporary disturbances that "contaminate" the data and are void of useful information. To overcome this problem, he recommends replacing end-of-period numbers by period averages, which will improve the quality of data.

(iii) Raw data are also contaminated by temporary movements in the money supply that are largely irrelevant for nominal national income. In order to avoid this, he suggests that we must distinguish between changes in the money stock that are caused by temporary actions on the part of the banks and the public (with the multiplier framework in mind), which we may wish to disregard for macroeconomic analysis, and changes that cannot be classified straight away as temporary and should, therefore, not be erased out of the published data. By eliminating temporary swings in the money supply, we get a series of "corrected" money supply that explains prices and output better*.

Bomhoff's overall conclusion is that "money matters and corrected money matters even more." He also concludes that the time delay between changes in

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* Bomhoff suggests that we can correct the money supply series by making use of the likelihood that interest rates such as those on savings deposits, where the cost of changing interest rates is high for financial institutions, will be adjusted approximately in step with rates that are determined continuously by the market-place, if market rates are deemed to have changed permanently. Otherwise, the financial institutions will tend to hold back if, in their judgement, market rates respond to temporary factors that will be shortly reversed.

monetary growth and their consequences for economic growth varies between countries and periods but estimated at 3-9 months.

The relationship between prices and output on the one hand, and monetary and fiscal stimuli on the other, can be expressed as follows:

$$P = P\,(M,\ G)$$

$$Y = Y\,(M,\ G)$$

where

P = price level

Y = real output

M = money supply

G = government expenditure

The above formulation shows that the effect is contemporaneous. But, especially when we consider quarter to quarter changes, this is not the case because firms are heterogeneous with respect to the time taken to adjust their prices and output. Therefore, the general price level and aggregate output will be distributed over time in a dynamic pattern which could be approximated by some convenient lag distribution. Thus, we may rewrite the price and output equations as follows:

$$P = a_0 + \sum_{i=0}^{m} a_{1i}\, M_{t-i} + \sum_{i=0}^{n} a_{2i}\, G_{t-i} + u_1$$

$$Y = b_0 + \sum_{i=0}^{r} b_{1i}\, M_{t-i} + \sum_{i=0}^{s} b_{2i}\, G_{t-i} + u_2$$

where m,n,r,s indicate length of longest lag, u_1 and u_2 are disturbance terms. Rutledge (1981) argues that there is no reason to impose any prior restrictions on the shape of the lag distributions. Instead, he prefers to estimate the lag parameters using the Almon distributed lags procedure (Almon

(1965)). He postulates that the precise shape of the lag distribution between prices and policy variables (M and G) depends on: (i) the distribution of the pricing period across industries in terms of length, i.e. the homogeniety or heterogeniety of pricing periods, (ii) the timing of monetary and fiscal "shocks" within the pricing period, and (iii) the distribution of price-setting dates over time. Variations in these factors can make it difficult to obtain stable estimates of the parameters of various lags, and can make estimates rather difficult to interpret.

One important question that arises is the following: if real output is affected by both monetary and fiscal actions, which one of them has the more stable and effective impact on output? Monetarists, in general, emphasise the role of monetary policy (see Brunner (1968) for a general reference on the monetarist view). Rutledge (1981) agrees by stating that in simple-reduced form regressions employing distributed lags, dynamic multipliers of monetary growth are individually significant, whereas those of government spending are "generally" significant but their pattern, average length of lag and the sign of the coefficient sum are unstable. In general, the monetarist view regarding macroeconomic policy holds that only the money supply (and hence monetary policy) has any long-run impact on GNP, and that government expenditure has almost no long-run impact while, perhaps, it has some immediate impact. On the other hand, the following criticims are made of monetary policy (see Eshaq (1971)): (i) monetary policy is relatively ineffective in regulating or controlling aggregate demand as compared with direct controls and fiscal measures, especially when the measures are directed at stimulating demand in a recession, (ii) the impact of monetary measures is uncertain due to the complex relationship between the money supply and aggregate demand, i.e. it is more difficult to predict the effect of monetary measures on demand than is the effect of fiscal measures, and (iii) monetary measures are blunt, thus they cannot be applied as selectively as fiscal measures and direct controls to influence the patterns of production, investment and consumption. Take, for instance, the U.S. experience over the first half of 1985, when real growth was running at a much slower pace than in 1984; here, although monetary expansion was effective in stimulating domestic demand, it did not give a significant boost to domestic output because much of the increased expenditure was on imported goods -given the strength of the dollar and the high marginal propensity to import in the U.S. economy. This will not be as much of a problem with fiscal stimulus because the government can be more discrete in spending on domestically-produced rather than foreign goods. However, it must be made clear that this property of fiscal policy is only valid for the first round effect because recipients of funds spent by the fiscal authority will also have the option of spending them on imported goods.

To test the effectiveness of monetary versus fiscal policy, Andersen and Carlson (1970) estimated a modified version of the St. Louis model, originally built by Andersen and Jordan (1968). One of the equations of the model relates changes in income ΔY (in current dollars) to changes in the money supply ΔM and government expenditure ΔG, i.e.

$$\Delta Y_t = a + \sum_{i=0}^{4} m_i \ \Delta M_{t-i} + \sum_{i=0}^{4} g_i \ \Delta G_{t-i}$$

When this equation was estimated using quarterly data, the following distributed lags coefficients were found (t - statistics in parenthesis).

$m_0 = 1.22$	(2.73)	$g_0 = 0.56$	(2.57)
$m_1 = 1.80$	(7.34)	$g_1 = 0.45$	(3.43)
$m_2 = 1.62$	(4.25)	$g_2 = 0.01$	(0.08)
$m_3 = 0.87$	(3.65)	$g_3 = -0.43$	(-3.18)
$m_4 = 0.06$	(0.12)	$g_4 = -0.54$	(-2.47)
$\sum m_i = 5.57$	(8.06)	$\sum g_i = 0.05$	(0.17)

These results confirm the monetarist hypothesis. An increase in G will initially have a positive impact on Y, but after 2 or 3 quarters it will have a negative impact with a total (long-run) impact that is close to zero (0.05). M, on the other hand, has a large long-run impact (5.57). The St. Louis model, however, has been criticised on the grounds that simple unrestricted reduced form equations cannot capture the whole effect of policy changes. In essence, it has been criticised on the same lines as Ando and Modigliani's (1965) criticism of Friedman and Meiselman (1963). Batten and Thornton (1983) present a full evaluation of the St. Louis model and refer to major studies which have cast doubt on its findings.

The importance of government expenditure is supported by the findings of Kmenta and Smith (1973). They conducted some simulations based on a reduced-form equation for GNP and came up with the following results:

(1) The impact effect of $1 billion increase in government expenditure is to increase GNP by $1.1427 billion. The impact effect of a $1 billion increase in the money supply is to increase GNP by $3.649 billion.

(2) Total long-run multiplier for government expenditure is 1.8406, for the money supply 1.227, and for time trend 0.6363.

These results are quite different from those of the St. Louis model and support the view that both G and M are effective as policy instruments. Figures 6.1 and 6.2 illustrate graphically the difference in the distributed lag coefficients of changes in government expenditure and the money supply as generated by the St. Louis and Kmenta and Smith's models. Research undertaken in recent years has verified that macroeconomic models used by policy makers must, at a minimum, include some representation of the instruments of both monetary and fiscal policy. Bryant (1980) asserts that whatever the views of monetarists and Keynesians may have been in earlier stages of their debate,

Figure 6.1

Distributed Lag Coefficients of Changes in Government Expenditure

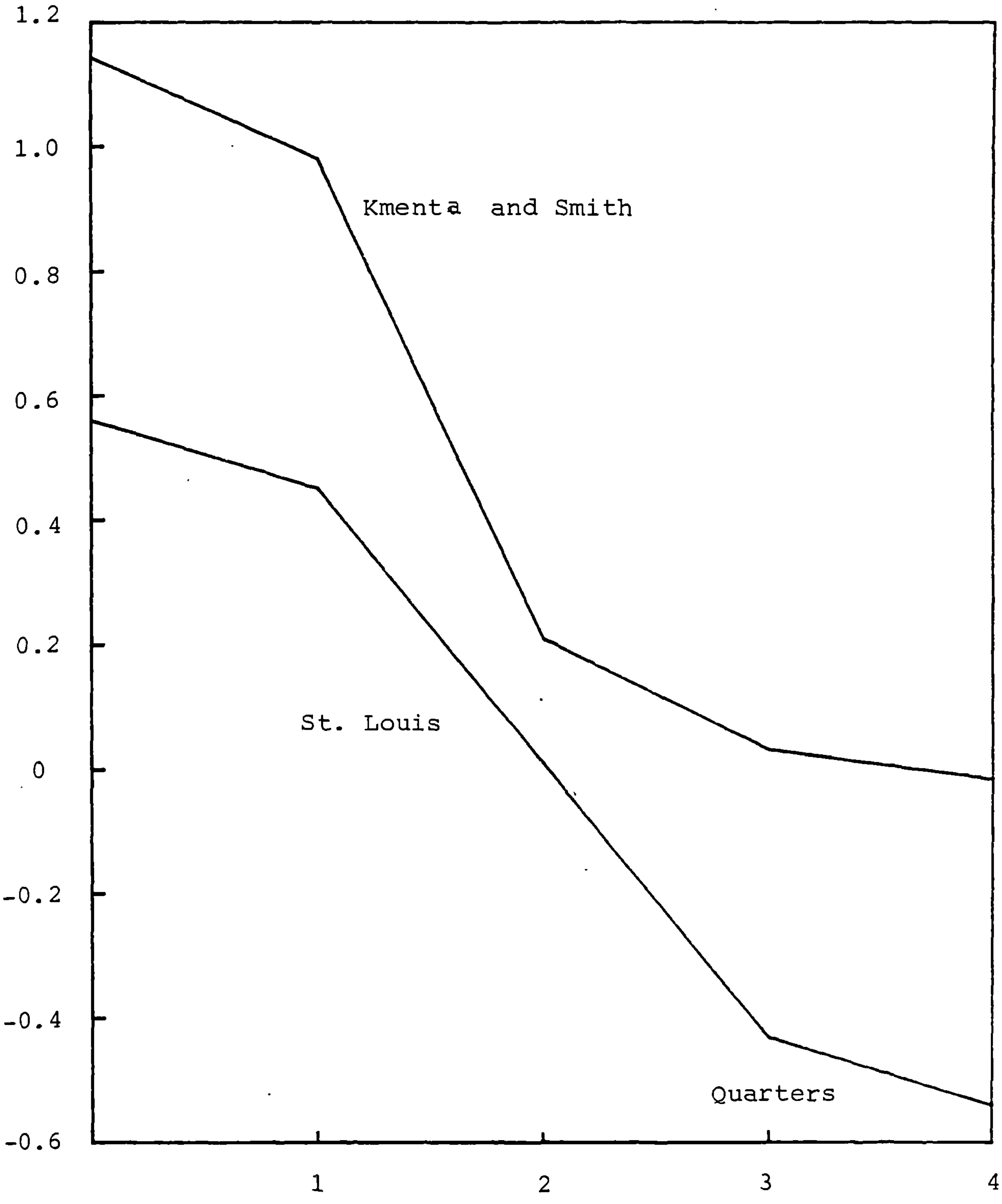
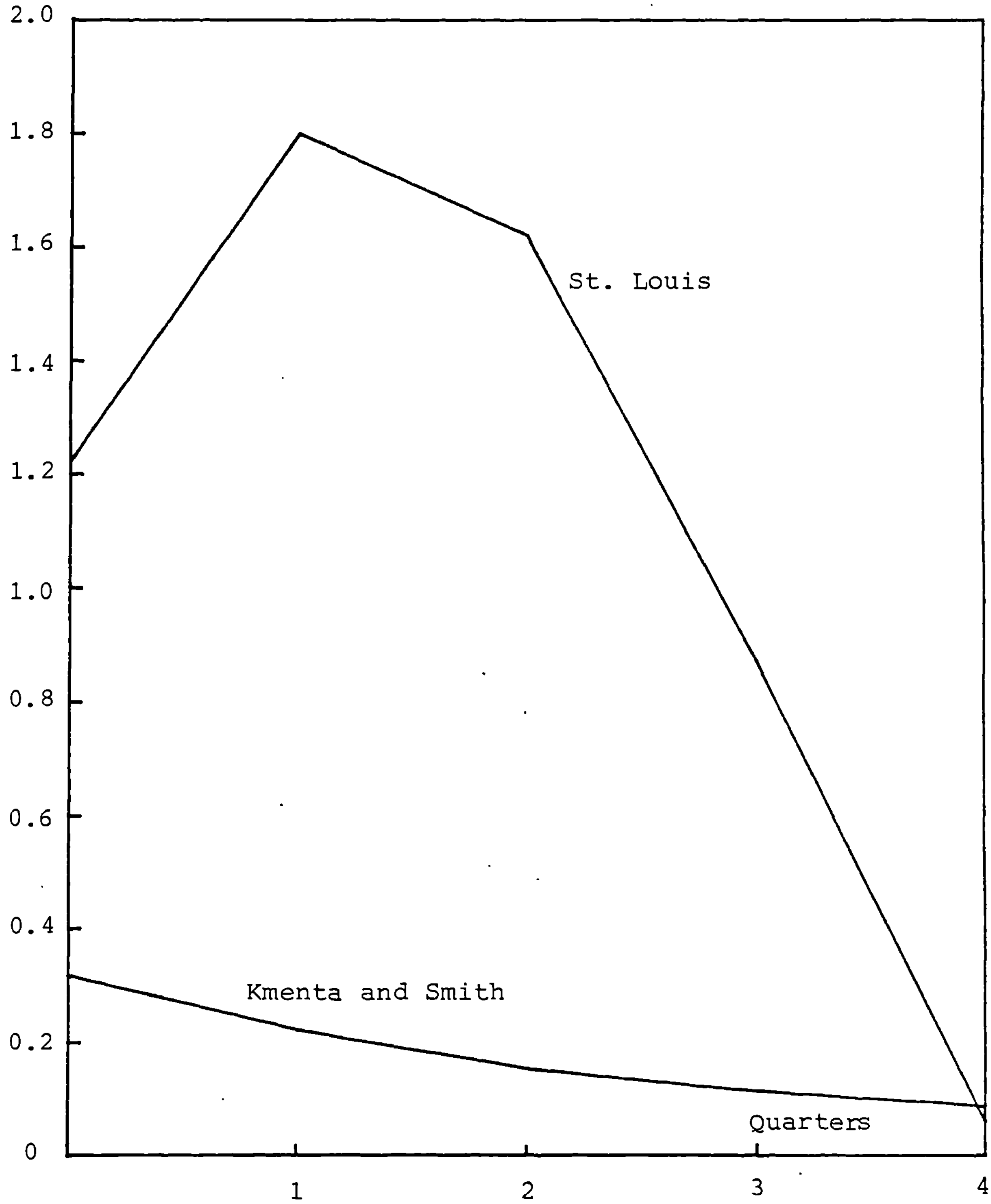


Figure 6.2

Distributed Lag Coefficients
of Changes in Money Supply



the extreme views that "money and monetary policy do not matter" and "fiscal policy does not matter" need no longer be taken seriously today. Differences now concern the relative magnitudes and timing patterns of the impacts of the two types of action, not whether one or the other can be ignored.

Many empirical studies on the effect of money on prices and output in developing countries rest upon the quantity theory. If the money supply rises by more than demand, then expenditure on goods and services will rise with a consequent rise in output and prices. If output is at, or near, the full capacity level, we get a direct relationship between money and prices. Meiselman (1975) tested such a simple model using pooled data for 16 Latin American countries in the period 1950-69 by estimating the following equation:

$$\Delta P/P = a_0 + a_1 (\Delta M/M) + a_2 (\Delta Y/Y)$$

where Y stands for real income and all variables are averages of all countries in the sample. His empirical results suggest that for a given growth rate of real income, changes in the money supply cause price changes.

Vogel (1974) pooled cross-section and time-series data for some Latin American countries to estimate an equation of the form:

$$\Delta P/P = b_0 + b_1(\Delta M/M) + b_2(\Delta M/M)_{t-1} + b_3(\Delta Y/Y) + b_4[(\Delta P/P)_{t-1} - (\Delta P/P)_{t-2}]$$

The significance of lagged monetary growth is that it indicates the existence of lagged response of prices to changes in the money supply, whereas the last term introduces a measure of inflationary expectations. Vogel's empirical results were mixed, but he concluded that the most important result of his study was that a purely monetarist model with no structuralist variables reveals little heterogeniety among Latin American countries, in spite of their extreme diversity.

It must be mentioned, however, that structuralists do not deny that an inflationary process requires an expansion in the money supply. They maintain that monetary growth is largely endogenous, and is a response to more fundamental underlying causes of inflation. Chakraborti (1978) estimated a structuralist model of inflation in India using annual data for the period 1950 - 76. His equation explained inflation rate in terms of lagged rate of change of agricultural output relative to non-agricultural output and lagged monetary growth. All explanatory variables turned out to be significant, but lagged monetary growth was the major determinant of inflation (as indicated by its t - statistic). A very important implication of these studies is that the effect of money on prices is not necessarily contemporaneous. This statement is even more valid if we use quarterly rather than annual data.

For Kuwait, the Claremont Economics Institute (1983) has estimated the following two equations for prices (consumer price index) and real output (non-oil GDP):

$$\Delta P/P = \sum_{i=0}^{3} a_i \; Ga_{t-i} + \sum_{i=0}^{3} b_i \; Gu_{t-i} + e \; Pm$$

$$\Delta Yn/Yn = \sum_{i=0}^{7} c_i \; Ga_{t-i} + \sum_{i=0}^{3} d_i \; G_{t-i} + \sum_{i=0}^{3} f_i \; Eu_{t-i}$$

where

Ga = growth rate of anticipated government expenditure

Gu = growth rate of unanticipated government expenditure

Pm = growth rate of import prices

Eu = rate of change of the unanticipated component of the exchange rate.

Some arguments that can be put forward against these specifications have already been mentioned in evaluating the Claremont model. Here we shall only be concerned with the output and price equations which can be criticised on the following grounds:

(i) The inclusion of both anticipated and unanticipated components of government expenditure in the price and output equations is inconsistent with the previous discussion of the effect of the two components on prices and output.

(ii) The omission of the monetary stimulus variable from the equations is inconsistent with the discussion so far. We have seen that theory and empirical evidence suggest that money does matter.

(iii) No theoretical argument was presented to explain why and how unanticipated changes in the exchange rate affect real output.

(iv) Import prices suffer from measurement errors because they are based on the U.S. inflation rate. This is not valid, considering that Kuwait's imports from the U.S. are no more than 20 percent of its total imports from the four major exporters (Japan, the U.S, Britain and Germany).

(v) The last criticism is econometric and concerns the estimation method. The two equations were estimated by the Almon distributed lags scheme with the imposition of end-point constraints which have no basis in either economic or econometric theory according to Schmidt and Waud (1973). It is argued that the popularity of this procedure is due to the resulting "plausible" shapes of the lag distributions (Dhrymes (1971)), but when it is used there is no way of knowing the actual length of the lag distribution. In fact, we may even get the impression of there being a distributed lag when there is none; furthermore, it is difficult to capture any "long-tailed" distribution by means of a single polynomial (Maddala (1977)).

El-Mallakh and Atta (1981) had estimated a price equation for Kuwait in an attempt to investigate the effects of absorptive-capacity constraints on prices. They estimated an equation that explained the consumer price index in terms of the money supply and import prices. Empirical results revealed that import prices are more important in determining domestic price level. This is so because Kuwait depends almost entirely on imports for the supply of goods and services. As El-Mallakh and Atta (1981) put it, imported inflation is the supply-side determinant of domestic inflation, whereas demand-pull factors of domestic origin are generated and fuelled by fiscal and monetary stimuli. El-Mallakh and Atta argue that real estate speculation, mainly generated by government expenditure on land acquisition and bank credit, and structural bottlenecks, have not allowed imports and the domestic non-oil capacity to expand at a rate consistent with the rate of growth of aggregate demand.

Amuzegar (1983) expresses the same idea for oil-exporting countries in general, attributing inflation to excess demand resulting from the fact that domestic output expansion did not match higher national income, and so, additional demand has to be met through imports which have inelastic supply due to port congestion and other distribution inadequacies. He points out that in the absence of financial constraints, imports act as a safety valve against domestic inflation; but, because of delays in expanding infrastructure and related services, imports often fail to service this function, implying that inflationary pressures develop from fiscal and monetary stimuli. Specifically, Amuzegar attributes inflation in oil-exporting countries to highly expansionary policies (fiscal and monetary) and import prices. He explains in terms of these factors the historical experience of OPEC countries in the period between late 1973, when oil prices were first increased, and the early 1980s (see also Moosa (1980)).

The discussion so far enables us to specify a price equation of the form

$$P = P(G, M, Pm)$$

The function implies a contemporaneous effect of all explanatory variables on the price level. But whereas this may be true for import prices, it is not necessarily true for government expenditure and money, particularly if we are talking about a period of one quarter. Firstly, when there is an increase in aggregate demand it can be satisfied by an immediate drawdown of inventories; as this process accelerates, however, pressure mounts on prices since inventories cannot be replenished immediately because of the time lag required by imports to perform this function. Secondly, there must be a time lag between the decision by the government to incur expenditure on land acquisition, and the use of the proceeds by individuals for real estate speculation. Thirdly, to use Rutledge's (1981) argument, not all firms change their prices at the same time.

It is important to stress once more the point made by Goldfeld (1981), that the length of lag is an empirical issue and, therefore, exploratory regressions may be used to find out the most appropriate lag length. Judged by their standard errors, it was found that for real government expenditure, significant lags exist at three and four quarters and for money supply they only exist at two quarters. There is no contemporaneous effect from the money supply to the price level, which is consistent with Barro's (1978) finding that an increase in the money supply in the U.S. has no impact at all on the price level during the initial quarter.

Following Crouch (1967), currency will be excluded from the money supply for this particular purpose because it is felt that the relationship between economic activity and currency runs purely from the former to the latter, since currency is entirely demand determined, i.e. causality runs from economic activity to currency. This means that our explanatory variable becomes total deposits TD. Therefore, the price equation may be specified as

$$P = P\ (G_{t-3},\ G_{t-4},\ TD_{t-2},\ Pm)$$

where the government expenditure variables are measured in real terms, i.e. deflated by P (actually 0.01 P).

Scepticism may arise about this specification because of price rigidity. If prices are sticky downwards, then a decline in explanatory variables will not affect the price level but rather the inflation rate, and hence the dependent variable should be the inflation rate or absolute change in the price level. This, however, is not the case in Kuwait because prices are not sticky downwards. Consumer prices in Kuwait contain substantial profit margins, and so sellers can afford to give discounts in periods of deficient demand or if import prices go down. It must be mentioned here that in most cases, prices of consumer goods are actually determined by bargaining between buyers and sellers, and it is natural that the seller is more willing to give way in periods of deficient demand and lower import prices. Rents of housing units also do come down -as was evident in the recession year of 1984- due to excess supply of housing units. Therefore, the price level may come down, and there are such cases in our sample.

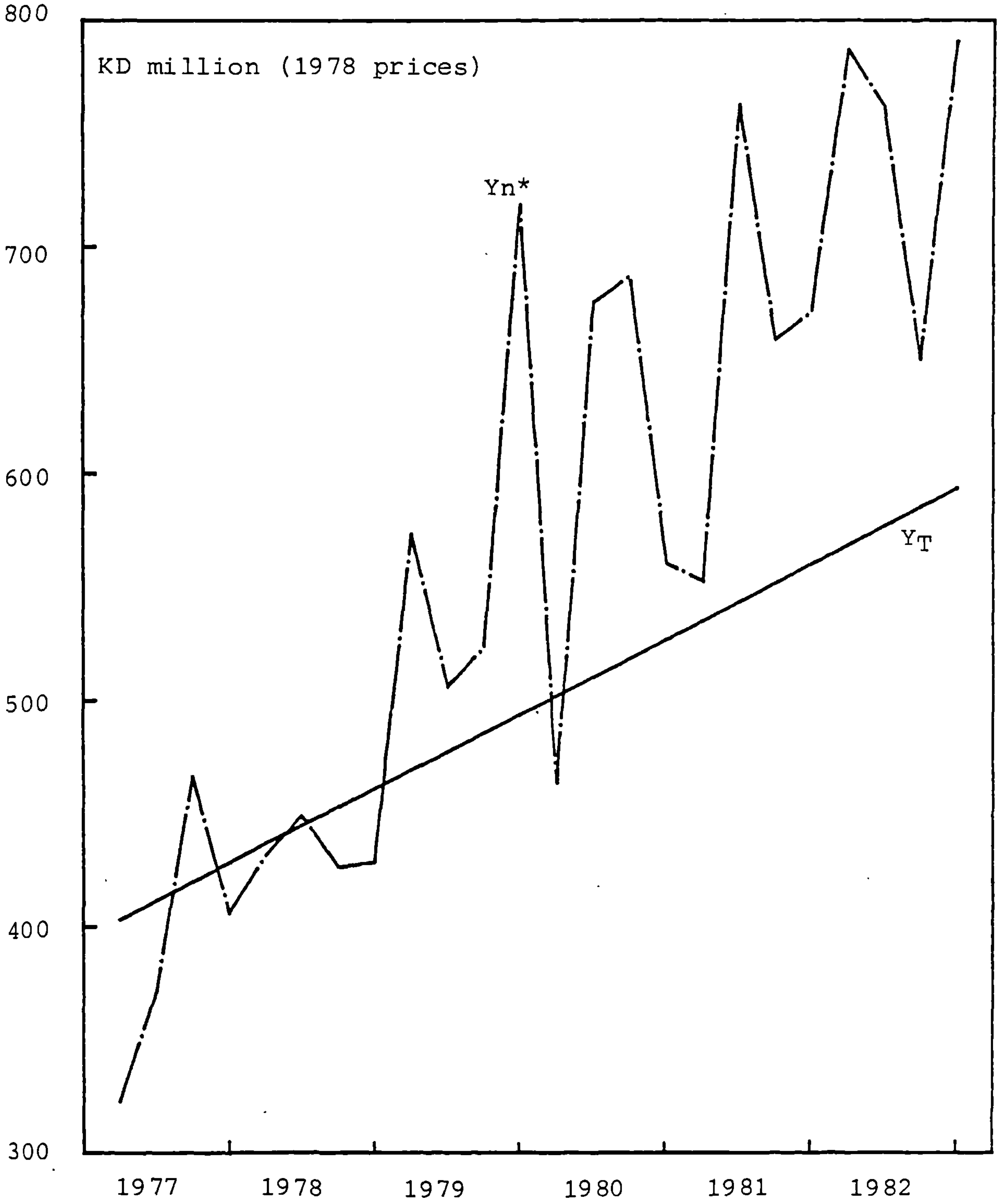
We now turn to the output equation. The output variable used here is non-oil GDP, i.e. oil GDP is excluded. This issue was discussed in Chapter 2, but we may add that oil GDP is excluded because as Crockett and Evans (1980) have pointed out, it is determined by the production and price of oil, both of which are determined by external factors and thus neither affect, nor are affected by, fiscal or monetary actions. Moreover, since the oil sector affects production in other sectors in the long run only, the output equation may be specified as

$$Yn^{*} = Y\ (G,\ M,\ Y_T)$$

where Yn^{*} is real non-oil GDP and Y_T is the trend value of output determined in the long run by such factors as the growth of factors of production and oil GDP. Figure 6.3 shows the behaviour of Yn^{*} and Y_T over the period 1977-82.

Figure 6.3

Trend (Y_T) and Actual (Yn^*) Real Non-Oil GDP (Quarterly)



We have already seen that data problems prohibit the estimation of a conventional production function for Kuwait. We have, therefore, no alternative but to resort to the naive specification of making Y_T a function of time T. We may now express the deviation of Yn^* from its trend value as a function of government expenditure and the money supply

$$Yn^* - Y_T = Yd = F(G,M)$$

where

$$Y_T = f(T)$$

This concept of trend output Y_T is more or less equivalent to what Rutledge (1981) calls "full-information output." He defines this as the output to be produced by an economy if there were no mistakes in forecasting past and present government policies, the stock of available resources and technology. Deviation of actual output from full-information output, Rutledge argues, is due to "policy and resource shocks."

Exploratory regressions revealed that there is a contemporaneous effect from real government expenditure to real output, and a one-quarter lag in the response of real output to the money supply. This is not surprising because government expenditure is itself part of non-oil GDP and its effect must, therefore, be contemporaneous. Alternatively, it takes time for any monetary stimulus to work its way on output whether directly, through real expenditure, or indirectly, through interest rates. Therefore, the final specification of the real output equation is as follows

$$Yd = f(G/G_{t-1}, TD_{t-1}/TD_{t-2})$$

therefore

$$Yn^* = Yd + Y_T$$

$$Yn = PYn^*$$

The fiscal and monetary variables in the output equation reflect contemporaneous and lagged growth rates of real government expenditure and supply of deposits because

$$G/G_{t-1} = 1 + \Delta G/G_{t-1}$$

and

$$TD_{t-1}/TD_{t-2} = 1 + \Delta TD_{t-1}/TD_{t-2}$$

6.4.2. Demand for Money

The demand for money has perhaps been the most comprehensively studied of economic relationships and one of the most important elements of modern macroeconomics. The concept refers to the functional relationship between the quantity of money demanded and its determining factors. It is a key function of macroeconometric models of the national economy or the monetary sector for advanced countries and LDCs.

The importance assigned to the demand for money stems from its implications for stabilisation policies. Economic stability depends in part on the relationship between the supply and demand for money, and a policy that aims at maintaining stable prices and preventing monetary disturbances to real output should keep the money supply adjusted to its demand. The relative stability of the demand for money is also important for the rules versus discretion controversy. In short, the relationship between the nominal stock of money on the one hand and prices, income, and the balance of payments on the other is determined by the demand for money. Gordon (1984) argues that the relationship plays such an important role in macroeconomic theory that it is difficult to imagine living without it.

It must be emphasised, however, that recent writings on the demand for money (Laidler (1980), (1981), Judd and Scadding (1982), Dotsey (1984), and Hetzel

(1984a), (1984b)) have cast doubt on the existence of a stable demand for money function. Laidler (1969) had earlier argued for the existence of a stable function, but in a 1981 article he asserted that the 1970s produced a good deal of evidence to suggest that the relationship shifted in an upredictable way in a number of countries. The shift is believed to have been brought about by a number of reasons including the regime of flexible exchange rates after 1973, and innovations in financial markets whereby new and highly liquid interest-bearing assets (e.g. NOW accounts) were introduced to compete with the traditional monetary liabilities of commercial banks. Furthermore, Laidler (1980) attributes the instability of the demand for money function in the 1970s to the very attempt by governments to follow monetarist policies. He argues that instability in the demand for money resulted from attempts to control the money supply, a similar situation to that which emerged in the late 1960s, with the unemployment inflation trade-off vanishing as soon as policy makers attempted to exploit it. This hypothesis is in line with Goodhart's (1980) postulation that any statistical regularity will tend to collapse once pressure is put upon it for control purposes. Desai (1981) concludes that the demand for money is either unstable, or if a stable equation can be extracted from data by a suitable econometric technique, it exhibits a variable -but significant- interest elasticity with the velocity of circulation not constant but a function of income, prices and monetary growth.

In a more recent paper, Dotsey (1984) attributed the instability of the demand for money functions during the mid-1970s to the shift resulting from the adoption of more sophisticated methods of cash management by firms, allowing them to perform a given level of transactions while holding lower average money balances. He argues that the adoption of the new methods was motivated by the improvement of computer technology, the lowering of computer costs, and the rise in interest rates. Therefore, the failure to include a measure of the effects of cash management in the demand function will render it unstable.

Hetzel (1984a) found that the public's demand for M1 is not stable in an absolute sense. In particular, he showed a modest leftward shift in the M1 demand function in the mid 1970s and a rightward shift in the early 1980s. However, he contends that the magnitude of the shift estimated for the mid 1970s is smaller than what is generally estimated by Judd and Scadding (1982). In another paper, Hetzel (1984b) has shown that as from the second half of 1982, the rate of inflation in the U.S. was below the rate that would have been predicted on the basis of the historical relationship between the rate of growth of M1 and the rate of inflation, and he took that as evidence of a rightward shift in the public's M1 demand function. He presented three alternative explanations for this rightward shift: (i) the Friedman-Schwartz hypothesis (Schwartz (1983)), whereby it is conjectured that the public's M1 demand function has come to resemble permanently its demand function for M2, as formerly defined to include savings as well as transactions balances, (ii) the initial balance hypothesis suggested by Cook and Rowe (1984), whereby it is conjectured that consumers in the process of establishing new "other checkable deposit" accounts, make a one-time transfer of funds from their saving accounts in order to satisfy their minimum balance requirements, and (iii) the rise in the interest elasticity of the demand for real M1 balances in combination with the significant drop in the level of market rates of interest relative to the own rate on other checkable deposits (Brayton et al (1983)). Accordingly, Hetzel suggests that the post-1982 M1 demand function exhibited, relative to its pre-1981 behaviour, a lower trend rate of decline in the demand for M1 and higher interest rate and income elasticities of demand for M1. He further suggests that the characteristics of the post-1982 M1 demand function lie in between those of the pre-1981 M1 function and those of the former M2 function.

In another development, Robert Gordon (1984) states at the outset of his recent paper on the demand for money that slightly over a decade ago the demand for money was one of the least controversial topics in macroeconomics, both in its underlying theory and in the stability and plausiblity of empirical coefficient estimates, but now, he argues, there is a cloud of uncertainty hanging over the entire subject of short-term demand for money. He argues that the Federal Reserve's shift of emphasis from interest rate stabilisation to monetary aggregate targeting implies that the coefficients in the conventional equations of the demand for money actually represent a shifting mixture of demand and supply responses. Furthermore, he argues that it can be a misleading practice to estimate money demand equations over varying sample periods with the intention of studying changes in the income and interest rate elasticities of the demand for money, because the coefficient shifts may tell us more about changes in policy rules than about the characteristics of the underlying money demand function. Thus, the coefficients in the standard equation can be interpreted as parameters of money demand only if the central bank has followed a regime of interest rate stabilisation. On the other hand, instability in the coefficients of standard equations may tell us more about shifts in central bank regimes than about shifts in money demand behaviour.

By and large, it can be argued that the above-mentioned reasons for the instability of the demand for money function are not valid for Kuwait. Therefore, conventional analysis of the demand for money can be used to specify a function for Kuwait.

The standard demand for money function includes a scale variable (income or wealth), and an opportunity cost variable (yield on other financial or real assets), as well as a stock adjustment or expectations framework which is represented by a lagged dependent variable. Formulations based on different theories of the demand for money fall into two broad classes: transactions theories, which emphasise the function of money of a medium of exchange, and asset theories, which view the demand for money as part of the broader issue of portfolio selection. The first set of theories, in which money was considered as inventory held for transactions purposes, evolved in the work of Baumol (1952), Tobin (1956) and later, Miller and Orr (1966). Theories of portfolio selection or asset theories of the demand for money are found in the work of Friedman (1956) and Tobin (1958). As we shall see later, viewing money as an inventory held for transactions or as an asset in a diversified portfolio is relevant to determining explanatory variables in the demand for money function. We shall now discuss potential explanatory variables.

There have been extensive discussions of the appropriate scale variable i.e. whether it is current income, permanent income or wealth. Laidler's (1969) extensive survey led to the conclusion that the evidence favours wealth. However, Stephen Goldfeld (1973) later estimated various functions using quarterly data, and concluded that "the use of an income variable in the demand for money equation seems eminently sensible." But he also stated that "a variable reflecting the change in wealth slightly improves the explanatory power of the equation but slightly worsens its predictive ability." In general, the relevant scale variable and the choice between income and wealth depends on whether money is viewed as a medium of exchange or an asset in a diversified portfolio.

The opportunity cost variable in the demand for money function is intended to measure the yield on money against other assets. In financially developed economies, the opportunity cost variable is an interest rate, though there is no general agreement on which particular interest rate should be used. Choice of a representative interest rate is warranted by collinearity in interest rates, but no matter what interest rate was used it turned out to be significantly negative (Moosa (1976) p.42). Friedman's (1959) work remains the exception as he found no statistical association between the demand for money and interest rate; this was because he used a broad definition of money which does not allow the substitution that occurs in response to interest rate changes to take place. Friedman subsequently defended himself by saying that zero interest elasticity only held in the long run, and that the elasticity was low in the short run.

Moreover, in the modern quantity theory (Friedman (1956)), money serves as an alternative for physical goods, hence the expected rate of inflation can serve as opportunity cost variable. However, empirical evidence in favour of this variable was mostly found in cases of countries experiencing hyperinflation. In countries where inflation is mild, there has been little evidence. Harry Johnson (1972 p.127), who wrote on the demand for money in the Chicago tradition, described the absence of solid evidence on the effect of inflation on the demand for money in the U.S. as "something of a puzzle", but he attributed it to the relatively mild inflation. Goldfeld (1973) tried three alternative measures of price expectations and concluded that the results were a "mixed bag."

The most controversial issue in empirical work on the demand for money is whether or not it is appropriate to use lagged dependent variables. Most empirical studies have employed lagged dependent variables to analyse both demand adjustment and expectations lags with respect to explanatory variables. However, there is a consensus that the length of such lags can be estimated only empirically. The partial adjustment mechanism assumes that there is a desired level of money holdings M* that depends on income Y and interest rate r

$$M^* = f(Y,r)$$

Portfolio adjustment costs are assumed to prevent a full and immediate adjustment of actual to desired money balances. Now if

$$M^* = a_0 + a_1Y + a_2r$$

and

$$M - M_{t-1} = k(M^* - M_{t-1})$$

where M is the actual money balance and k is the coefficient of adjustment. Then

$$M - M_{t-1} = k(a_0 + a_1Y + a_2r - M_{t-1})$$

or

$$M = (ka_0) + ka_1Y + ka_2r + (1-k)\ M_{t-1}$$

Ando (1981) presents an exhaustive list of reasons why there are delays in adjustment. (i) Many decisions are dependent on expected rather than current values of the relevant variables, and expectations may respond to changes in relevant variables slowly. (ii) The availability of information to decision makers may be delayed. (iii) Under uncertainty, economic agents may feel that they will have to take time to interpret any signal given to them. (iv) It may be difficult, physically and organisationally, to make rapid changes. (v) There may be many long-term contractual commitments that would not allow rapid changes (e.g. fixed deposits).

Scepticism has risen about the theoretical foundation of the partial adjustment mechanism as applied to money holdings. Goldfeld (1973) argues that the mechanism is satisfactory for capital stock accumulation, but the analogy between money holdings and capital equipment is far from perfect for the following reasons: (i) the exact nature of the costs involved is much less clear in adjusting financial portfolios than in the case of adjusting stocks of machinery and plant, (ii) the lags that result statistically for money adjustment appear too long to be explained on the grounds of adjustment cost, and (iii) even if the analogy is possible, it does not necessarily imply the simple formulation above (see also Gould (1968)). Although Ando (1981) recognises reasons for stock adjustment of money holdings, he admits that the specification of the dynamic adjustment process in macroeconometric models is often not well formulated. In this context, he believes that the intention of most econometricians is to model complex processes as close to reality as possible, while at the same time keeping the formulation simple enough so that it can be integrated with the steady state characteristics and still remains estimatable. Another problem with the partial adjustment mechanism in this context has been identified by Breen (1971). The problem, he argues, is that the approach may lead to "corner" solutions for an individual in the sense that he may not respond at all unless some critical condition is met, e.g. interest rate changes by more than a certain amount. This suggests the need to pay considerable attention to the details of aggregation over individuals to obtain a macro equation.

Goldfeld (1973) suggests a remedy to this "unsatisfactory state of affairs" concerning partial adjustment, by conceiving the adjustment as a slow response to expected values of income and interest rates, which in effect amounts to using expectations lags. Indeed, he believes that both types of lags may exist in combination, and this belief is shared by Friedman (1959) who had earlier suggested that quarterly data might be expected to reflect not only time lags in the adjustment of income expectations to current experience, but also lags in the adjustment of actual to desired money balances.

The expectations lag is generated by assuming an adaptation or a learning process. In each period, expectations are revised with due consideration to the size of error committed in the expectation of the previous period. If we are talking about income, then the expectation process can be expressed as follows:

$$Y^e = Y^e_{t-1} + k\,(Y - Y^e_{t-1})$$

Where Y^e is expected income and k is the average speed of change in expectation. If the demand for money depends linearly on income, and if we ignore the disturbance term we get

$$M = b_0 + b_1 Y^e$$

then

$$Y^e = -\frac{b_0}{b_1} + \frac{1}{b_1} M$$

and

$$Y^e_{t-1} = -\frac{b_0}{b_1} + \frac{1}{b_1} M_{t-1}$$

By substituting Y^e and Y^e_{t-1} in the expectations equation we get

$$-\frac{b_0}{b_1} + \frac{1}{b_1} M = -\frac{b_0}{b_1} + \frac{1}{b_1} M_{t-1} + k\left[Y + \frac{b_0}{b_1} - \frac{1}{b_1} M_{t-1}\right]$$

therefore

$$M = kb_0 + kb_1\,Y + (1-k)\,M_{t-1}$$

This means that the consideration of either adjustment or expectations lag enables us to introduce the lagged money variable into a short-run demand for money function. Indeed, whether we postulate an adjustment or expectations lag, the basic equation remains the same following the Koyck transformation (Koyck (1954)) except that the error term is different in each case.

It must be mentioned here that this type of formulation has been criticised by proponents of the rational expectations hypothesis. In particular, they criticise the adaptive expectations principle that past errors modify current expectations, and argue instead that once an error is observed it does not affect future expectations since it is random and contains no new information (see Holden et al (1985) p.19 on major differences between adaptive and rational expectations). The founder of the rational expectations hypothesis, John Muth (1961), believes that expectations are just as rational as other aspects of individual behaviour. Accordingly, he questions the accuracy of estimated parameters from observable data if expectations are not much different from the prediction of the model itself as rationality would imply. However, Muth admits that using lagged dependent variables and exponentially weighted moving averages as a proxy for expectations makes the equations identifiable, the parameter estimates easy to compute, and produce good results. Moreover, Shiller (1978) has criticised the rational expectations hypothesis, particularly the assumption that agents are assumed to know the correct model of the economy and solve it appropriately (see also Lawson (1981)). On balance, we believe that it is reasonable to use adaptive expectations in the case of Kuwait.

Another view on lagged dependent variables in the demand for money function is presented by Wong (1977). He notes that there may be a lag in the adjustment of actual money balance to money demand, and thus the lagged dependent variable can be taken to reflect disequilibrium in the money market due to lagged response of supply to demand and the existence of credit rationing. We can only assume that the demand for money at time t is contemporaneously equal to the observed money balance at time t if the banking system is willing, and efficient enough, to adjust the money supply to money demand within the same period.

To conclude on this issue, Laidler (1971) notes that there are time lags in the demand for money function, but whether one cares to think of them as being mainly adjustment lags, or expectation lags, is secondary to the general point that their existence must yield implications about the time path along which the economy adjusts to policy changes.

There are some econometric problems associated with lagged dependent variables. Firstly, if the error terms are serially correlated, then the estimate of the coefficient of the lagged dependent variable will be inconsistent. Secondly, when a lagged dependent variable is included in the function, the Durbin - Watson test for autocorrelation becomes inappropriate. Durbin (1970) has suggested an alternative test, but most empirical studies still report results of the conventional DW test. Thirdly, Goldfeld (1973) argues that formulations involving lagged dependent variables of the Koyck type are "a bit too restrictive", but he admits that the price paid for the simplification is not severe. More complicated alternatives, such as the Almon distributed lags, also suffer from many shortcomings as explained earlier. Moreover, Maddala (1977) argues that lagged dependent variables may provide the best means of imposing a lag distribution on the equation, and this benefit may outweigh the associated statistical problems.

In the case of LDCs, overall empirical evidence suggests that stable demand for money functions can be estimated on the same lines as for developed countries, but many have argued that there are some broad differences. For example, much has been said about the empirical inapplicability of the Keynesian liquidity preference theory in developing countries. This argument rests on the following observations: (i) interest rates in LDCs do not, in general, reflect money market conditions and in most cases they are legally fixed, or a ceiling is set; (ii) speculative demand for money is negligible due to the absence of a diversified menu of financial assets; and (iii) money is considered to be held only for transactions purposes. Park (1973) points out that the limited availability and diversity of financial assets in LDCs means that real assets are likely to be a close substitute for money, hence the demand for money would be sensitive to the nominal rate of return on real assets, i.e. inflation rate. On the same grounds, Wong (1977) has shown that attempts to include measures of credit restraint -as a replacement for interest rate- could prove useful.

A further source of complication is the pace of institutional change such as the pace of monetisation and the development of the "banking habit" which tend to be more rapid in LDCs than in developed countries. Aghevli (1973) points out that the development of the banking system is an important factor contributing to the rise in the demand for money, particularly in the early stages of banking development.

One aspect of difference concerns the nature of lags in the demand for money functions in LDCs. Some economists argue that lags are shorter, if not negligible, in LDCs because of higher risks and uncertainties attributable to economic and socio-political instability, as well as the limited scope for undertaking portfolio switches, again due to the lack of diversified financial assets (for example Adekunle (1968), Park (1970) and Polak (1957)). However, Wong (1977) presents a counter argument based on the cost of restoring equilibrium. He asserts that this cost depends partly on liquidity and convertibility of other assets. If the speed of adjustment depends on adjustment cost, it would take longer for wealth owners to adjust their money holdings when the other components in their portfolios are dominated by real assets which is presumably the case in LDCs. For example, it takes more time to liquidate property or to supply more consumer durables in the market than to switch between demand deposits and saving deposits, or as Laidler (1971) puts it, if a deficiency in money holdings is matched by too many building society deposits, one would expect the restoration of equilibrium to be a good deal cheaper and more rapid than if the matching disequilibrium were too big a house. The absence of adjustment lags is indeed inconsistent with the existence of substitution between money and real assets. Likewise, it is often argued that expectations lags can be ignored in LDCs where uncertainties and risks tend to be high. For example, Adekunle (1968) found income expectations lag to be negligible for a group of LDCs. But Wong (1977) argues in favour of the existence of expectations lags on the grounds that if the majority of entrepreneurs and households in LDCs are risk averters, and since these tend to be conservative in adjusting their portfolios, the expectations lags will be correspondingly longer.

In the case of Kuwait, the demand for money has been stable as supported by the evidence found in Chapter 4. The stability of the function may be due to the fact that a short time period is considered, but more importantly it is due to the absence of factors that have caused instability of the function in the U.S. e.g. financial innovation and cash management techniques.

There have been some attempts to estimate the demand for money function in Kuwait but not within the framework of a full macroeconometric model. Available empirical evidence -as well as theoretical considerations- suggest that the appropriate scale variable is non-oil GDP, although this variable is more appropriate for transactions demand. For asset demand it is better to use a measure of expected income, permanent income or wealth. For the interest rate variable there are two candidates: the interbank rate ^{r}k as a proxy for interest rate on KD deposits, and the Eurodollar rate ^{r}f as a proxy for interest rate on foreign assets, and it is indeed the interest rate on dollar deposits with local banks which comprise a large portion of quasi-money.

Interest rates on saving and time deposits are subject to a ceiling and there are no regular time series for them. However, below the ceiling they are correlated with the interbank rate as this is with the Eurodollar rate.

Since there has been no solid evidence to support the inclusion of inflationary expectations as a proxy for the return on real assets, and hence the opportunity cost of holding money, this variable is discarded, particularly because the consumer price index suffers from measurement errors.

Finally, a variable representing financial or banking development along the lines suggested by Aghevli (1973) will not be employed, because Ghuloum (1984) has shown that there are pitfalls in applying a strict quantitative measure to such a broad concept as financial or banking development. This proposition can be verified by trying to measure the concept by the ratio of demand deposits to narrow money which reflects the use of cheques vis-a-vis cash to settle transactions. The ratio remained more or less unchanged in the 19 years between 1963 and 1982 (0.6973 and 0.7095 respectively) despite the expansion and diversification of the financial system. Ghuloum attributes this phenomenon to the inflation-induced increase in the value of cash transactions, and the influx of expatriate labour in the 1970s from countries heavily dependent on cash transactions. Moreover, the effect of this factor tends to diminish at later stages of financial development.

In the light of the previous discussion, we may specify the demand for money in Kuwait to depend on income Y, interest rate ^{r}k (or ^{r}f) and a lagged dependent variable.

$$M^d = f\,(Y,\ {}^{r}k,\ M_{t-1})$$

Trying to estimate this function using the broad money aggregate M2 will lead into trouble, similar to that experienced by Friedman, because a positive interest rate coefficient will be obtained since the bulk of M2 is interest-bearing deposits.

Aggregated demand for money functions do not always work well, particularly with respect to the interest rate effect, owing to the heterogeniety of the components of money. Crouch (1967) correctly argues that one cannot treat the components of money as homogeneous and assume that they all react to various determinants in the same manner. Even if all components react to the same variables in the same manner, the size of reaction is not necessarily the same. Goldfeld (1973) expresses the same idea by saying that aggregation may badly muddy interest rate effects. His findings suggest that the simple specification used for M1 will not work for time deposits and neither should it be used implicitly for estimating a similar equation for M2. He concludes that for both theoretical and empirical reasons, aggregation to the level of M2 "seems to be a distinctly inferior procedure." Alternatively, he argues for disaggregation on the grounds that it permits greater flexibility in the choice of variables and specification of adjustment patterns. In his Nobel lecture, James Tobin (1982) asserts that the traditional aggregation of various financial assets into a single asset with a common interest rate does not permit the analysis of some important policies, institutional structures, and events. Therefore, he calls for asset disaggregation on the grounds that it is essential for analysing monetary policy. Indeed, currency is of practical significance in the analysis of monetary policy, since, as we have seen, currency is a component of the monetary base which can be used to trace out the money supply process. Therefore, M2 will be disaggregated into currency, demand deposits and quasi-money (saving deposits, time deposits, certificates of deposit and foreign currency deposits), and specify three separate demand functions.

Demand for currency is simply a function of current income (non-oil GDP). As income rises, so does the quantity of currency required to finance the higher level of transactions as shown graphically by the scatter diagram in Figure 6.4. Demand comes from the corporate sector to pay for wages (for example manual construction workers), and from the household sector to buy goods and services. Exploratory regressions revealed that the demand for currency is not sensitive to interest rate, and this is confirmed by the scatter diagram in Figure 6.5 which shows a positive rather than the expected negative response. Therefore, the function can be expressed as

$$C^d = C\ (Yn)$$

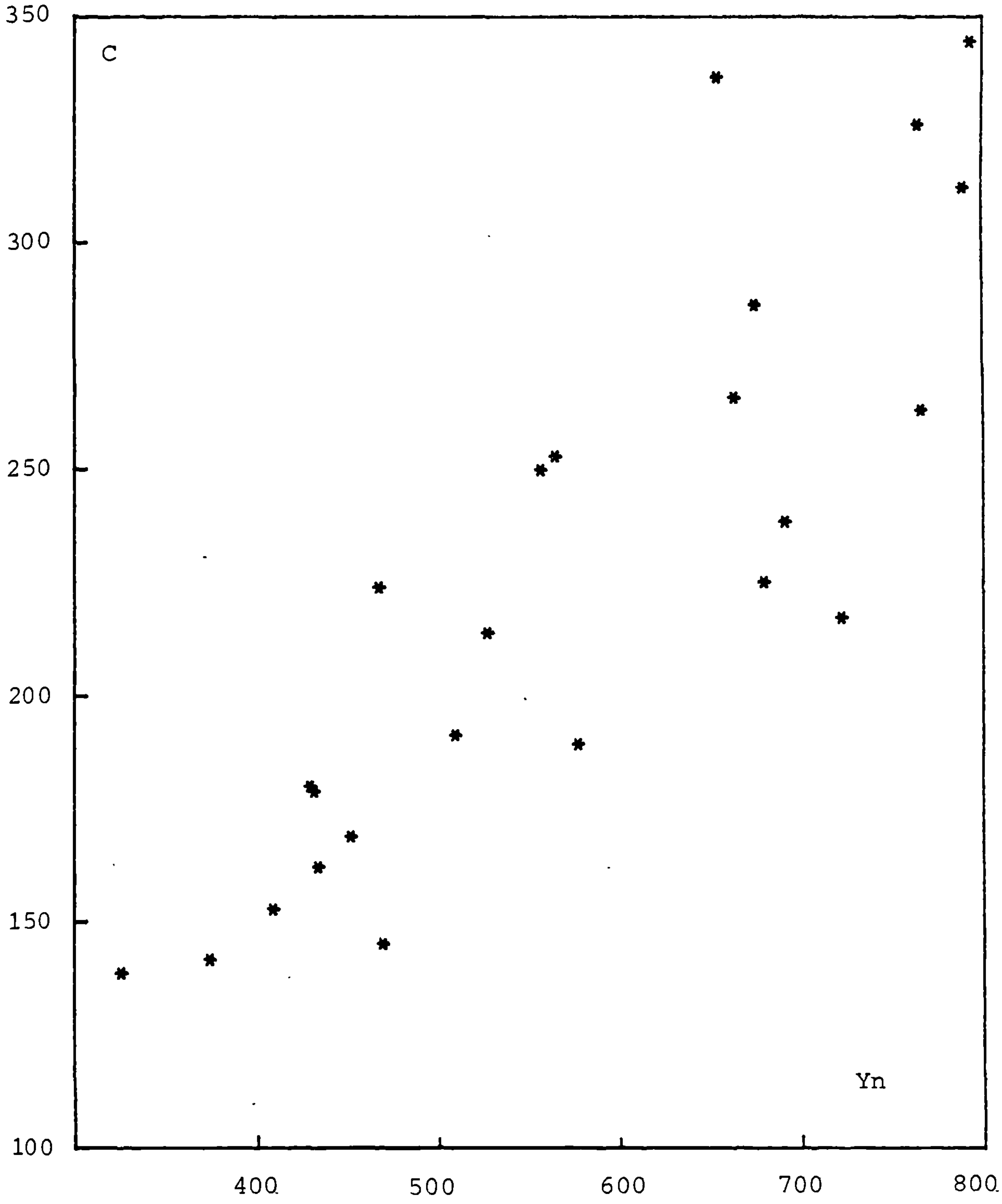
On the other hand, it has been observed that there is considerable substitutability between demand deposits and quasi-money, particularly at times of extreme activity (or lack of it) in the stock market as shown in Figure 6.6. It is felt that the demand for demand deposits and quasi-money is more of an asset demand, making it more responsive to wealth, expected income, or permanent income than to current income. Expected or permanent income Yp can be reasonably proxied by an 8-quarter moving sum of total GDP (i.e. oil and non-oil GDP). Such formulations are not unfamiliar in econometric research. For example, Pindyck and Rubinfeld (1976) have used a two-quarter moving sum of past inflation rates as a proxy for expected inflation and a two-quarter moving sum of the wage rate as a proxy for expected wages. Thus

$$(Yp)_t = \sum_{i=1}^{8} (Yo + Yn)_{t-i}$$

Using such a formulation for income is consistent with Gordon's (1984) proposition that the usual restriction in money demand equations of including only the current value of an explanatory variable and no lagged values is unjustified. In addition, the demand for demand deposits is made a function of domestic interest rate r_k and a lagged dependent variable. Lastly, a dummy

Figure 6.4

Scatter Diagram of the Relationship between the Demand for Currency and Non-Oil GDP



<u>Figure 6.5</u>

Scatter Diagram of the Relationship between the
Demand for Currency and Interest Rate

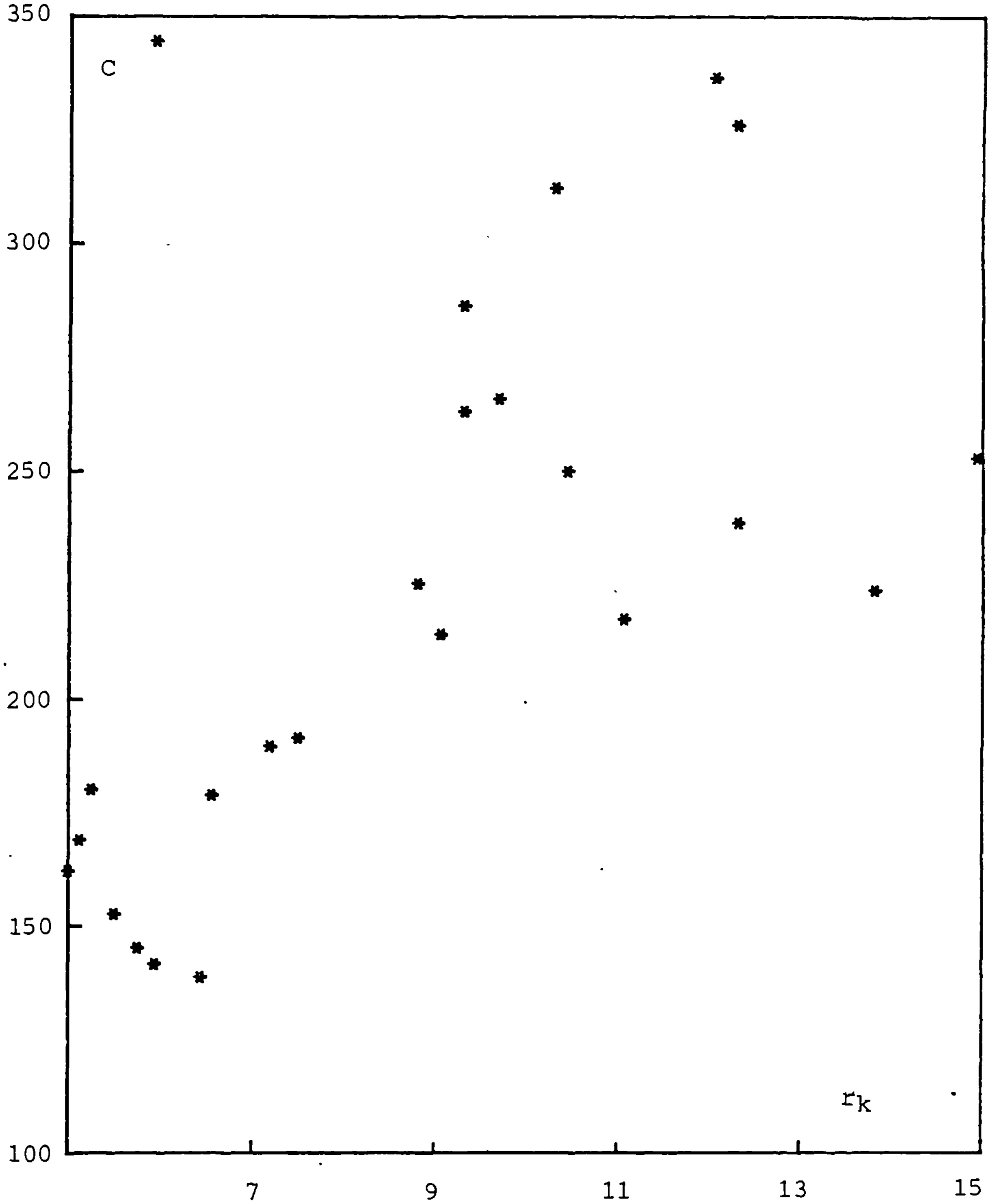
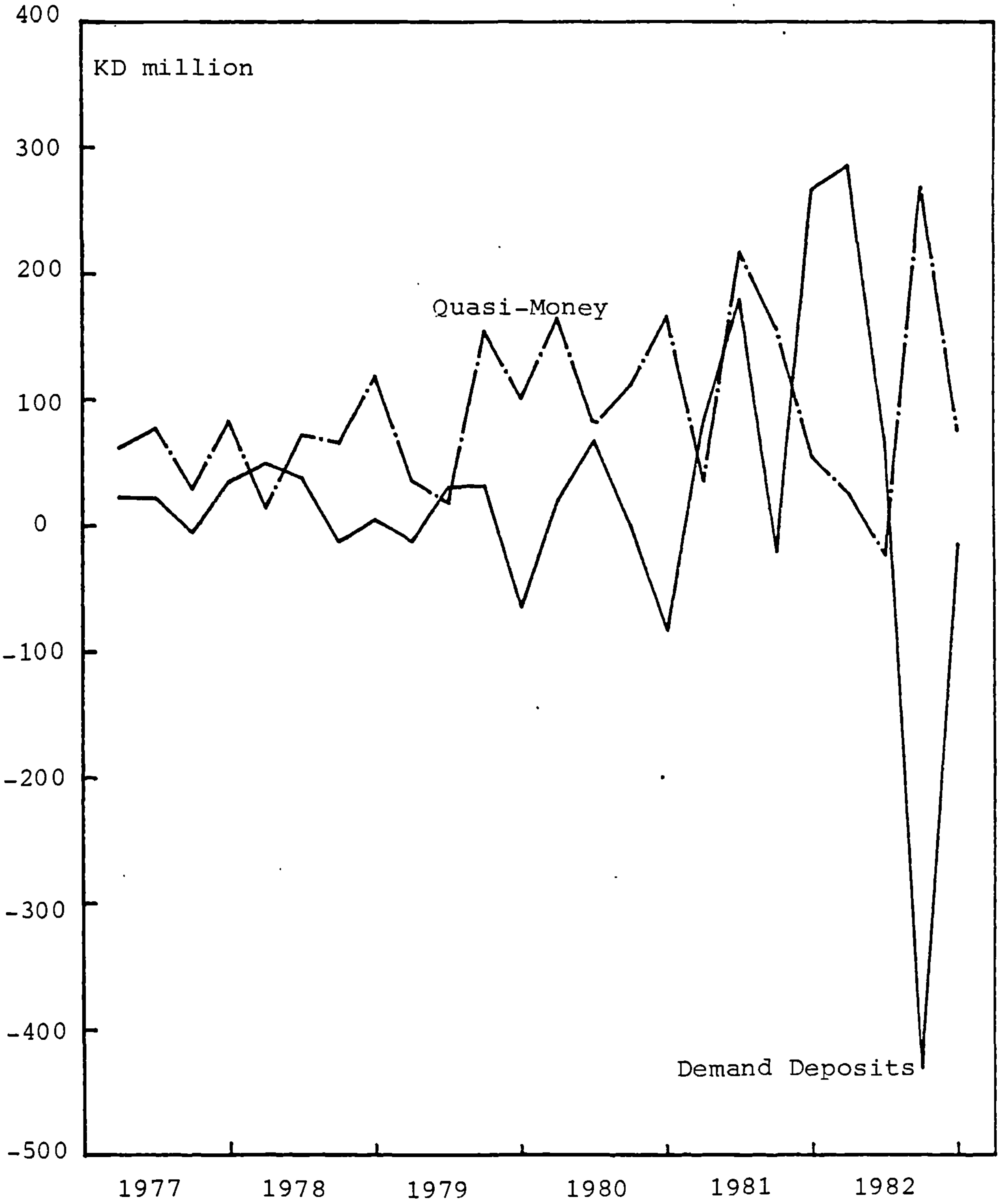


Figure 6.6

Quarter-to-Quarter Changes in Demand Deposits and Quasi-Money



variable D1 is used to account for the increase in demand during the stock market boom in the last quarter of 1981 and the first half of 1982. Therefore, the function may be expressed as

$$DD^d = D\ (Yp, {}^rk,\ DD_{t-1},\ D1)$$

Likewise, the demand for quasi-money QM^d is made a function of income Yp, foreign interest rate ${}^rf$, lagged dependent variable and a dummy variable D2 for the stock market collapse in the second half of 1982. The use of ${}^rf$ (3 month Eurodollar rate) is justified on the grounds that a major component of quasi-money (foreign currency deposits) actually earns this rate. Moreover, we shall see later that ${}^rf$ determines ${}^rk$. Therefore, the demand for quasi-money can be expressed as

$$QM^d = Q\ (Yp,\ {}^rf,\ QM_{t-1},\ D2)$$

There is an important issue concerning these specifications. The variables are expressed in nominal terms, and this is a practice that has been adopted by several writers although the most common specification is in real terms. Goldfeld (1973) argues that real-term specification is the one suggested by economic theory, particularly in the Baumol-Tobin types of formulation. Similarly, Gordon (1984) points out that a universal feature of every theory of the long-run demand for money is homogeniety of degree one with respect to the price level, which implies that the demand for money is demand for real balances. Sometimes, real specification is used in transactions demand but not in speculative demand, but Evans (1969) argues against this practice on the grounds that if nominal values are used in the absence of money illusion, the demand for money function would imply that changes in the price level would induce people to hold a different amount of money as an asset, even though the same amount of real income was being used to purchase the same amount of goods and services. He concludes that with the assumption of no money illusion, real values should be used.

The author agrees with the proposition that rationality implies demand for real rather than nominal balances, but in a country where money illusion is present (see Appendix 6.3), the assumption that demand is for nominal balances is acceptable. Moreover, there are other arguments in favour of using nominal balances. Smith (1963) has argued that for stabilisation goals, variables in current prices are more relevant. Wong (1977) has argued that it is reasonable to relate nominal money balance to nominal income, but he warns against the inclusion of both nominal income and price level not only because that may cause the problem of multicollinearity but also because the effect of changes in prices could be distorted by nominal income as the latter contains a price component. White (1978) has suggested that the stock adjustment transformation should be applied to nominal rather than real balances. In this respect, Gordon (1984) points out that the absence of adjustment costs in response to a price surprise suggests that it is costly to adjust nominal rather than real balances, accordingly, he rewrites his specification of the adjustment mechanism in nominal form (p.411). Similarly, Goldfeld (1976) shifted to the nominal adjustment hypothesis following his reexamination of the "Goldfeld puzzle", appearing in his classic 1973 paper: too little money and too much velocity. Lastly, Hetzel (1984b) argues that entering the nominal stock of money and price level as a ratio in the real balance specifications constrains the functional form very considerably. Instead, he suggests a less constraining functional form by making the price level the dependent variable and the nominal money stock an explanatory variable, and that in effect is an inverse function of the demand for nominal balances.

Perhaps the principal motive for using nominal values in this study is the unavailability of a proper deflator, and this is a problem frequently encountered in empirical work on LDCs. Wong (1977) argues that the deflator for money should be the GNP deflator as far as the real transactions demand for money is concerned, but he adds that GNP deflators are not often published in developing countries. So, the choice is between the incorrect procedure of deflating by the consumer price index -which is not only inappropriate but also suffers from measurement errors- and using nominal values. The choice falls on nominal values. A question immediately arises as to why output was deflated by the consumer price index? It would seem that there was no choice, because if nominal output was used, it would not be possible to know if changes in the money supply affect real output or merely the price level.

6.4.3. Demand for Reserves

Banks' holdings of reserves consist of required reserves to satisfy the reserve requirements, and excess reserves which are held for transactions, precautionary and speculative reasons. Transactions demand is motivated by the need to satisfy the public's demand for currency. These transactions are assumed to occur in the same way each day and, thus, result in a constant need for liquidity.

The precautionary motive is a response to deposit flow uncertainty because under uncertainty, banks do not know whether or not deposits in any one period will exceed cash withdrawals and whether or not they can satisfy the demand for credit. Finally, the speculative motive depends on interest rate because banks' portfolio behaviour is not fundamentally different from that of other wealth holders, i.e. they are likely to hold larger quantities of excess reserves during periods of low interest rates.

In Kuwait, the required reserve ratio (3 percent of total deposits) was introduced in the second half of 1980. However, the ratio is so low that it has not had a significant effect on the level of banks' total reserves. Even before the imposition of the required reserve ratio, the level of reserves had been substantially over and above the requirement.

Theoretical considerations and institutional factors suggest a demand for reserves function of the following form

$$R^d = R\ (C,\ TD,\ r,\ r_f,\ r_d,\ Dk,\ Dr,\ D3)$$

where

C = currency

TD = total deposits

r = required reserve ratio

r_f = foreign interest rate

r_d = discount rate

Dk = dummy variable to account for the introduction of Central Bank bills as part of reserves

Dr = dummy variable to account for the imposition of the required reserve ratio

D3 = seasonal dummy to reflect "window dressing" in the fourth quarter

Total deposits and the required reserve ratio are included in the function because they determine the level of required reserves. But since the level of excess reserves has always overwhelmed the level of required reserves, changes in the required reserves cannot explain variations in total reserves and, therefore, these two variables have little explanatory power. Moreover, the required reserve ratio has not been changed since it was first introduced, and so it cannot be treated as a variable. For exactly the same reason, exploratory regressions revealed that Dr is insignificant, i.e. the imposition of the reserve ratio did not result in a structural shift in the demand for reserves function. Foreign interest rate r_f is included in the function because it represents the opportunity cost of holding excess reserves. This is justified on the grounds that in the absence of exchange controls, banks tend to invest a major portion of their funds in foreign assets. The discount rate is included because it represents the cost (to banks) of borrowed reserves. However, the discount rate has only been changed once (in April 1979) and, therefore, it cannot be treated as a variable. Finally, exploratory regressions revealed that Dk is insignificant, i.e. the acceptance of Central Bank bills as part of the reserves in 1979 did not result in a structural shift of the function.

Attempts to incorporate variables to represent precautionary demand for reserves failed to improve the results, because banks in Kuwait tend to rely on the Central Bank for that purpose. When there is an unexpected rise in the demand for credit, or unexpected fall in the flow of deposits, banks resort to the Central Bank for funds which the latter provides through the discount window, currency swaps and direct lending. In Kuwait, the Central Bank is committed to meet banks' needs in order to "preserve a sound banking system." Indeed, this has occurred whenever there has been a liquidity crisis (see Chapter 5). Thus, the demand for reserves function reduces to

$$R^d = R\ (C,\ {}^{r}f,\ D3)$$

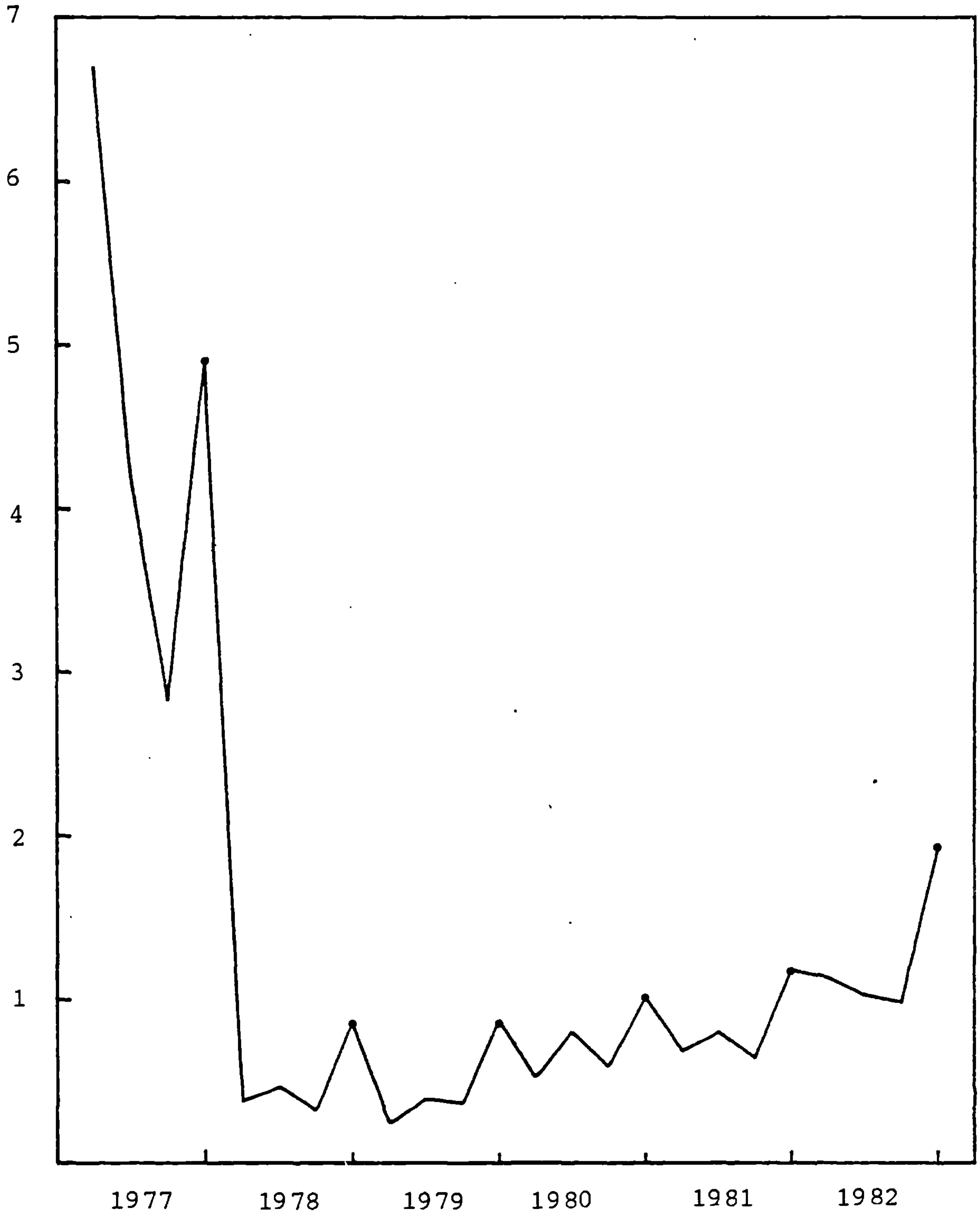
Figure 6.7 plots the behaviour of the ratio of actual reserve holdings to their trend value. It is obvious that the ratio exhibits seasonal variation as it tends to shoot up in the fourth quarter. This is explained by the banks' behaviour in holding larger reserves in the fourth quarter for the purpose of "window dressing" at the end of the financial year, which is equivalent to the calendar year. This behaviour justifies the inclusion of the dummy variable D3.

6.4.4. Interest Rate

To the author's knowledge, the Claremont model is the only model of the Kuwaiti economy that includes a separate equation for domestic short-term interest rate (3-month interbank rate). Two versions of this equation have

Figure 6.7

Ratio of Actual Reserve Holdings to their Trend Value



been estimated: the first expresses the rate as a function of interest rate on 3-month U.S. Treasury bills, a three-quarter moving average of the absolute change in this rate as a proxy for foreign risk, and the price of oil as a proxy for wealth. The second expresses the rate as a function of U.S. Treasury bill rate and a distributed lag of government expenditure and exchange rate changes. Empirical results for both versions were poor in terms of statistical significance, and the second version lacks the theoretical justification for including the exchange rate as an explanatory variable. What is more important is that both versions exclude a very important explanatory variable, namely the liquidity position of the banking system.

The interbank rate is the interest rate on KD interbank deposits. Thus, it depends on the liquidity position of the banking system which is strongly influenced by foreign interest rates (proxied by the 3-month Eurodollar rate), because higher foreign rates induce capital outflows leading to liquidity strains and, consequently, higher interbank rates. Therefore, the interbank (local) rate should be positively correlated with the Eurodollar (foreign) rate as shown graphically in Figure 6.8. Another indicator of the liquidity position is the net position NP of local banks with the Central Bank which is defined as follows:

$$NP = Rk + Rb - (SW + DC + LN)$$

where

Rk = Central Bank bills held by local banks

Rb = Local banks' balances with the Central Bank

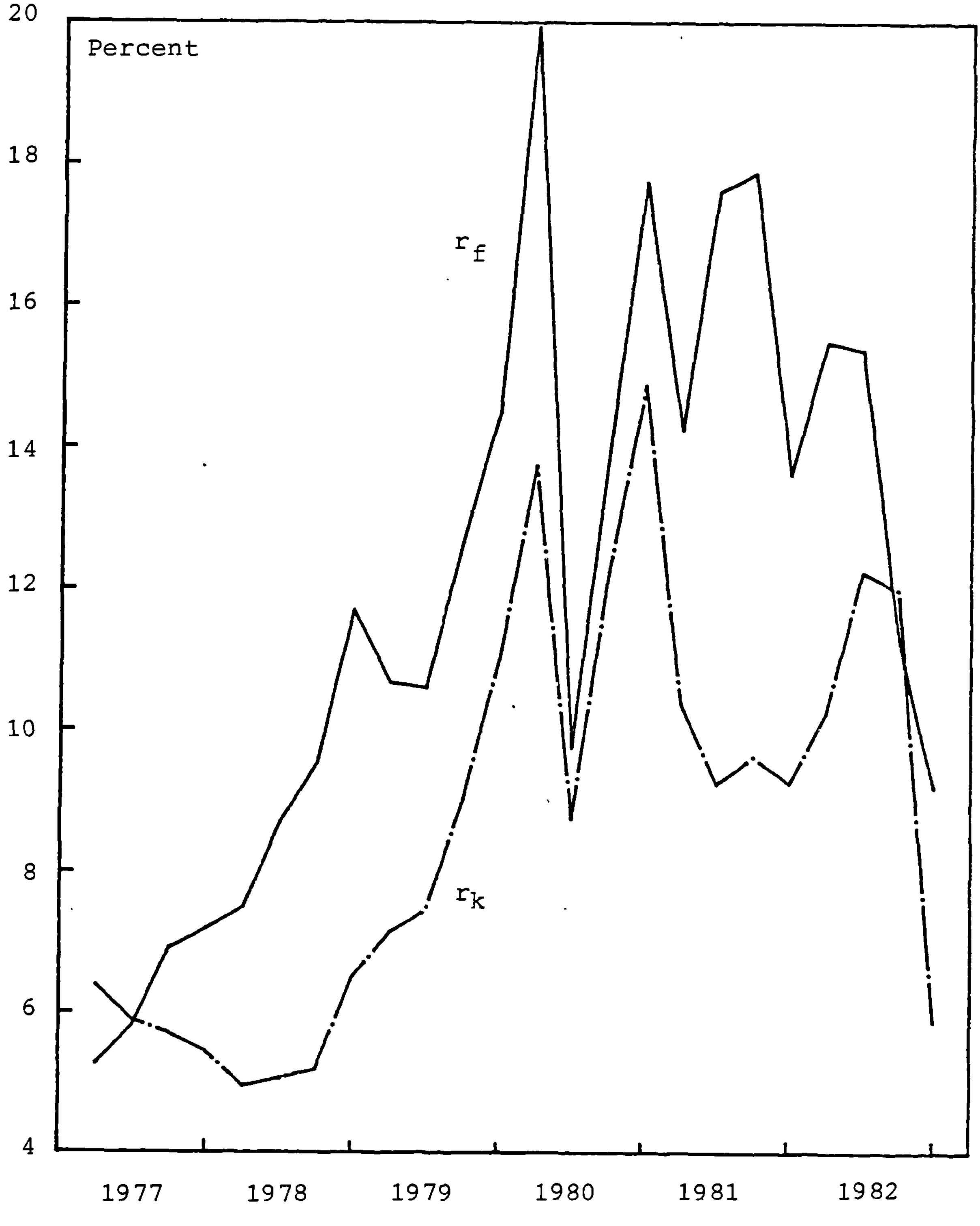
SW = Currency swaps

DC = Discounts

LN = Loans against Central Bank bills

Figure 6.8

Local (r_k) and Foreign (r_f) Interest Rates



SW, DC, and LN are policy variables through which the Central Bank injects liquidity into the banking system. If NP has a negative value, it indicates movement of funds from the Central Bank to the banking system which accelerates during periods of liquidity strains. Therefore, lower values of NP indicate liquidity strains and should be associated with higher interbank rates. Thus, the interest rate equation may be specified as:

$$r_k = r\,(r_f,\ NP)$$

Exploratory regressions revealed that better results are obtained by using a two-quarter moving average of net position rather than its current value. Therefore, NP will subsequently be redefined to refer to a two-quarter moving average of the net position, not its absolute value.

6.4.5. Supply of Total Deposits

Deposit expansion may result from an increase in government expenditure, credit expansion and, in the long run, a surplus in the balance of payments. This proposition is valid for Kuwait both theoretically and empirically, but the important thing to note is that in all cases deposit expansion can take place only if some additional reserves appear from outside the banking system. For if an individual bank wishes to replenish its reserves by selling some of its assets to the public, it does so at the expense of the deposits and reserves of another bank.

Yet, no previous attempt to estimate the money supply function for Kuwait took explicit account of this fact by including reserves as a separate explanatory variable. Khouja and Sadler (1979) specified a function in which changes in the money supply were made a function of government expenditure and the 3-month Eurodollar interest rate. Goodness of fit turned out to be poor (R^2 = 0.458 for OLS estimates). El-Mallakh and Atta (1981) specified a function in which the money supply (excluding foreign currency deposits) was a function of credit to the private sector, government deposits with the Central Bank, foreign assets of the Central Bank, and other deposits. The money supply growth rate in the Claremont model was made a distributed lag function of real government expenditure and the KD/dollar exchange rate. Finally, Ghuloum (1984) tried several specifications for the money supply function and concluded that in the short run, government expenditure and domestic credit expansion are the most important determinants of the money supply.

With a minimum reserve requirement of 3 percent, a KD 1 million increase in reserves could lead to a maximum of KD 33.3 million in the money supply. This maximum can be realised only as long as there is no hoarding either by banks or by the public. If banks choose to hold the added reserves (KD 1 million) idle, instead of converting them into earning assets, the money supply increases by KD 1 million only. In making a decision of this kind, commercial banks must also satisfy the liquidity ratios (see Chapter 5). Similarly, the process of expansion is limited by the extent of hoarding (cash) by the public.

We have seen that the Central Bank of Kuwait can control the level of reserves through direct lending, swaps and discounts. But the ability to control the level of reserves does not necessarily imply the ability to control the money supply, which means that there is no constant, proportional relationship between reserves and the money supply, since banks are not likely to utilise all of their excess reserves to purchase earning assets. That is why the reserve to deposits ratio fluctuates considerably.

A rise in interest rate will encourage banks to purchase earning assets (e.g. foreign assets, loans, or interbank deposits), and that leads to an increase in the ratio of these assets to reserves and, consequently, the money supply.

Thus, the "potential" money supply depends entirely on the level of reserves and can, therefore, be treated as a policy variable. However, the divergence between actual and potential money supply may fluctuate under the impact of changing interest rates and uncertainty. This point is well expressed by Bryant (1980) who asserts that the supply of money function must take into account not only policy actions of the central bank and fiscal authority, but also the profit-motivated actions of commercial banks.

In his model of the British monetary sector, Crouch (1967) specified the supply of deposits to depend only on reserves -without any interest rate variable. He justified his specification on the assumption that British banks never hold excess reserves because of their prompt and speedy reaction to the emergence of excess reserves which is facilitated by the "perfection" of the London money market. In Kuwait, banks tend to hold substantial excess reserves firstly, because of the absence of developed financial markets and secondly, because the major part of reserves (Central Bank bills) carries interest. Therefore, the supply of deposits in Kuwait is interest-responsive.

The interest-responsiveness of the supply function stems from the profit maximisation behaviour of commercial banks. When foreign interest rates rise, banks will initially change the composition of their portfolios, increasing their holdings of foreign assets. At a later stage, they will try to obtain extra funds from the public by making their deposits more attractive (e.g. by raising interest rate) and thus increasing the potential supply. This is possible with the existence of excess reserves. Whether or not there will be an increase in the equilibrium level of deposits depends on demand by the public, who will have to choose between investing more funds in foreign or local deposits, both of which are now more attractive. Some people will prefer local deposits for security reasons, to avoid foreign exchange risk, or because of lack of knowledge. This supply-demand interaction has been a common phenomenon during the recent monetary history of Kuwait. For example, in 1974 there was a sharp increase in quasi-money (up 31.2 percent) because of both higher supply and demand. Higher supply resulted from higher deposit rates emanating from the banks' strive to make deposits more attractive to finance the increased demand for credit. Higher demand was the direct result of higher personal income -a sequel to the government's decision to raise the wages and salaries of its employees in reaction to the rise in revenue induced by higher oil prices.

The hypothesised positive correlation between the supply of deposits and interest rate may seem contradictory with the significantly negative coefficient in Khouja and Sadler's (1979) money supply function, and the Central Bank's approach to the determination of the money supply whereby higher foreign rates induce capital outflows and render a contractionary effect on the money supply. There is, in fact, no contradiction. Khouja and Sadler's function, and the Central Bank's approach describe long-run equilibrium in total money supply, whereas the present equation explains the short-run reaction of supply of deposits to changes in foreign interest rate. Moreover, Khouja and Sadler's equation is in the reduced form, whereas this one is in the structural form.

The same reasoning can be used to explain the responsiveness of the supply of deposits to the interbank rate or the difference between foreign and interbank rates, both of which were found to be significant in exploratory regressions. However, the foreign rate is used because it is theoretically more plausible and produces better statistical results.

Scepticism about the existence of a deposit-supply function in Kuwait rests on the assumption that there is a free supply of reserves by the Central Bank. But, this assumption is false, despite the Central Bank's commitment to maintain a "sound" banking system. The reasons for believing that the supply of reserves is not perfectly elastic are as follows:

(i) Lending by the Central Bank to commercial banks depends on the availability of collateral.

(ii) The Central Bank can, and often does, refuse to discount a particular commercial paper, without any given explanation.

(iii) The Central Bank can, and often does, set an upper limit on discounts/direct lending.

(iv) The Central Bank refuses to discount commercial papers if it feels that the proceeds of the discount will be used by commercial banks to acquire Central Bank bills, which yield higher interest than the discount rate.

Indeed, if the supply of reserves were perfectly elastic, commercial banks would not have been unable to satisfy the private sector's demand for credit during periods of liquidity strain. Such periods were quite common in the years 1977-82 for which the model is estimated. Again, if the supply of reserves were perfectly elastic, commercial banks would not have resorted to other sources of funds, in particular, foreign liabilities and the interbank market which have witnessed remarkable growth since 1974.

Moreover, even if the level of reserves does not affect the money supply directly, it does have an indirect effect through the supply of credit because credit expansion is followed by monetary expansion. This is a hypothesis for which there is empirical evidence (Ghuloum (1984)). Lastly, even if the required reserve ratio were not an effective constraint on the supply of deposits, liquidity ratios certainly are.

We have already seen that banks tend to hold more excess reserves in the fourth quarter for the purpose of "window dressing." This means that there is a seasonal variation in the reserve-deposits ratio with banks maintaining a higher ratio in the fourth quarter. This must imply that the supply of deposits is negatively influenced by the seasonal rise in the reserve-deposits ratio. Therefore, a seasonal dummy is included in the function which we may specify as

$$TD^s = T\ (R,\ {}^{r}f,\ D3)$$

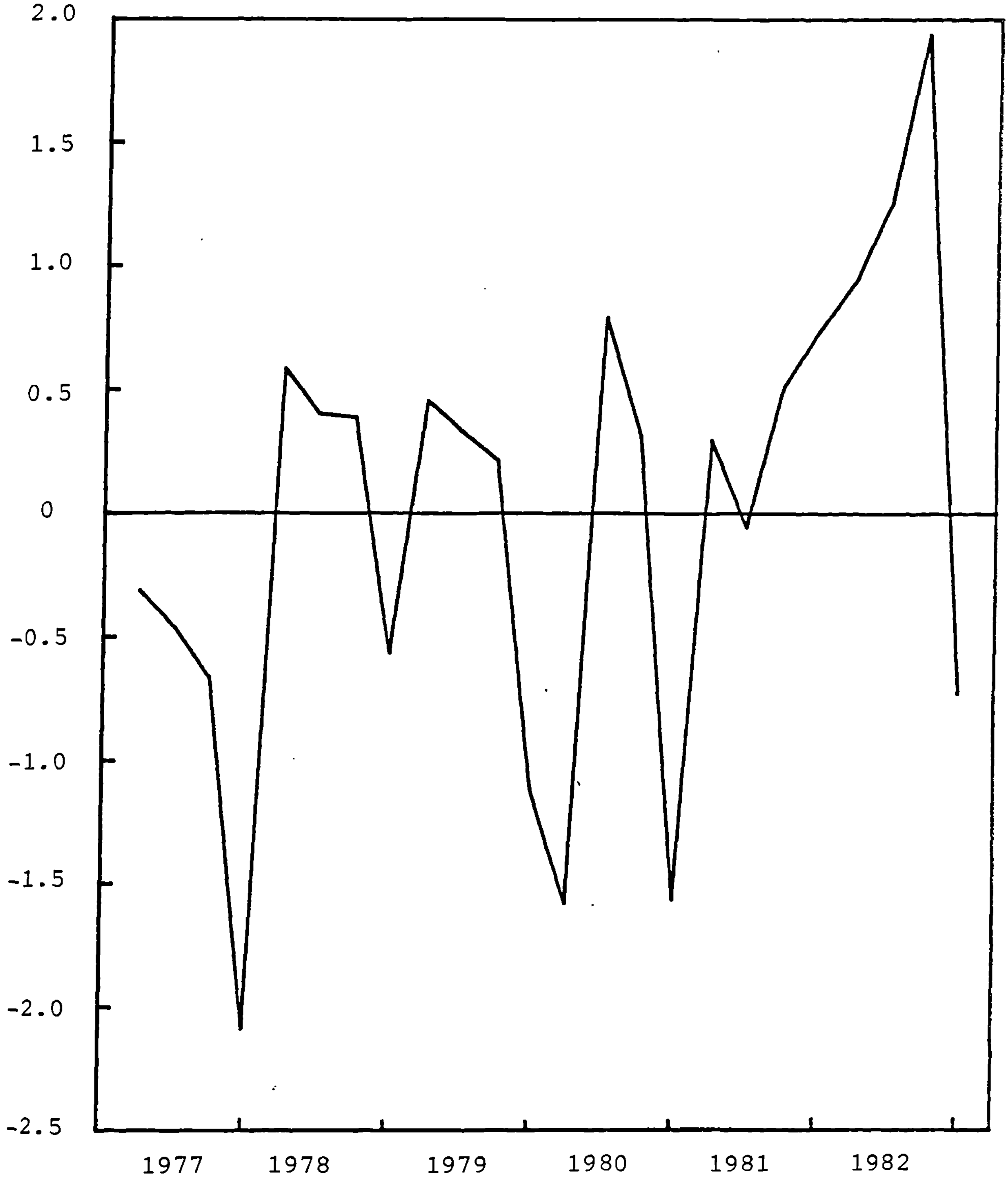
Figure 6.9 plots the standardised empirical residuals derived from the regression of the supply of deposits on reserves and foreign interest rate only. It is obvious that the residuals tend to assume negative values in the fourth quarter, which must surely imply the existence of seasonal variation and justify the inclusion of a seasonal dummy in the function. In Chapter 4, a time-series test just failed to detect seasonal variation in the broad money supply which includes currency as well as total deposits. The difference in the two cases is attributed to currency which does not have seasonal variation.

6.4.6. Supply of Credit

The supply of credit by commercial banks to the private sector depends on their ability and willingness to lend. Ability is determined by the flow of total private and government deposits. The latter are, indeed, used as a policy variable to enhance or otherwise banks' ability to grant credit. Willingness depends on interest rate considerations, more specifically, the differential between foreign and local rates and a variable that reflects the portfolio behaviour of banks with respect to the relationship between credit to the private sector and the private sector's deposits with banks TD.

Figure 6.9

Standardised Residuals of the Deposits Supply Equation Without Dummy Variable



It is plausible to assume that commercial banks have a long-run norm or desired value of the credit to deposits ratio. In each period, banks adjust this ratio by a fraction of the divergence between the desired ratio b and last period's actual ratio. Figure 6.10 shows the behaviour of the actual ratio relative to its mean value over the period 1977-82. Thus, we may specify the following adjustment mechanism:

$$(CR/TD) - (CR/TD)_{t-1} = k\left[b - (CR/TD)_{t-1}\right]$$

therefore

$$(CR/TD) = kb + (1-k)\ (CR/TD)_{t-1}$$

or

$$CR = kb\ (TD) + (1-k)\ TD\ (CR/TD)_{t-1}$$

which means that to take account of the adjustment process, the supply of credit function should contain as an explanatory variable the lagged ratio of credit to total (private) deposits. Deviations of actual from desired ratio are explained by the interest rate differential which determines the portfolio behaviour of commercial banks. There are other variables that affect the supply of credit such as the discount rate and required reserve ratio (Park (1973)), but these do not apply in our case because they have been constant. Therefore, the supply-of-credit function can be expressed as follows:

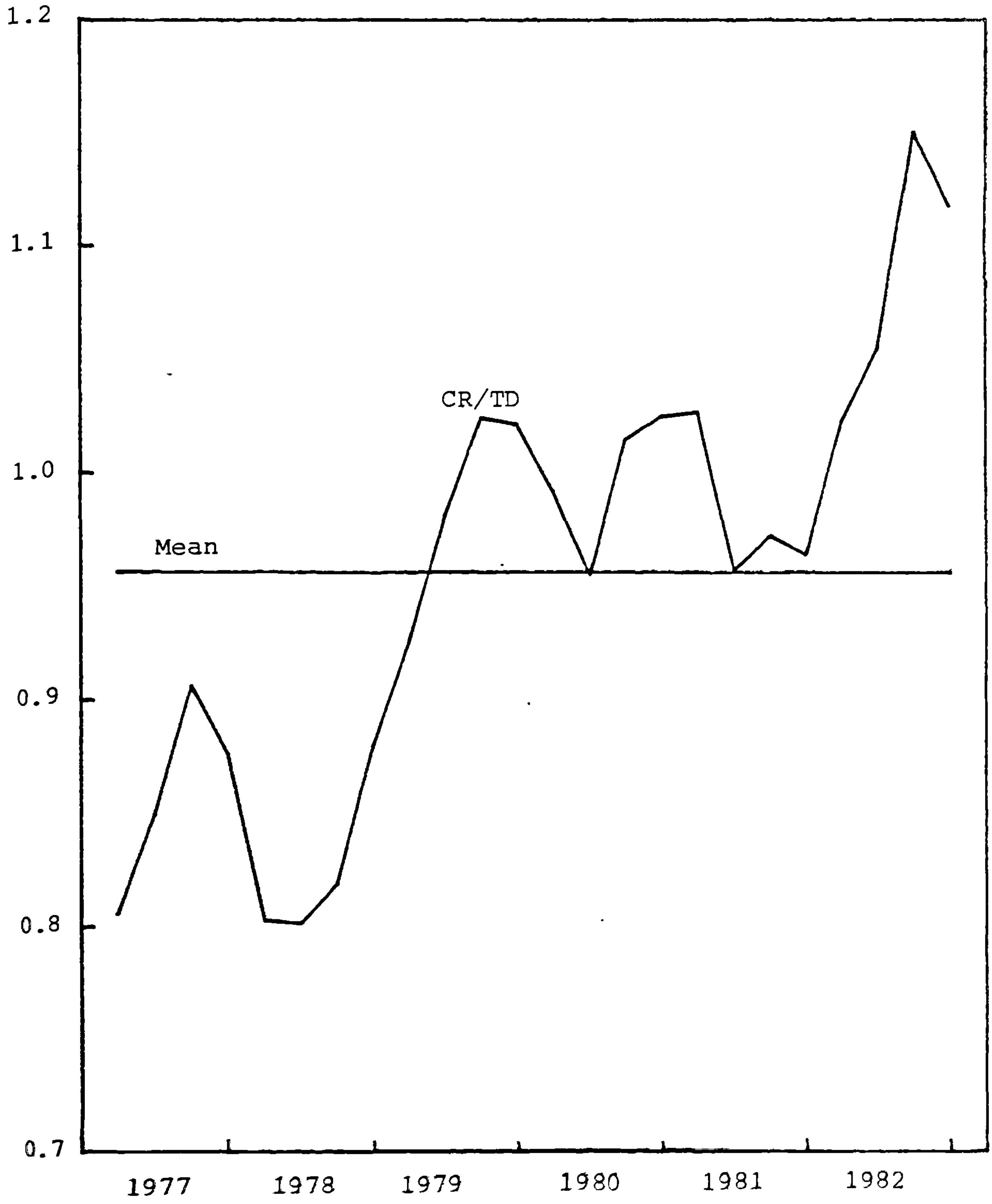
$$CR^s = C\ ((TD + GD),\ ({}^rf - {}^rk),\ (CR/TD)_{t-1})$$

6.4.7. Demand for Credit

Previous attempts to estimate the demand-for-credit function focused on non-oil GDP as a measure of economic activity. In the Claremont model, it was simply made a function of non-oil GDP in a log-log form. In El-Mallakh and Atta's (1981) model, the demand for credit was specified to depend on the contemporaneous and lagged values of non-oil GDP. Ghuloum (1984), on the other

Figure 6.10

Ratio of Credit to Total Private Deposits



hand, used a different specification in which the change in the demand for credit was made a function of government expenditure and a lagged dependent variable. The goodness of fit for Ghuloum's specification turned out to be poor ($R^2 = 0.53$), and the coefficient of government expenditure was insignificant, though correctly signed. A negative sign was expected on the grounds that higher government expenditure reduces the immediate demand for credit. It seems, however, that all of these studies overlooked the role of the banking system in financing imports through letters of credit, and that is why none of them used imports as an explanatory variable in the demand for credit function.

Credit is used to finance domestic economic activity as well as imports. Therefore, the demand for credit should depend on non-oil GDP Yn and imports IM.

$$CR^d = R\ (Yn,\ IM)$$

Since credit is also used to finance stock market transactions, an attempt was made to employ the value of traded shares as an explanatory variable, but the results were insignificant. This may sound peculiar, but Ghuloum's (1984) explanation was a good one, in that the bulk of stock market transactions were financed by overdrafts (on which no data are available) and not by "regular" credit.

Moreover, the function does not include an interest rate variable. This is so because the existence of interest rate ceiling makes the cost of borrowing negligible compared with the high rates of return on real investment, e.g. in the business of retail trade. High rates of return usually result from substantial profit margins and outweigh the cost of borrowing, even when banks overcome the ceiling by imposing administrative charges and commissions. Thus, in boom periods, the private sector tries to get the maximum amount of credit allowed by its collateral, financial position and other factors irrespective of the loan rate. Attempts to incorporate as explanatory variables the difference between inflation rate and interest rate or the difference between local rate and foreign rate failed to improve the results. This has a very interesting implication for the credit market, at least in the period under consideration: there is excess demand for credit but interest rate does not have a rationing role. Instead, rationing is done by banks' preference, which is governed by such factors as collateral and personal relationships with the decision makers at commercial banks. The Central Bank also plays a rationing role because it is empowered to set a limit for loans to any individual borrower.

Finally, a seasonal dummy is added in order to account for the decline in the demand for credit in the fourth quarter. This may be due to book-squaring at the end of the calendar year which is equivalent to the financial year. Figure 6.11 shows that the behaviour of standardised residuals derived from a regression without a seasonal dummy justifies its inclusion. Therefore, the demand for credit function becomes:

$$CR^d = R\ (Yn,\ IM,\ D3)$$

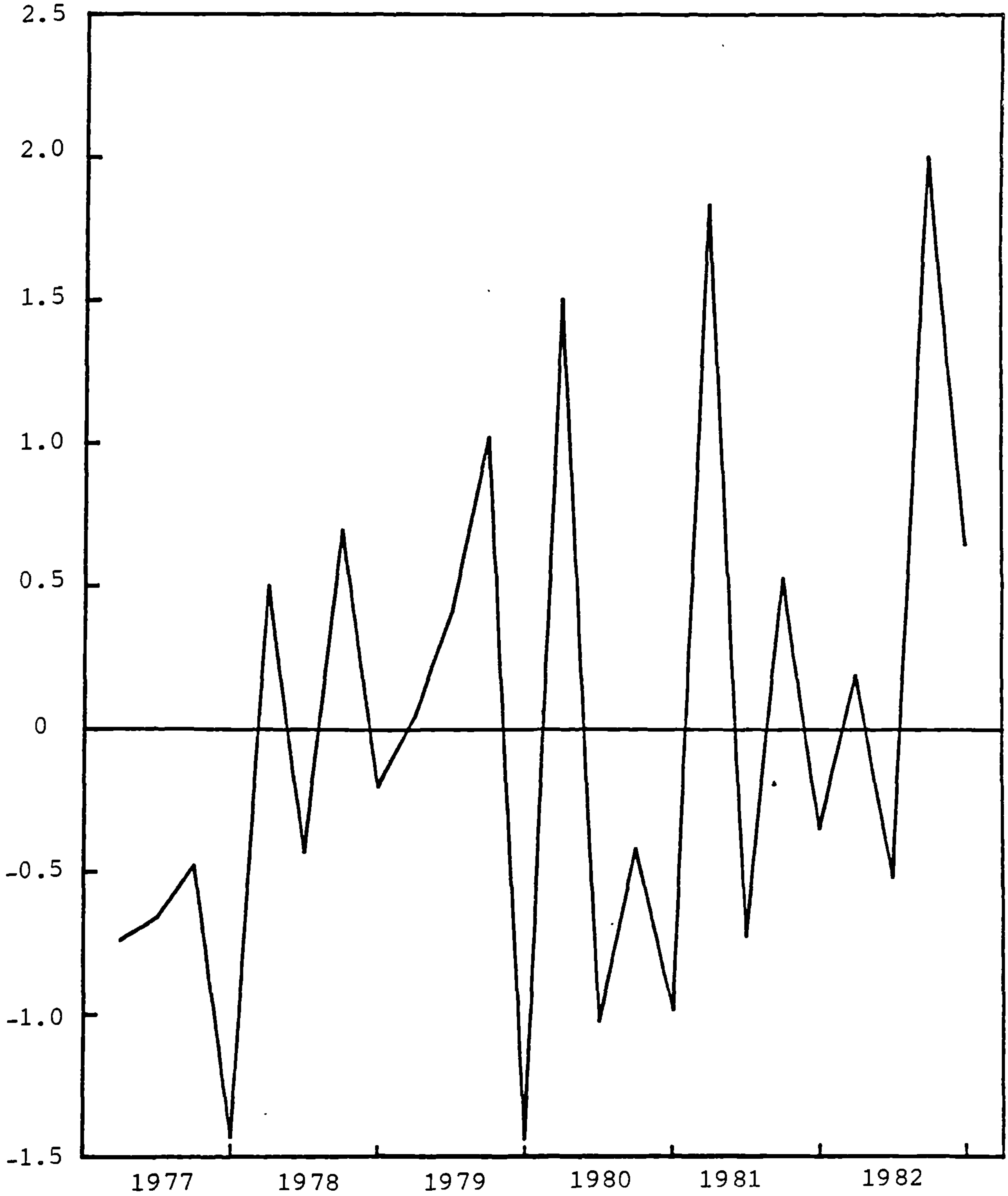
6.4.8. Imports

Since imports are conceived to be an important determinant of the demand for credit and the money supply, it would be useful to specify an imports function as part of the model.

Several attempts have been made at estimating this function for Kuwait, the

Figure 6.11

Standardised Residuals of the Credit
Demand Equation Without Dummy Variable

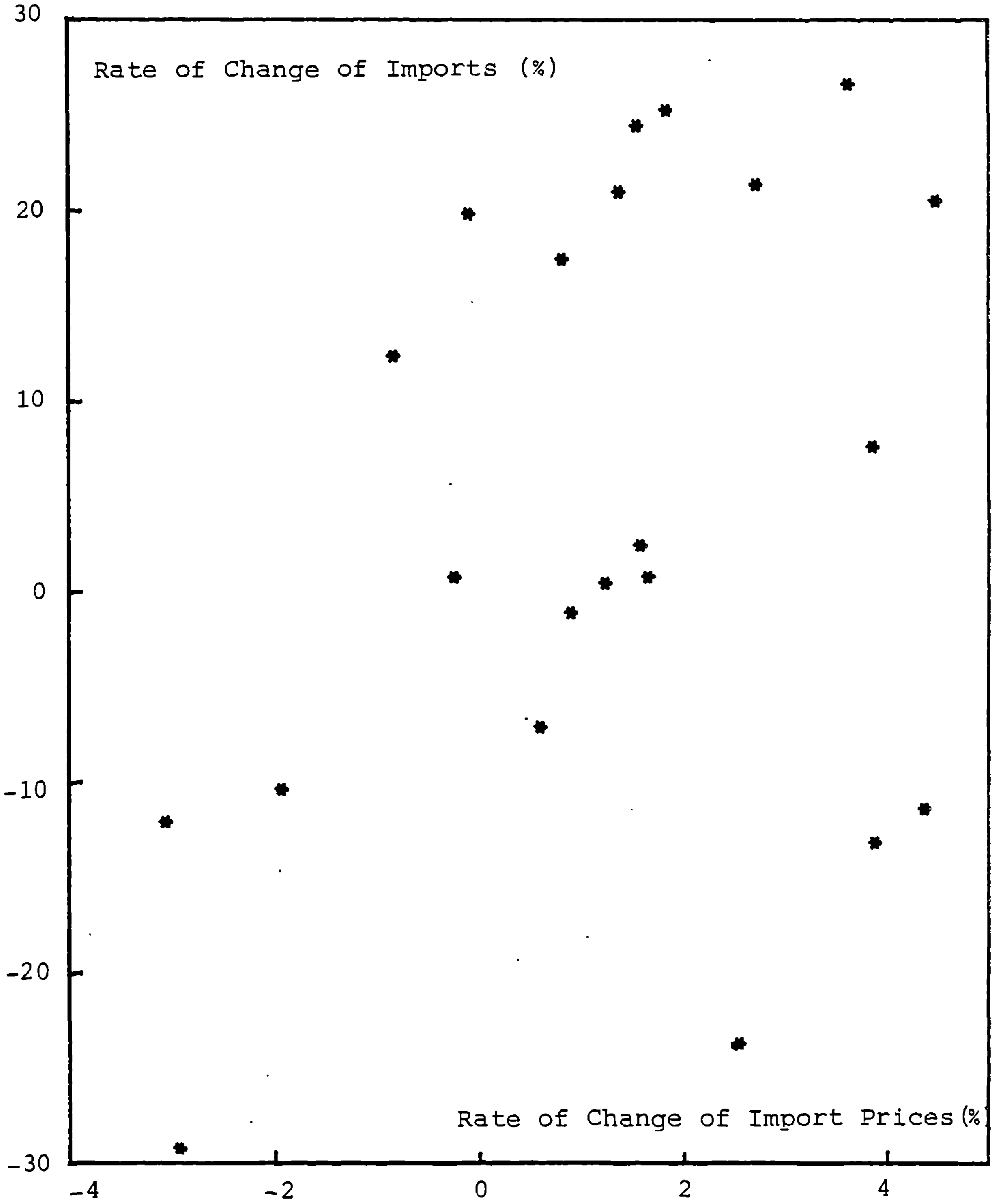


majority of which employed annual data. Khouja (1973) estimated the simple specification of making imports a function of GNP. Later, Khouja and Sadler (1979) estimated a better specification by making imports a function of GNP, change in the price level and the ratio of money supply to disposable income. The last variable which Khouja and Sadler termed "monetary liquidity" was introduced on the grounds that the banking system plays an important role in financing imports. The lag was explained by the procedure involved in financing imports which requires opening letters of credit six to twelve months in advance of final delivery of the imported goods, i.e. when imports are actually recorded. The results also indicated that the change in the price level was significantly negative. This is not convincing, however, because the general domestic price level was incorrectly taken to be a proxy for import prices, and also because the high marginal propensity to import, and the extent of Kuwait's dependence on imported goods and services, make the demand for imports price inelastic. The scatter diagram in Figure 6.12 shows that imports are not responsive to changes in import prices where the latter are proxied by the variable Pm which was used as an explanatory variable in the price equation. Also, the term "monetary liquidity" is not so much a determining factor as much as it is a "catalyst" to increased imports. The availability of bank financing may be a necessary, but certainly not a sufficient, condition to trigger an increase in imports. Indeed, imports should be determined by more fundamental factors, with any increase in the demand for imports resulting in a greater demand for credit. El-Mallakh and Atta (1981) later made imports a function of gross domestic absorption, which they defined as the sum of consumption and investment. Finally, in the Claremont model, imports were made a function of total GDP in a log-log form.

In the present model, imports are conceived to be a function not of current income, but rather of wealth or permanent income, the concept of Yp that we

Figure 6.12

Price Elasticity of Imports



came across earlier. This is particularly true for the import of consumer durables. Another important determining factor of imports that has been overlooked in other studies on Kuwait is re-exports, i.e. the portion of imports re-exported to neighbouring countries, particularly Iraq, Iran and Saudi Arabia. Therefore, re-exports RX as a proportion of total exports X is another explanatory variable.

Two dummy variables are also included: a seasonal dummy D3 to account for the seasonal increase in imports in the fourth quarter, and a war dummy D4 to take account of the impact on imports of the Iraq - Iran war. It is felt that the initial shock of the war influenced imports negatively in 1981, but the effect dissipated in 1982 as people started to conceive the war as a long one and adjusted to the new situation. Therefore, D4 takes the value of 1 in each of the four quarters of 1981 and zero otherwise. The standardised residuals plotted in Figure 6.13 verify the need to incorporate the dummy variables D3 and D4. The import function may look like this

$$IM = M\ (Yp,\ RX/X,\ D3,\ D4)$$

6.5. The Full Model and Estimation Results

The preceding discussion suggests that a model of Kuwait's monetary sector can be represented by the following system of equations. Unsubscripted variables are at time t.

$$P = a_0 + a_1\ G_{t-3} + a_2\ G_{t-4} + a_3\ TD_{t-2} + a_4\ Pm + u_1$$

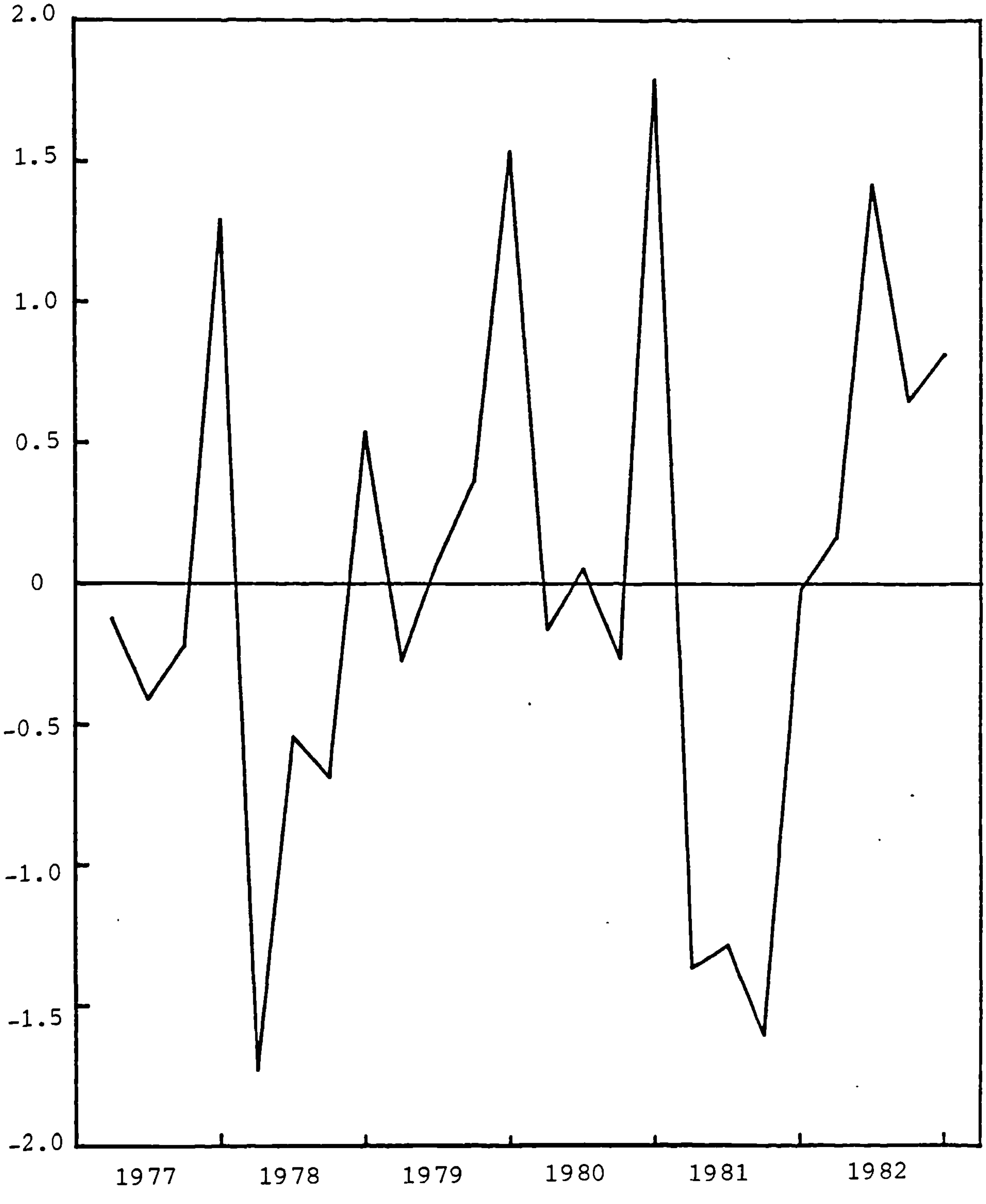
$$Yd = b_0 + b_1\ (G/G_{t-1}) + b_2\ (TD_{t-1}/TD_{t-2}) + u_2$$

$$Yn^* = Yd + Y_T$$

$$Yn = PYn^*$$

Figure 6.13

Standardised Residuals of the Imports Equation Without Dummy Variable



$$Yp = \sum_{i=1}^{8} (Yo + Yn)_{t-i}$$

$$C^d = c_0 + c_1\ Yn + u_3$$

$$R^d = d_0 + d_1\ C + d_2\ {}^{r}f + d_3\ D3 + u_4$$

$$R = Rc + Rb + Rk$$

$$NP = \frac{1}{2} \sum_{i=0}^{1} (Rb + Rk - SW - DC - LN)_{t-i}$$

$$r_k = e_0 + e_1\ {}^{r}f + e_2\ NP + u_5$$

$$DD^d = f_0 + f_1\ Yp + f_2\ {}^{r}k + f_3\ DD_{t-1} + f_4\ D1 + u_6$$

$$QM^d = g_0 + g_1\ Yp + g_2\ {}^{r}f + g_3\ QM_{t-1} + g_4\ D2 + u_7$$

$$QM = S + T + F$$

$$TD^s = h_0 + h_1\ R + h_2\ {}^{r}f + h_3\ D3 + u_8$$

$$TD = QM + DD$$

$$M = C + TD$$

$$CR^s = i_0 + i_1\ (TD + GD) + i_2\ ({}^{r}f - {}^{r}k) + i_3\ (CR/TD)_{t-1} + u_9$$

$$IM = j_0 + j_1\ Yp + j_2\ (RX/X) + j_3\ D3 + j_4\ D4 + u_{10}$$

$$CR^d = k_0 + k_1\ Yn + k_2\ IM + k_3\ D3 + u_{11}$$

The following responses are expected from our previous discussion:

$a_1 > 0$, $a_2 > 0$, $a_3 > 0$, $a_4 > 0$

$b_1 > 0$, $b_2 > 0$

$c_1 > 0$

$d_1 > 0$, $d_2 < 0$, $d_3 > 0$

$e_1 > 0$, $e_2 < 0$

$f_1 > 0$, $f_2 < 0$, $f_3 > 0$, $f_4 > 0$

$g_1 > 0$, $g_2 > 0$, $g_3 > 0$, $g_4 > 0$

$h_1 > 0$, $h_2 > 0$, $h_3 < 0$

$i_1 > 0$, $i_2 < 0$, $i_3 > 0$

$j_1 > 0$, $j_2 > 0$, $j_3 > 0$, $j_4 < 0$

$k_1 > 0$, $k_2 > 0$, $k_3 < 0$

The predetermined variables are the lagged endogenous variables plus G, GD, NP, Pm, r_f, X, Yo, Yp and Y_T as well as the dummy variables D1, D2, D3 and D4. The u's are error terms whereas the a's, ..., k's are parameters to be estimated empirically. The superscripts d and s denote demand and supply respectively. The following notation is used where all variables are measured in KD million unless otherwise stated

C = Currency in circulation.

CR = Commercial banks' credit to the private sector.

D1 = Dummy variable for stock market boom = 1 in 81(4), 82(1) and 82(2), 0 otherwise.

D2 = Dummy variable for stock market collapse = 1 in 82(3) and 82(4), 0 otherwise.

D3 = Seasonal dummy = 1 in the fourth quarter, 0 otherwise.

D4 = Dummy variable for the war shock = 1 in 81(1), 81(2), 81(3) and 81(4), 0 otherwise.

DC = Discounts to commercial banks.

DD = Demand deposits

F = Foreign currency deposits

G = Government domestic expenditure (real)

GD = Government deposits with commercial banks

IM = Imports

LN = Loans from the Central Bank to commercial banks

NP = Net position of commercial banks with the Central Bank (two-quarter moving average)

P = Consumer Price index (1978 = 100)

Pm = Import price index (1976 = 100)

QM = Quasi-money

R = Reserves of commercial banks

Rb = Balances of commercial banks with the Central Bank

Rc = Cash reserves of commercial banks

Rk = Central Bank bills held by commercial banks

RX = Re-exports

^{r}f = 3-month Eurodollar interest rate (percent p.a.)

^{r}k = 3-month KD interbank interest rate (percent p.a.)

S = Saving deposits

SW = Currency swaps

T = Time deposits

TD = Total deposits of the private sector with commercial banks

X = Exports

Yd = Deviation of real non-oil GDP from its trend value

Yn = Non-oil GDP (nominal)

Yn^* = Non-oil GDP (real)

Yo = Oil GDP (nominal)

Y_p = Permanent or expected income (nominal)

Y_T = Trend value of non-oil GDP (real)

The ordering of the equations in this particular manner is not without significance. The system is recursive in the sense that the solution for the nth endogenous variable involves only the first n equations of the model. For example, given the value of Yn we can solve for C, and given the value of C we can solve for R and so on. Now if E (uiuj) = 0 for i≠j then the endogenous variables appearing on the right hand side of each equation are independent of the equation's error term. Referring to the model we have

$C^d = C\ (Yn,\ u_3)$

$R^d = R\ (C,\ {}^{r}f,\ D3,\ u_4)$

Since u_3 and u_4 are independent and C^d depends on u_3, it is also independent of u_4, i.e. Cov $(C, u_4) = 0$, which means there is no simultaneous equations bias. In this case OLS produces consistent estimators. Wold and Jureen (1953) have shown that the estimators will be identical to those of the full information maximum likelihood if the error terms are normally distributed and homoscedastic.

For the estimation of recursive systems, 2SLS estimates do not have any advantage over OLS estimates. Moreover, recursive systems have the added advantage that the identification problem does not arise. Sims (1980) points out that recursive systems are identified but result in equations which are linear combinations of the reduced form equations which he calls "multiple possible normalisations." For these reasons, some econometricians have advocated the use of recursive systems to model economic relationships. Wold and Jureen (1953) suggest that economic theory usually defines the most important explanatory variables of a relationship and that minor determinants of the dependent variable may well be excluded from the function, simply because each one of them has a negligible effect and their influence as a whole may be reflected by the random variable. Under these circumstances, they argue, economic relationships are overidentified but may be adequately represented by recursive systems.

In fact, Wold (1949) objects to simultaneity - the notion of everything occurring at the same time - on the grounds that the true description of economic events has to be along a temporal sequence. For example, current consumption cannot be a function of current income since we must have income before we can spend it. Wold even argues that simultaniety is misspecification and what appears to be simultaneous occurrence is in fact a consequence of the data being available over long intervals and that lags are obliterated by low-frequency data. He concludes that economic models are recursive in the sense that the matrix of coefficients of endogenous variables is triangular or even diagonal (see also Wold (1954), (1956), (1959), (1964)).

Theil (1971 P.462) argues that Wold's criticism of interdependence was exaggerated, but he admits that Wold had contributed to a better understanding of the importance of recursive models. In particular, Theil points out that the condition Cov $(u_i u_j)=0$ is very restrictive because the omitted variables which are represented by the error terms are correlated. Theil also argues that long time periods mean simultaniety; this conforms with Wold's basic argument for recursive models, i.e. economic agents usually react after some lag. Thus, it is conceivable to say that simultaneous models are associated with low-frequency data (e.g. annual), whereas recursive models are associated with high-frequency data. In a sense, then, there is a form of conflict between data and economic specification; this is a point that has been raised by proponents of continuous time-dynamic models (see Wymer (1976), (1979)). Fisher (1967) has suggested that simultaneous models are limiting approximation to non-simultaneous models in which certain time lags converge to zero. Finally, Tobin (1982) implicitly defended recursive models in his Nobel lecture, by stating that simultaneous equations systems are a convenient representation of interdependence, but it is more persuasive to think of the economic processes that solve them as taking time than as working instantaneously. In fact, he argues that representation of economies as systems of simultaneous equations always strains credibility because "it takes extraordinary suspension of disbelief to imagine that the economy solves and re-solves such systems every microsecond."

Recursive systems do appear in empirical research. The St. Louis Federal Reserve model of the U.S. economy (Andersen and Carlson (1970)) is a purely recursive system, and Crouch (1967) presented a recursive system to describe the British monetary sector from the mid 1950s to the mid 1960s. David Laidler (1973) built a simple recursive model for the United States over the period 1953-72 to test the influence of money on real income and inflation -one of the objectives of our Kuwait model. Recursive or block recursive systems appear more frequently in models of LDCs; the latter appear particularly in full models of the economy. We have already seen that El-Mallakh and Atta's model of the Kuwaiti economy turned out to be block recursive, with monetary variables grouped in one block that was estimated by OLS because of within-block equation recursiveness. Similar examples are found in Atta's (1980) model of Ghana and the model of the Syrian economy built by Butterfield and Kubursi (1980).

Butterfield and Kubursi did not justify the use of OLS on the basis of the block-recursiveness property of the model only, but also on the grounds of measurement errors and the small sample size. It is interesting to note that one of the conclusions of the conference on large-scale macroeconometric models (Michigan, October 26-27, 1978), was that despite econometric and computing advances, OLS remains the most prevalent estimating technique. Indicative of this is the fact that of the 12 large scale models of Project Link (Waelbroeck (1976)), ten were estimated by OLS. The remaining two were estimated by FIML (West Germany) and a combination of LIML and 2SLS (Holland). At the same conference, the general discussion revealed preference (sometimes conditional) for OLS. For example, Arnold Zellner noted that OLS may be superior in small samples under very specific circumstances, but that consistent and efficient estimators are preferable in large samples. Michael Darby pointed out that in a number of existing models there are so many predetermined variables relative to the number of observations, that 2SLS estimators are identical to OLS. Franco Modigliani declared his preference for OLS with autoregressive transformations on the grounds that OLS estimators are "objective", since they do not call for a choice of exogenous variables as in the case of 2SLS or 3SLS. Finally, the Howrey et al (1981) survey revealed that whilst there has been extensive experimentation with various alternative estimation procedures for simultaneous equations models, alternatives to OLS achieved no more than modest improvement in model performance.

Greater emphasis seems to have been placed on the importance of flexibility to deal with data refinement, data revision and incorporation of new blocks of equations. Various studies involving the application of different econometric techniques to different data sets have shown that variations in estimates are much greater between different data sets, than between different estimation methods. This is why some econometricians believe that the results of empirical research will be improved by upgrading techniques of data collection and processing, rather than by devising and employing more sophisticated estimation methods. This point is particularly true in the case of Kuwait.

In what follows, model estimates are presented. The model was estimated by OLS using 24 quarterly observations of seasonally unadjusted data over the period 1977-82. Empirical results include the t-statistics, coefficient of determination (R^2) and the Durbin-Watson statistic (DW). To begin with, validation of the model involves a check to see whether the estimated coefficients are statistically significant with the proper sign, and later, whether the simulated time series correlate well with the historical time series.

(1) Price Level

$$P = 58.2 + 0.012\ G_{t-3} + 0.016\ G_{t-4} + 0.0088\ TD_{t-2}$$

(15.66) (3.45) (4.47) (12.36)

$$+ 0.177\ Pm$$

$R^2 = 0.995$ SE = 1.03 DW = 1.67

(2) Real Output

$$Yd = -808.8 + 203.08\ (G/G_{t-1}) + 566.43\ (TD_{t-1}/TD_{t-2})$$

(-3.07) (3.85) (2.24)

$R^2 = 0.528$ SE = 46.29 DW = 1.64

(3) Demand for Currency

$$C^d = 6.7 + 0.381\ Yn$$

(0.24) (7.89)

$R^2 = 0.739$ SE = 33.22 DW = 1.81

(4) Demand for Reserves

$$R^d = -\ 149.9 + 2.11\ C - 15.01\ r_f + 115.4\ D3$$

(- 3.26) (8.88) (- 4.13) (4.17)

$R^2 = 0.845$ SE = 58.1 DW = 1.49

(5) Interest Rate

$$r_k = 5.13 + 0.234\ r_f - 0.0086\ NP$$

(4.84) (2.45) (- 4.84)

$R^2 = 0.847$ SE = 1.21 DW = 1.50

(6) Demand for Demand Deposits

$$DD^d = 59.7 + 0.029\ Y_p - 16.56\ r_k$$
$$(1.36)\quad (4.91)\qquad (-\ 3.36)$$
$$+\ 0.53\ DD_{t-1} + 347.03\ D1$$
$$(9.68)\qquad (9.05)$$

$R^2 = 0.972$ SE = 50.44 DW = 2.28

(7) Demand for Quasi-Money

$$QM^d = -\ 105.5 + 0.0442\ Y_p + 13.32\ r_f$$
$$(-\ 2.91)\quad (4.44)\qquad (4.48)$$
$$+\ 0.73\ QM_{t-1} + 320.5\ D2$$
$$(7.55)\qquad (16.33)$$

$R^2 = 0.998$ SE = 34.78 DW = 2.40

(8) Supply of Total Deposits

$$TD^s = 275.5 + 5.54\ R + 111.59\ r_f - 650.5\ D3$$
$$(1.21)\quad (9.31)\quad (6.36)\qquad (-\ 3.54)$$

$R^2 = 0.880$ SE = 343.73 DW = 1.62

(9) Supply of Credit

$$CR^s = -\ 1106.9 + 1.053\ (TD + GD) - 34.53\ (r_f - r_k)$$
$$(-\ 3.48)\quad (26.45)\qquad (-\ 3.26)$$
$$+\ 961.87\ (CR/TD)_{t-1}$$
$$(2.36)$$

$R^2 = 0.991$ SE = 113.69 DW = 1.67

(10) Imports

$$IM = 12.9 + 0.027\ Y_P + 1640.8\ (RX/X)$$
$$(0.54)\quad (9.30)\qquad (7.48)$$
$$+\ 59.73\ D3 - 92.86\ D4$$
$$(5.03)\qquad (-\ 5.33)$$
$$R^2 = 0.957 \qquad SE = 25.05 \qquad DW = 1.89$$

(11) Demand for Credit

$$CR^d = -\ 1912.6 + 1.82\ Yn + 7.81\ IM - 349.4\ D3$$
$$(-\ 6.30)\quad (2.09)\qquad (6.62)\qquad (-\ 2.03)$$
$$R^2 = 0.915 \qquad SE = 342.2 \qquad DW = 2.12$$

Empirical results show that the equations are reasonably well determined in the sense of having high explanatory power, with the exception of the output equation which has R^2 of 0.528. This explanatory power, however, only applies to the divergence of real output from its trend value, not to its total value, which means that the explanatory power for the total value is more than that which is implied by this R^2*. All of the individual coefficients are statistically significant in the sense that their standard errors are equal to or less than half their values, i.e. they have t-statistics of 2 and more. Moreover, all of them are correctly signed, i.e. in accordance with a priori economic considerations. The DW statistics indicate only limited evidence of autocorrelation although -as discussed before- this statistic is not strictly appropriate for equations containing lagged dependent variables. However, the alternative -Durbin's h statistic (Durbin (1970))- requires a large sample which is not feasible in the present study.

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* The low R^2 of the output equation may also be attributed to errors of measurement in the non-oil GDP series resulting from interpolation. Other explanatory factors include the various reasons suggested by Bomhoff (1983) and referred to in an earlier section of this chapter.

The price equation shows that the impact of the monetary stimulus on the price level is both stronger and faster than the fiscal stimulus. A 100 percent increase in the money supply produces a 16.9 percent increase in the price level two quarters hence, whereas a 100 percent increase in government expenditure leads to an increase of 4.9 percent three quarters hence and a 6.2 percent increase a year hence. Import prices remain the major determinant of domestic prices: a 100 percent increase in import prices produces a 20.4 percent contemporaneous increase in import prices. This may seem relatively small but this is because the import price index as constructed here does not take into account changes in exchange rates, as it expresses import prices in currencies of exporting countries. The increase in import prices is in most cases outweighed by the appreciation of the KD against foreign currencies. As for real output, the effect of government expenditure, though contemporaneous, is less powerful than the effect of the money supply which, though lagged, has a coefficient of nearly three times that of government expenditure. Again it must be stressed that these effects relate to the divergence of real output from its trend value.

In the demand for currency equation the intercept term is insignificant, implying a proportional relationship between the demand for currency and non-oil GDP, and confirming the applicability of the quantity theory with respect to the demand for currency, i.e. currency is held for transactions purposes only. The income elasticity of the demand for currency is 0.97 which is nearly 1, implying that there are no economies of scale in the demand for currency. The demand for demand deposits is more elastic than the demand for quasi-money with respect to "permanent income" and interest rate; and the coefficient of adjustment (one minus the coefficient of the lagged dependent variable) is larger in the case of demand deposits than in the case of quasi-money, (0.47 versus 0.27) implying faster adjustment in the case of demand deposits.

For banks, an increase of one percentage point in the Eurodollar rate will induce a reduction of excess reserves by about KD 15 million, whereas on average, KD 115 million is held in the fourth quarter for the purpose of "window dressing." Moreover, a 100 basis points increase in the Eurodollar rate will induce a 23 basis points increase in domestic interest rates and about a KD 112 million increase in potential supply of deposits.

Banks' supply of credit to the private sector depends mostly on the size of their total deposits. The relationship is slightly more than proportional as a 100 percent increase in total deposits induces an increase in the supply of credit of about 113 percent. A doubling of the interest rate differential will only produce about a 5 percent decrease in the supply of credit. On the demand side, credit is influenced more by imports than by domestic economic activity. This is because the bulk of imports is financed by bank loans, whereas the bulk of domestic economic activity is financed either by government expenditure, directly or indirectly as in the case of construction, or by cheap non-commercial loans from specialised banks as in the case of housing (the Credit and Savings Bank) or industrial projects (the Industrial Bank of Kuwait).

Finally, imports are more influenced by "permanent income" than by the need to re-export. A 100 percent increase in permanent income or the ratio of re-exports to total exports will respectively produce 69 percent and 29 percent increase in total imports.

Table 6.1 shows some of the more interesting elasticities which emerge from the model. If $y = f(x, y_{t-1})$, then short-run elasticities are calculated as follows:

$$E\ (y,x) = \frac{\partial y}{\partial x} \cdot \frac{x}{y}$$

Long-run elasticities, naturally larger than short-run elasticities are calculated using the long-run reaction of y with respect to x in equations involving a distributed lag adjustment process, i.e. lagged endogenous variables. So, long-run elasticities are calculated by the formula

$$E\ (y,x) = \frac{\partial y/\ \partial x}{1 - \partial y/\ \partial y_{t-1}} \cdot \frac{x}{y}$$

This is because in a geometrically declining distributed lag function

$$y_t = \sum_{i=0}^{\infty} ak^i x_{t-i}$$

Thus, the long-run reaction of y to a change in x is given by

$$\sum_{i=0}^{\infty} ak^i = \frac{a}{1-k} \qquad \text{since } 0<k<1$$

After the Koyck transformation is performed, a is the coefficient of x ($\partial y/\ \partial x$) and k is the coefficient of y_{t-1} ($\partial y/\ \partial y_{t-1}$).

Table 6.1: Some Short-Run and Long-Run Elasticities

Elasticity	Short-Run	Long-Run
E (C, Yn)	0.97	--
E (R, $^r f$)	-1.06	--
E (DD, Yp)	0.56	1.19
E (DD, $^r k$)	-0.26	-0.55
E (QM, Yp)	0.26	0.96
E (QM, $^r f$)	0.09	0.33
E (TD^s, $^r f$)	0.56	--

At this final stage, a word of warning is warranted. This model represents the first "serious" attempt to model Kuwait's monetary sector in a disaggregated form, and to trace out the effect of money on output and prices. Because of the deficiency of some series, results should be treated with caution. As new and better-quality data become available, the model can be improved and tested over longer periods. After all, model building itself is a dynamic process in the sense that various developments may lead to changes in the specification of the model. These, inter alia, include changes in legislative and institutional arrangements, advancement of economic theory, the emergence of new empirical evidence, the re-interpretation of old evidence and changes in policy objectives.

APPENDIX 6.1

SELECTED RESULTS FROM PREVIOUS ECONOMETRIC STUDIES OF THE KUWAITI ECONOMY

Model	Function	Data	Estimation Method	R^2
Khouja (1973)	$Cp = f(Y)$	Annual	OLS	0.956
	$Ip = f(Y)$	Annual	OLS	0.816
	$IM = f(Y)$	Annual	OLS	0.967
	$GE = f(GR)$	Annual	OLS	0.961
	$GR = f(X\text{-}NF)$	Annual	OLS	0.954
Khouja and Sadler (1979)	$Cp = f(Yd, \Delta P)$	Annual	2SLS	0.925
	$Ip = f(M2/Yd, (Ip+Ig)_{t-1})$	Annual	2SLS	0.771
	$IM = f(Y, P, M2/Yd)$	Annual	2SLS	0.969
	$GE = f(Y, GR, (M2/Yd)_{t-1})$	Annual	2SLS	0.987
	$(M2)^s = f(GE, {}^r f)$	Annual	2SLS	0.789
Crockett and Evans (1980)	$(M1/P)^d = f(Yn/P)$**	Annual	OLS	0.928
	$(M2/P)^d = f(Yn/P)$**	Annual	OLS	0.984
El-Beblawi and Fahmi (1981)	$SP = f(M2, {}^r f, SP_{t-1})$	Monthly	OLS	0.960
El-Mallakh and Atta (1981)	$IM = f(GDA)$	Annual	OLS	0.990
	$(M2)^s = f(CR, GDC, FAC, OD)$	Annual	OLS	0.990
	$CR^d = f(Yn, Yn_{t-1})$	Annual	OLS	0.910
	$P = f(M2, Pm)$	Annual	OLS	0.990

Model	Function	Data	Estimation Method	R^2
Moosa (1983a)	$Yo = f(\sum_{i=1}^{4} w_i x_i)$	Annual	OLS	0.976
Moosa (1983e)	$(M1)^d = f(GE, {}^rk, \dot{P}_{t-1}, M1_{t-1})$	Quarterly	IV	0.961
Claremont Economics Institute (1983)	$Yo = f(COP, COQ)^{**}$	Annual	OLS	0.980
	$\dot{Y}n = f(L\dot{G}Ea, L\dot{G}Eu, L\dot{E}u)^*$	Quarterly	OLS	0.978
	$X = f(COP, COQ)^{**}$	Annual	OLS	0.990
	$\dot{P} = f(\dot{P}m, L\dot{G}Ea, L\dot{G}Eu)^*$	Quarterly	OLS	0.987
	$(\dot{M}2)^s = f(L\dot{G}E, L\dot{E})^*$	Quarterly	OLS	0.807
	$CR^d = f(Yn)^{**}$	Annual	OLS	0.990
	$QM^d = f(Yn)^{**}$	Annual	OLS	0.910
	${}^rk = f({}^rf, COP, s)$	Quarterly	OLS	0.840
	${}^rk = f({}^rf, L\dot{G}E, L\dot{E})^*$	Quarterly	OLS	0.937
Ghuloum (1984)	$R/TF = f(GE, \Delta DC, {}^rf, SP, (R/TF)_{t-1})$	Quarterly	OLS	0.632
	$FA/TF = f(GE, \Delta DC, {}^rf, Sp, (FA/TF)_{t-1})$	Quarterly	OLS	0.899
	$CR/TF = f(GE, \Delta DC, {}^rf, SP, (CR/TF)_{t-1})$	Quarterly	OLS	0.740
	$OA/TF = f(GE, \Delta DC, {}^rf, SP, (OA/TF)_{t-1})$	Quarterly	OLS	0.913
	$(\dot{M}1)^s = f(\dot{B}, \dot{r}, \dot{c})$	Quarterly	OLS	0.721
	$(\dot{M}2)^s = f(\dot{B}, \dot{c}, \dot{r}, \dot{t})$	Quarterly	OLS	0.378
	$(M1)^s = f(GE, \Delta CR)$	Quarterly	2SLS	0.780
	$(M2)^s = f(GE, \Delta CR)$	Quarterly	2SLS	0.940
Kuwait Int. Inv. Co. (1984)	$COX = f(COX_{t-2}, COX_{t-4}, COQ)$	Quarterly	OLS	0.992
	$ROQ = f(COQ-COX, COQ-COX_{t-1})$	Quarterly	OLS	0.898

NOTATION

. Rate of change

Δ First difference

L Distributed lag

d Demand (superscript)

s Supply (superscript)

* Output and/or expenditure measured in real terms

** Equation estimated in log-log form

Variables

Unsubscripted variables are at time t.

B = Monetary base

c = Currency to demand deposits ratio

COP = Crude oil price

COQ = Crude oil production

COX = Crude oil exports

CP = Private consumption

CR = Credit of commercial banks to private sector

DC = Discounts to commercial banks

E = KD/dollar exchange rate

Eu = Unanticipated change in KD/dollar exchange rate

FA = Foreign assets of commercial banks

FAC = Foreign assets of Central Bank

GDA = Gross domestic absorption

GDC = Government deposits at Central Bank

GE = Government expenditure

GEa = Anticipated government expenditure

GEu = Unanticipated government expenditure

GR = Government revenue

Ig = Government investment (capital formation)

IM = Imports

Ip = Private investment (capital formation)

M1 = Narrow money

M2 = Broad money

NF = Net factor payments

OA = Other assets of commercial banks

OD = Other deposits

P = Price level

Pm = Import prices

QM = Quasi-money

R = Reserves of commercial banks

r = Reserves to demand deposits ratio

r_f = Foreign interest rate

r_k = Local interest rate

ROQ = Refined oil production

s = Foreign risk

SP = Stock prices

t = Quasi-money to demand deposits ratio

TF = Total disposable funds of commercial banks

w_i = Principal-component weight of category i oil product

X = Exports

x_i = Value of category i oil product

Y = GNP

Yd = Disposable income

Yn = Non-oil GDP

Yo = Oil GDP

APPENDIX 6.2

EXCHANGE RATE AND INFLATION

We have seen that import prices significantly affect the domestic price level. However, the variable Pm that was used to estimate the price equation does not take into account changes in the exchange rate which have proved to be an independent cause of inflationary pressures (Wanniski (1975)), and that may explain why the coefficient of Pm in the price equation turned out to be smaller than expected.

It has been argued (for example Mundell (1976)) that the inflationary impact of exchange rate variability depends on the hypothesis that price increases resulting from exchange rate depreciation have a larger, or more lasting effect, than reductions that occur when the exchange rate appreciates. This mechanism is attributed to several reasons such as:

(i) price setters respond more rapidly to developments that tend to erode their incomes than to those that increase them;

(ii) the existence of a ratchet effect operating on the price level, especially in periods of buoyant demand; and

(iii) because it is easier for price setters to put through an increase in prices when there is an external factor (declining exchange rate) on which to place the blame.

There are two methods whereby we can incorporate the effect of the exchange rate in the original price equation:

(i) By adjusting the import price index Pm which was originally calculated as a weighted average of the unit values of exports of the four major exporters to Kuwait, i.e.

$$Pm = \sum_{i=1}^{4} X_i P_i \Big/ \sum_{i=1}^{4} X_i$$

where P_i is the unit value of exports of country i and X_i is its exports to Kuwait. To adjust for exchange rate variability, we use the following formula

$$Pm^* = \sum_{i=1}^{4}\left(\frac{X_i P_i}{E_i}\right) \Big/ \sum_{i=1}^{4} X_i$$

where E_i is an index of the exchange rate measured as number of units of currency i per one KD.

(ii) By adding another explanatory variable, the KD effective exchange rate E which is measured as a weighted average of its exchange rates against the currencies of its top four exporters, i.e.

$$E = \sum_{i=1}^{4} E_i X_i \Big/ \sum_{i=1}^{4} X_i$$

The following are the results of re-estimating the price equation using both methods of adjustment to take account of the effect of exchange rate

$$\underset{(10.96)}{P = 66.43} + \underset{(3.49)}{0.0162\, G_{t-3}} + \underset{(3.76)}{0.0187\, G_{t-4}} + \underset{(7.00)}{0.0093\, TD_{t-2}} + \underset{(1.38)}{0.0852\, Pm^*}$$

$R^2 = 0.989$ SE = 1.42 DW = 1.39

$$\underset{(8.66)}{P = 71.78} + \underset{(2.77)}{0.0096\, G_{t-3}} + \underset{(3.39)}{0.013\, G_{t-4}} + \underset{(11.67)}{0.0097\, TD_{t-2}} + \underset{(4.17)}{0.158\, Pm} - \underset{(-1.81)}{0.116\, E}$$

$R^2 = 0.996$ SE = 0.970 DW = 1.67

These results show that both variables accounting for exchange rate variation (Pm^* and E) are of low statistical significance. Pm^* is insignificant at the 5 percent level, whereas E is only significant on the basis of a one-tailed test -though it is correctly signed- implying that the appreciation of the KD (higher E) has a negative effect on the price level. The reason for the low statistical significance of both variables is the asymmetry in the relationship between the exchange rate and domestic prices under buoyant demand; this characterised most of the estimation period (1977-82). The relationship is asymmetric in the sense that lower exchange rates lead to higher domestic prices, but the opposite is not necessarily true, at least in terms of scale. This asymmetry is due to any, or all, of the three reasons mentioned earlier, and it results in distorting the response of domestic prices to exchange rate variablility and thus the low statistical significance of Pm* and E.

APPENDIX 6.3

DEMAND FOR REAL BALANCES

We have seen that demand functions for currency, demand deposits and quasi-money were estimated in nominal terms, and several reasons were given to justify such a procedure. The most important reason given was the unavailability of a proper deflator, but it was also argued that if money illusion is present, then it is justifiable to specify demand functions in nominal terms.

Some empirical studies of advanced countries over the 1950s and 1960s have verified the absence of money illusion by showing that the demand for nominal money balances is homogeneous of degree one with respect to the price level. Laidler and Parkin (1970) found evidence of a proportional relationship between the demand for nominal balances and the price level. Similarly, Goodhart and Crockett (1970) obtained results consistent with a long-run price level elasticity of approximately unity. However, empirical evidence on this issue is inconclusive, encouraging some economists to resort to Friedman's (1959) notion of "permanent price level" -measured as some average of current and lagged values of prices- to explain "undesired results."

In this appendix a test for money illusion in Kuwait is conducted, and the demand functions are re-estimated using real balances. The broad money aggregate M2 will be used to test for money illusion since the functional relationship used here does not contain an interest rate variable. Following Conlisk (1970) we can test for money illusion using the following demand function

$$M/P^{i} = aY^{d}$$

where

M = money stock (nominal)

P = price level

i = money illusion parameter (= 1 when there is no money illusion)

a = velocity parameter which is equal to velocity when $i=p=1$

Y = real income

If we linearise the function by taking logs

$$\log M - i \log P = \log a + b \log Y$$

or

$$\log M = \log a + b \log Y + i \log P$$

Therefore, testing for money illusion boils down to testing the significance of i. If this function is estimated for Kuwait over the period 1975-82 using non-oil GDP for income, we get the following results:

$$\log M = \underset{(-26.88)}{-8.65} + \underset{(2.63)}{0.212} \log Yn^{*} + \underset{(27.54)}{3.21} \log P$$

$R^2 = 0.989$ SE = 0.057 DW = 1.10

Estimation results show that i is significantly different from zero (t=27.54), and significantly different from one (t=18.89). Results show that any increase in the price level leads to a more than proportional increase in the demand for money, implying that the demand for money function is not homogeneous of degree one with respect to the price level and thus the existence of strong money illusion. However, it is felt desirable to present estimates for real money balances using the same specifications as in the model, except that money and income will now be measured in real terms (deflated by CPI).

Demand for Currency

$$(C/P)^d = 67.24 + 0.256\ Yn^*$$
$$(2.10)\quad (4.04)$$
$$R^2 = 0.427 \qquad SE = 25.91 \qquad DW = 1.07$$

Demand for Demand Deposits

$$(DD/P)^d = 24.41 + 0.0304\ Y_P^* - 14.19\ r_k$$
$$(0.43)\quad (4.01)\qquad (-3.34)$$
$$+\ 0.55\ (DD/P)_{t-1} + 266.35\ D1$$
$$(9.09)\qquad (8.43)$$
$$R^2 = 0.959 \qquad SE = 40.29 \qquad DW = 2.18$$

Demand for Quasi-Money

$$(QM/P)^d = -73.08 + 0.0432\ Y_P^* + 12.91\ r_f$$
$$(-1.47)\quad (3.94)\qquad (4.49)$$
$$+\ 0.699\ (QM/P)_{t-1} + 255.33\ D2$$
$$(14.75)\qquad (6.51)$$
$$R^2 = 0.995 \qquad SE = 33.62 \qquad DW = 2.19$$

The only marked difference that emerges from these regressions concerns the income elasticity of the demand for currency. In the case of real balances, the income elasticity is significantly less than unity, implying that there are economies of scale in the real demand for currency.

CHAPTER 7

MODEL SIMULATION AND PREDICTIVE POWER

7.1. Introduction

In Chapter 6 a model of Kuwait's monetary sector was estimated and validated by examining the goodness of fit using such statistics as R^2 and t. In this chapter, the model will be validated by simulation to see how well it reproduces actual data. This exercise is not only important for validation per se, but also for policy analysis, because simulations can be used to compare the effects of alternative policies where policies are stated as changes in the value of policy parameters.

In this context, it is important to elucidate the concept of model validation, although part of the validation was undertaken in Chapter 6. Naylor and Finger (1971) define model validation in general as proving the model is true. Specifically, they argue that the model must have a high degree of goodness of fit and that the assumptions upon which it rests must be valid. Sowey (1973) presents an alternative definition with less stringent conditions than those implied by Naylor-Finger. He defines validation simply as the process of determining whether the model fulfils the demands made of it, i.e. whether it does an adequate job of prediction both within and beyond the estimation period.

Practicing econometricians seem to think of validation in terms of a combination of the two definitions mentioned above. The Howrey et al (1981) survey presents views of some well-established model builders on the subject of model validation. Keith Carlson favours validation to be based on dynamic simulations of the model, whereas Gregory Chow gives a more detailed account of the process. Chow looks upon validation as encompassing some, or all, of the following procedures: examining properties of individual equations such as the standard errors of the individual parameters and the sizes and behaviour of the residuals, studying goodness of fit of the entire system using ex-post and ex-ante forecasting errors, properties of the reduced form and the final form including various multipliers and stochastic properties, and the checking of properties of subsystems imbedded in the model. Otto Eckstein responded to the question of validation by outlining the procedures used by econometricians at Data Resources Incorporated (DRI), which include the following: (i) individual equation testing through the standard test statistics and dynamic single-equation simulation, (ii) full dynamic historical simulation, (iii) tests for simulation properties including those suggested by economic theory, (iv) "destructive" testing by assuming extreme values for policy and other variables, and (v) ex-ante solution to assure that the model has sound simulation properties in the forecast interval. Garry Fromm believes that more work needs to be done on validation criteria and procedures, but he points out that his current practice is to validate models by predictive tests (conditional and unconditional) and by checking correspondence with theory and institutional characteristics. Finally, Albert Hirsch believes that validation depends on the specification, but that in general the following procedures should be used: (i) single-equation criteria (statistical, theoretical, judgemental), (ii) sector simulations, (iii) full model simulations, and (iv) analysis of multipliers.

In Chapter 6 we satisfied the validation condition set out by Naylor and Finger. Here, we shall examine whether or not the model fulfils the validation condition stated by Sowey, and some other validation procedures will be used such as stochastic simulations. A question now arises as to whether model validation should be based on its ex-ante or ex-post predictive power. Following Pindyck and Rubinfeld (1976), there are three types of simulation/forecasting exercises:

(i) Ex-post simulation, which may also be called historical simulation or within-sample prediction. In this case the model is simulated (solved) for the period for which historical data for all variables are available, which serves the purpose of comparing the original data series with the simulated series for each endogenous variable. It is the kind of simulation that is particularly useful for policy analysis, since by letting policy variables follow different time paths the outcomes of different policies can be examined. This practice is, however, subject to the Lucas critique discussed in Chapter 6. It may be useful here to add that Christopher Sims (1982) argues that the types of policy changes that are subject to the Lucas critique rarely occur.

(ii) Ex-post forecasting, which may also be called out-of-sample prediction. In this case the simulation is done forward in time beyond the estimation period, and this is useful for testing the forecasting accuracy of a model.

(iii) Ex-ante forecasting, or conditional forecasting. This exercise requires predictions of the exogenous variables, making the forecasts conditional on the values of exogenous variables in any event (scenario). In this case the simulation starts in the current period and goes into the future over the forecast horizon.

Ex-ante forecasts are important for policy making concerning future events, but the comparison of forecasting performance of different models should be based on ex-post results. This is so because ex-ante forecasting involves the subjective judgement of the forecaster concerning future values of exogenous and policy variables. The same point is true of model validation as McNees (1981) illustrates, stating that "the traditional approach to model validation dismisses ex-ante evidence because it reflects both the quality of the model and the forecaster's subjective estimate of the future values of the exogenous variables in the model." Indeed, bad ex-ante forecasting results may have nothing to do with the quality of the model. If any other than the actual values of exogenous variables are used to solve the model, the resulting errors would be partly attributable to the incorrect values of the exogenous variables -which are not part of the model per se- and not solely to the deficiencies of the model.

Artis (1982) is more specific and illustrative on this issue as he proposes four sources for the variations amongst different ex-ante forecasts: (i) differences in the information set available on the recent past, (ii) differences in the judgement exercised to produce the forecast path of equation residuals or constant adjustments, (iii) variations in the paths set for exogenous variables, and (iv) differences in the models themselves -both in their economic structure and in the set of variables considered to be exogenous. Of these sources, only (iv) reflects the intrinsic quality of the model, whereas (i),(ii) and (iii) pertain to the skill of the forecaster and his ability to obtain unpublished information. For example, forecasting models of the U.K. economy assume a fiscal and monetary policy stance consistent with the medium-term financial strategy of the government. However, the strategy does not indicate an exact set of policy instrument changes (Wallis (1984)). It is the forecaster's skill and ability to obtain inside information that translates the broad indicators of the strategy into a set of figures that are subsequently used to obtain ex-ante forecasts.

Differences in forecasts may also be due to residual adjustment which is a totally subjective procedure (Savage (1983)). What is meant by residual adjustment is the introduction of non-zero residuals into the forecasts instead of assuming a residual mean of zero. One argument for this practice is the belief that there are several social, political, and economic factors that impinge on the model in the forecast period which are not accounted for in the original specification of the model. In this respect, a very interesting observation was made by two professional economists who recently wrote the following as they compared economic forecasters with weather forecasters, ".... but at least the weather forecasters do not have to make hasty adjustments to their equations to cope with a strike among the thunder gods or a cartel of the four winds ...." (Financial Times, 3rd July, 1985, p. 10). This was written in the context of how forecasters took account of the effect of the miners' strike on the British economy. Specifically, they said that "... economic forecasters need to be psychologists and fortune-tellers as well as econometricians to allow for all the effects of the year-long strike."

On this issue, McNees (1981) concludes that "model validity can only be established by ex-post simulation, using actual values of the exogenous variables to solve the model." Because ex-ante forecasting reflects the skills or otherwise of the forecaster, it has traditionally been regarded as irrelevant to model validation. Pindyck and Rubinfeld (1976) explicitly state that ex-post simulation should be used for model validation. It must be mentioned, however, that ex-ante forecasts can be used to serve the purpose of model validation because Artis (1982) has demonstrated the possibility of decomposing them into differences arising from exogenous assumptions, differences arising from residual judgements and differences arising from the models themselves. This methodology has been used to compare ex-ante forecasts of models of the British economy (Wallis (1984) pp. 87-91).

7.2. Measures of Predictive Power

If the model is to be validated by ex-post simulation, we must find a measure of predictive power that indicates how well it (the model) predicts the actual values of endogenous variables.

Several measures have been suggested (see for example Pindyck and Rubinfeld (1976 pp. 314-320)) based on the deviation of predicted from actual values (or changes). Theil's inequality coefficient (Theil (1962), (1966)) and the mean absolute deviation have the advantage of avoiding the problem of positive and negative errors cancelling each other. The inequality coefficient and the mean square error both have the property of penalising large individual errors more heavily. However, unlike the mean absolute deviation and the mean square error, Theil's inequality coefficient has the additional advantage of eliminating the scale factor, which makes it possible to compare the predictive power of a model with respect to various endogenous variables irrespective of the scale or units of measurement. For example, it is difficult to tell directly if the prediction of the money supply with mean square error of 5000 is better or worse than the prediction of interest rate with mean square error of 200. In the case of Theil's inequality coefficient, the sum of predicted relative changes is divided by the sum of actual relative changes and thus the scale factor as well as the units are eliminated in a process similar to the standardisation of variables, and that makes comparison easy.

Another advantage of Theil's inequality coefficient is that it can be decomposed into three components in a fashion similar to the analysis of variance (see Koutsoyiannis (1973) p. 493 and Gilchrist (1976) p. 235). Each of the three components, which are called partial inequality coefficients, shows a different source of forecast error: difference between means, difference between variances, and imperfect covariance of actual and predicted values.

Finally, Theil's inequality coefficient provides a relative basis for comparison with naive methods through the interpretation of its numerical value. A value of zero implies that the model attains perfect forecasts, a value of one means that the model forecasts no better than a naive zero-change prediction, and a value greater than one implies that the predictive power of the model is worse than the zero-change prediction, which means that there is no point in using it for forecasting.

A similar and related measure of predictive power has been suggested by McLaughlin (1975) who refers to his measure as a "batting average" BA. This measure is related to Theil's coefficient U as follows

$$BA = 100(4-U)$$

Thus if U = 0 (the case of perfect accuracy), BA = 400 and if U = 1, BA = 300 and so on.

However, the problem with Theil's inequality coefficient (and also McLaughlin's batting average), is that its numerical value does not indicate the seriousness of prediction errors. For example, we know that values of 0.3 and 0.4 for Theil's inequality coefficent both indicate better prediction than the naive zero-change model, and we also know that a value of 0.3 indicates better prediction than a value of 0.4. But we do not know the seriousness of prediction errors implied by these two values. A measure that tells us the seriousness of prediction errors, and yet has most of the characteristics of Theil's inequality coefficient, is the ratio of root mean square error to the mean which is defined as follows:

$$\frac{1}{\overline{Ya}} \sqrt{\sum_{i=1}^{n} (Ya - Yp)^2 / n}$$

where

Ya = actual value

Yp = predicted value

$\overline{Ya}$ = mean actual value

n = sample size

This measure tells us the seriousness of prediction errors because the "average" error is expressed as a percentage of the mean value of the variable concerned. Thus, we can feel the seriousness of errors better if we are told that the average error is, for example, 10 percent of the mean value of the variable concerned. It also eliminates the units and the scale factor which makes comparison easy. Therefore, this measure will be used to evaluate the predictive power of the model.

All of the above mentioned measures, and their different variants, look at the deviation of actual from predicted values (or changes) with the criterion that the lower the deviation, the better is the model. However, this criterion is not sufficient particularly for variables with frequent turning points in their time path, e.g. interest rate. Indeed, many forecasters (for example Cicarelli (1982)), argue that missed turning points are more important than the magnitude of the error, i.e. predicting the direction of change is more important than predicting its magnitude. Of course, it will be better to predict both direction and magnitude correctly, and for this purpose the prediction-realisation diagram will be utilised (see Koutsoyiannis (1973) p. 490)). This tool serves the purpose of exposing graphically the existence of direction (turning-point) errors, their magnitude, and the magnitude of non-direction errors. In essence, it is a scatter diagram plotted on the old familiar rectangular coordinate system of elementary analytical geometry (see Figures 7.7-7.12). Actual changes in the variable concerned are measured along the vertical axis and predicted changes along the horizontal axis, such that both actual and predicted changes are measured relative to the latest actual observation. Thus, points lying in the first and third quadrants show that the model predicts the direction of the change in the dependent variable correctly whereas those lying in the second and fourth quadrants imply direction or turning-point errors. If a 45-degree line is imposed such that it passes through the origin with a positive slope, we will have a graphical measure of prediction accuracy in the sense that points falling on the line imply perfect prediction. Thus the 45-degree line is called the line of perfect prediction. Table 7.1 illustrates all of the possibilities in the prediction-realisation diagram.

Table 7.1: Possibilities in the Prediction-Realisation Diagram

Quadrant	Position Relative to Line Above	Below
1	Underestimation	Overestimation
2	Turning Point Error	
3	Overestimation	Underestimation
4	Turning Point Error	

It must be mentioned, however, that some forecasters have developed quantitative measures of the ability of models to predict turning points (see for example Cicarelli (1982)).

7.3. Predictive Power of the Kuwait Model

The model developed in Chapter 6 was simulated over the estimation period 1977-82 to see how well it reproduces historical data for six endogenous variables: price level, real output (non-oil GDP), interest rate, money stock, credit, and imports. Table 7.2 shows the ratio of the root mean square error to the mean over the sample period, and the number of turning point errors which can be identified through the prediction-realisation diagram (Figures 7.7-7.12) as the points falling in the second and fourth quadrants. Figures 7.1-7.6 plot the actual and predicted values of the six variables.

Table 7.2: Within-Sample Predictive Power

Variable	RMSE/Mean (%)	Turning Point Errors
Price Level	0.8	1
Real Output	8.7	6
Interest Rate	13.2	3
Money Stock	6.2	5
Credit	7.9	4
Imports	5.2	2

The model predicts price level extremely well. The root mean square error is only 0.8 percent of the mean value and there is only one turning point error which occurred at the third quarter of 1981. The model predicted a decline in the price level by 0.5 when it actually rose by 0.5. The model predicted that decline because government expenditure decreased by 18.4 percent in the fourth quarter of 1980 (i.e. the explanatory variable G_{t-3}).

For real output, root mean square error is 8.7 percent of the mean value, not bad considering the seasonal volatility of this variable. There are six turning point errors: in four of them the model predicts an increase in real output whereas in fact it declined (78(1), 78(4), 81(1), and 81(4)), while in the other two, the model predicts a decrease when in fact it increased (79(3) and 80(3)).

Interest rate has the highest and the only double-digit ratio of root mean square error to the mean (13.2 percent), but the model is very good in predicting turning points of this highly volatile variable (only three turning point errors). For the second quarter of 1978, the model predicts a decline of 20 basis points -because of improved liquidity position- when in fact it rose by 10 basis points. For the second quarter of 1981, the model predicts a rise of 140 basis points -because of a 338 basis point rise in the Eurodollar rate- but the rate actually declined by 110 basis points. For the fourth quarter of 1981, the model predicts a rise of 20 basis points -because it underestimated the effect of improved liquidity position on lowering the rates- when it actually declined by 40 basis points. These errors may be taken to indicate that the net position of commercial banks with the Central Bank does not always fully reflect the liquidity of the banking system.

The 1982 turning points in the money stock are very well predicted by the model, something that a time-series extrapolative model would not have done just as well. The model, however, excessively overestimates the money stock in 1977 and in the first quarter of 1980, largely reflecting the effect of the volatile behaviour of reserves on the supply side. There are five turning point errors, in all of which the model predicts a decline, again because of the behaviour of reserves. This may be taken to mean that a better specification of the deposits-supply function is warranted. A better specification would incorporate the liquidity ratios and, also, distinguish between excess and required reserves. However, it is not possible to estimate such a function for the time being, because of some data problems.

For credit, the ratio of root mean square error to the mean is 7.9 percent. There are four turning point errors, in all of which the model predicts a fall on demand considerations, which may imply inadequacy of the specification of the demand-for-credit function, perhaps because it should incorporate a measure of activity in the domestic stock market as a source of demand.

Finally, imports are predicted very well, especially turning points as there are only two turning point errors for the third quarter of both 1979 and 1981. Predicted values are so close to actual values with the exception of two relatively large deviations for the first quarter of 1978 and the second quarter of 1982.

The model was also simulated over the four quarters of 1983 to measure the out-of-sample predictive power. Results are shown in Table 7.3.

Table 7.3: Out-of-Sample Predictive Power

Variable	Mean	RMSE/Mean (%)
Price Level	138.7	4.3
Real Output	556.3	7.1
Interest Rate	6.91	16.5
Money Stock	4268.6	11.7
Credit	4565.1	14.4
Imports	532.6	8.8

Out-of-sample prediction performance is reasonably good, though not as good as the within-sample performance, particularly with respect to the price level.

Figure 7.1

Price Level: Actual and Predicted

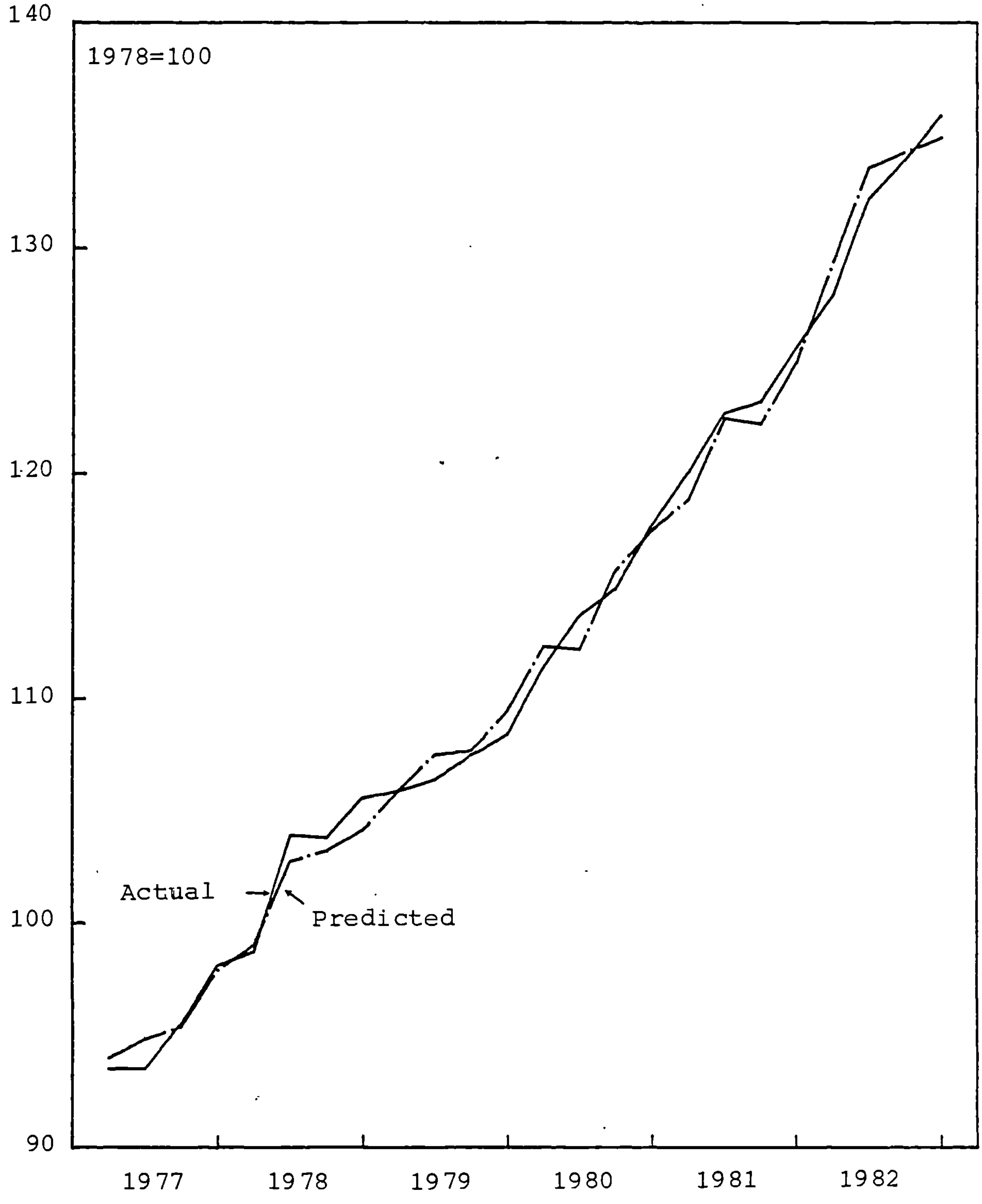


Figure 7.2

Real Output: Actual and Predicted

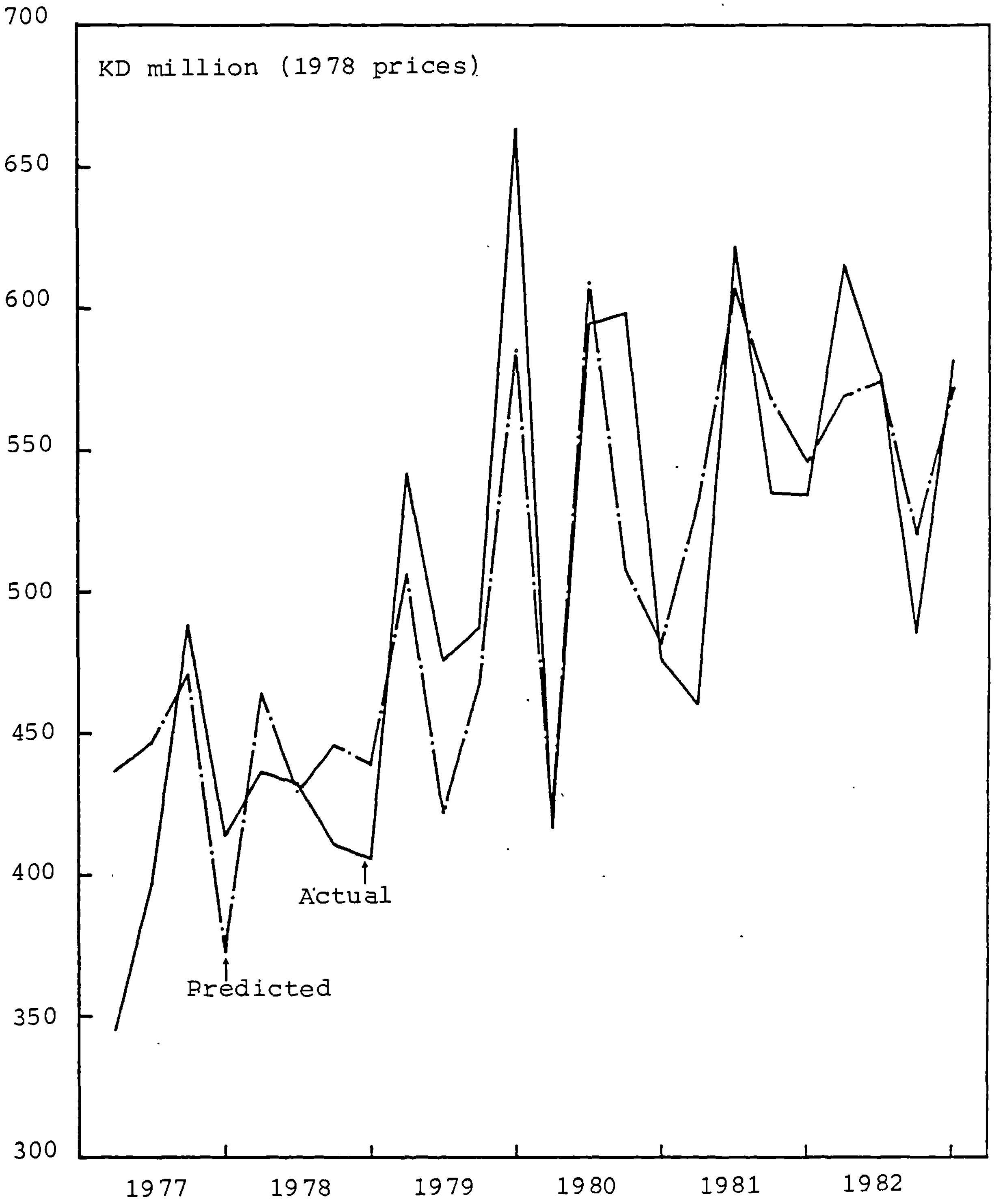


Figure 7.3

Interest Rate: Actual and Predicted

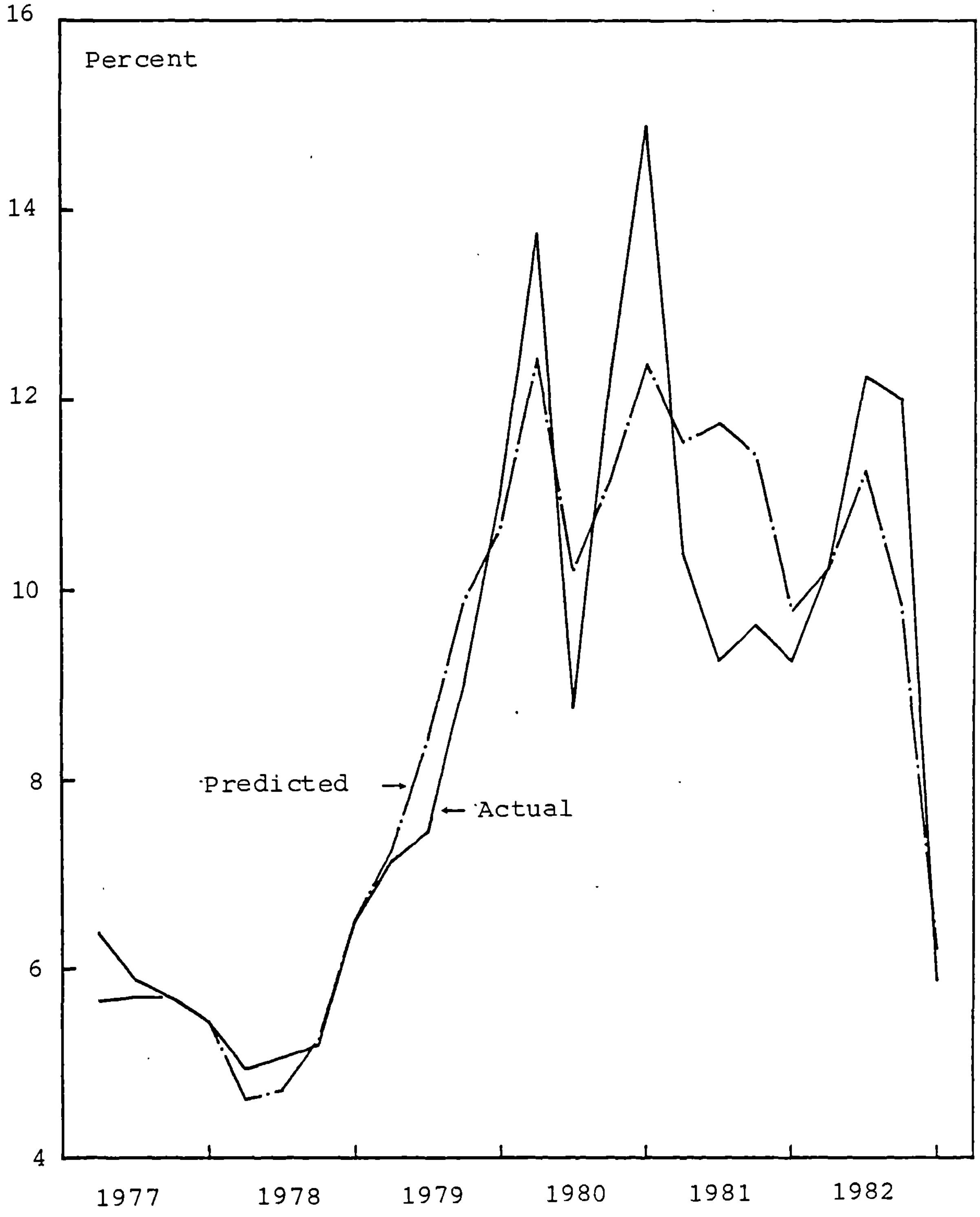


Figure 7.4

Money Stock: Actual and Predicted

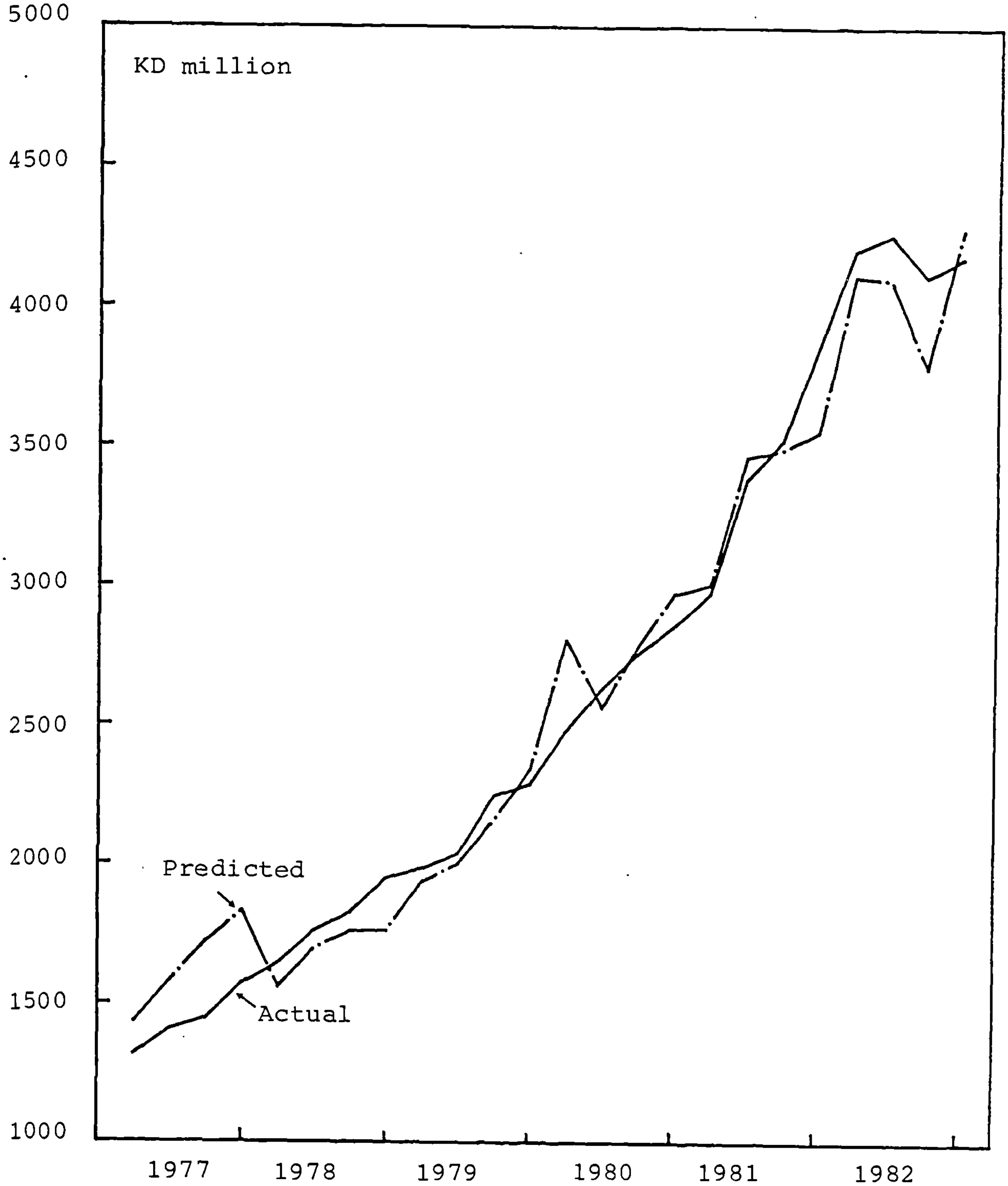


Figure 7.5

Credit to the Private Sector: Actual and Predicted

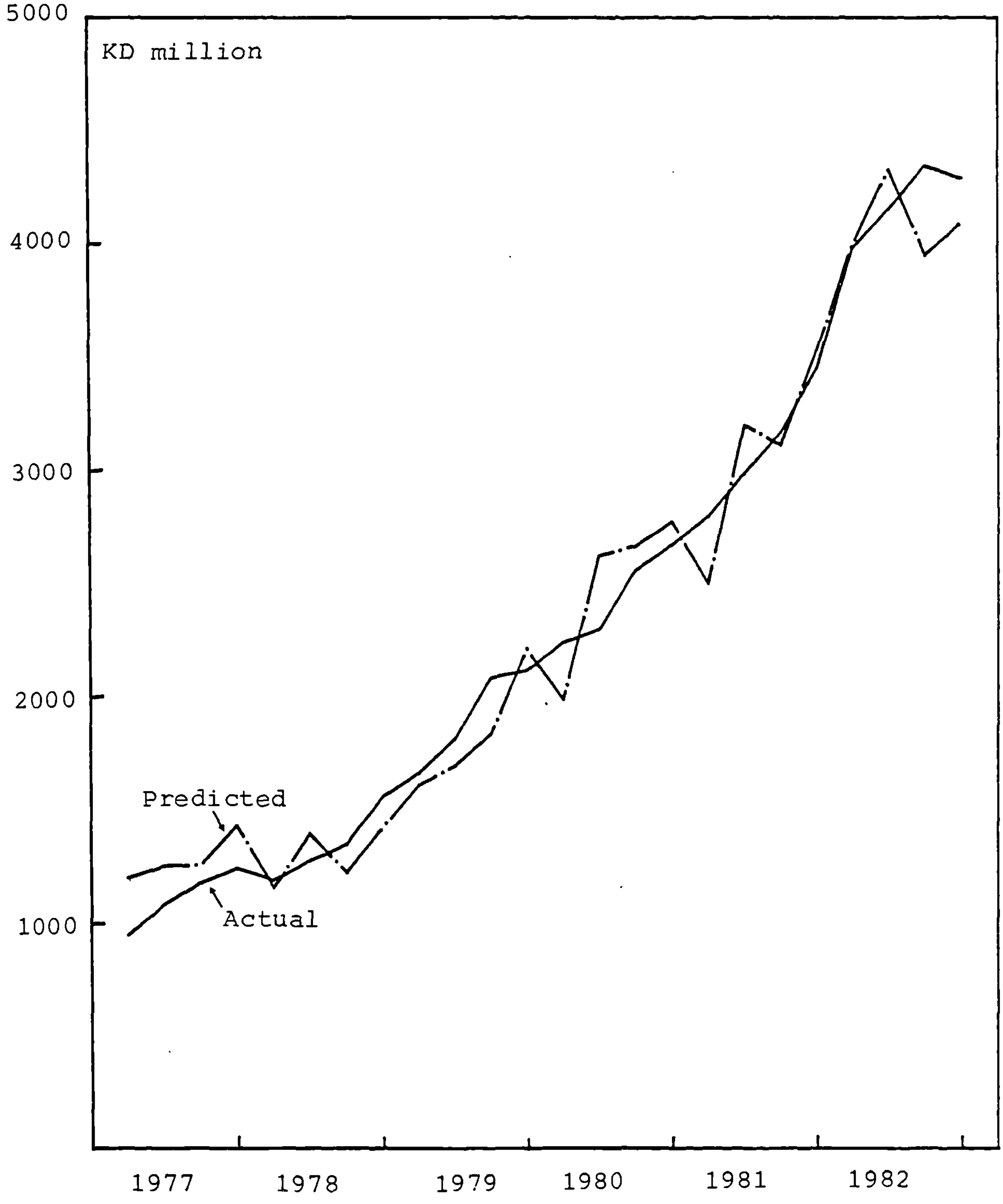


Figure 7.6

Imports: Actual and Predicted

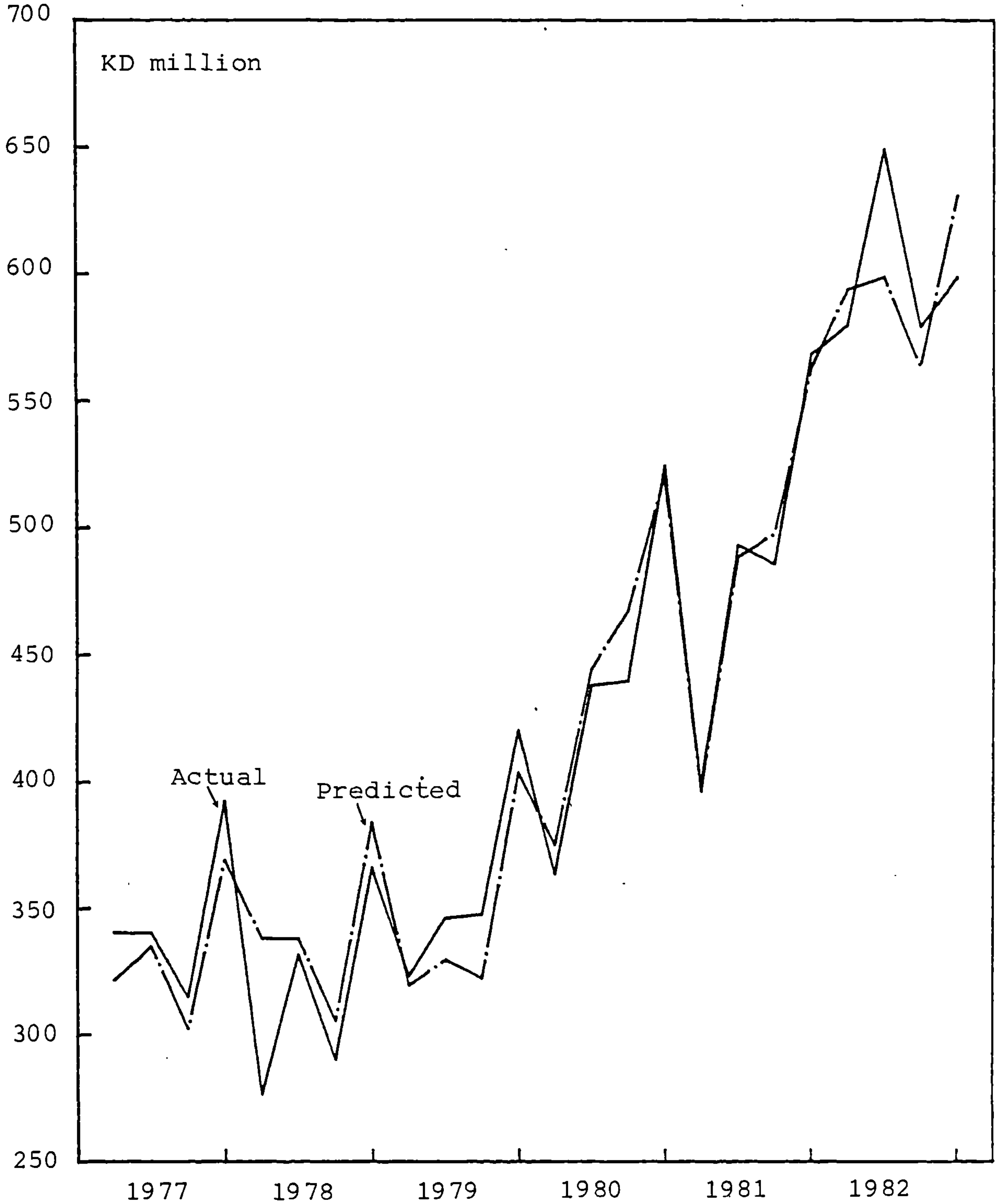


Figure 7.7

Price Level: Prediction-Realisation Diagram

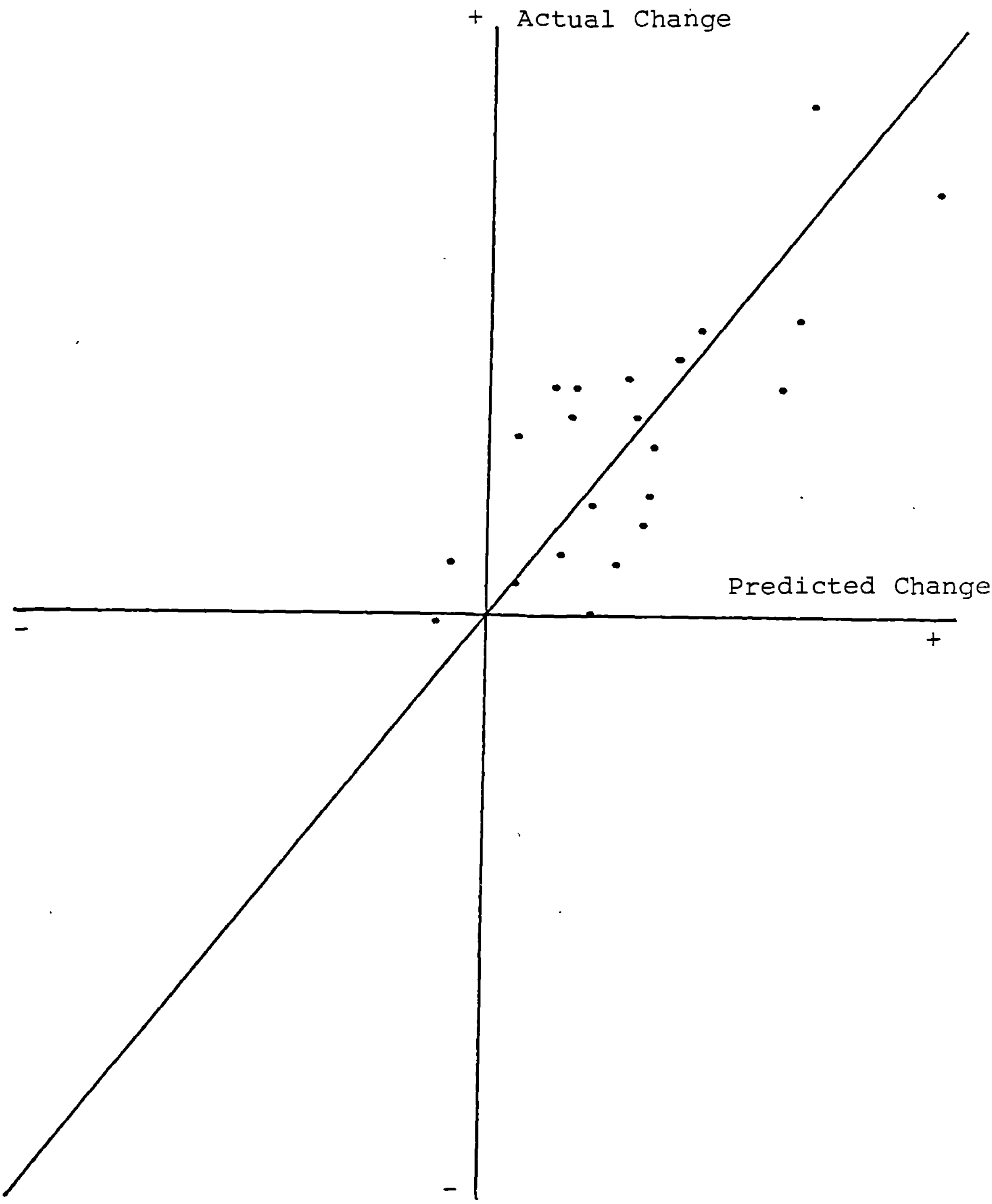


Figure 7.8

Real Output: Prediction-Realisation Diagram

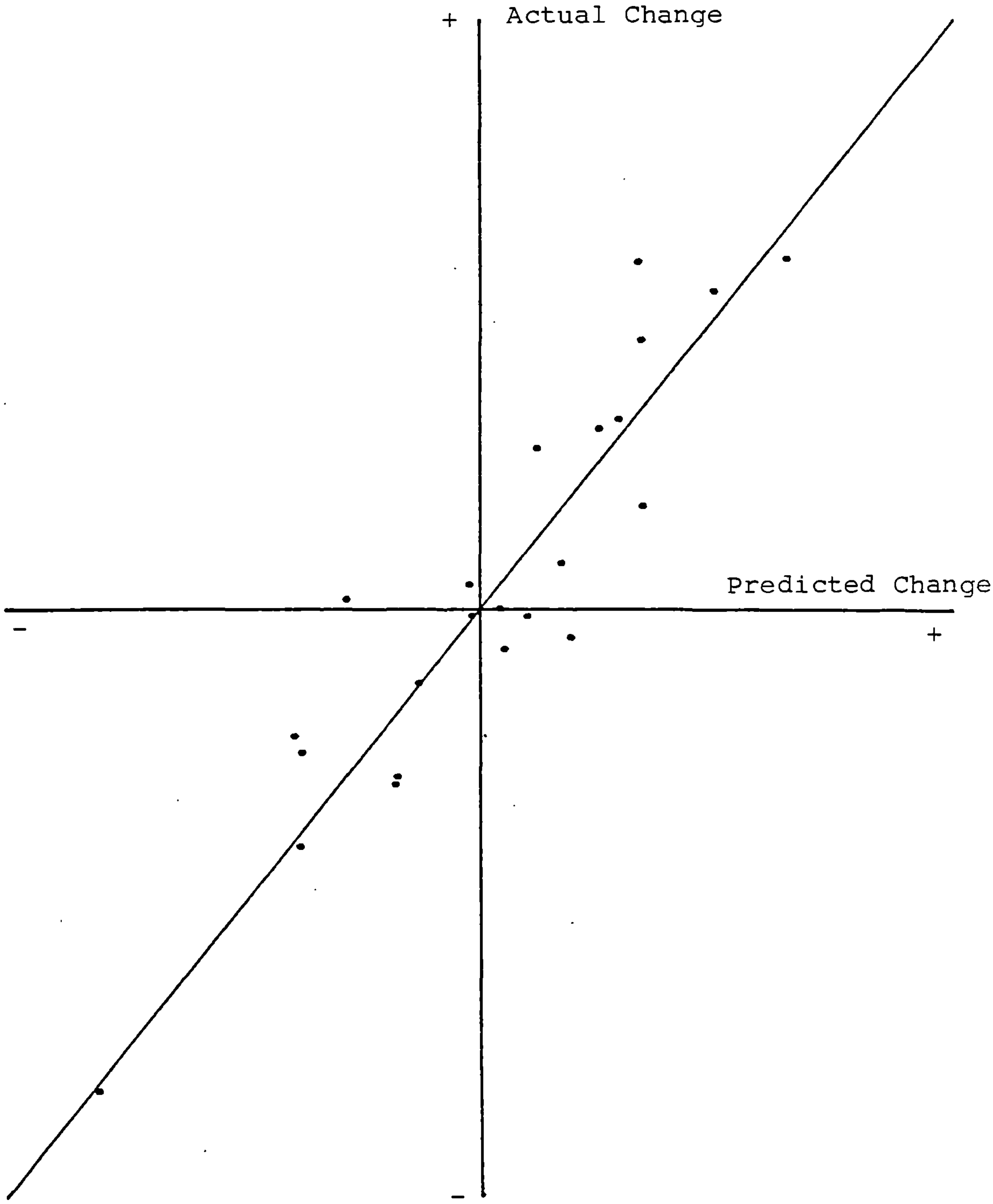


Figure 7.9

Interest Rate: Prediction-Realisation Diagram

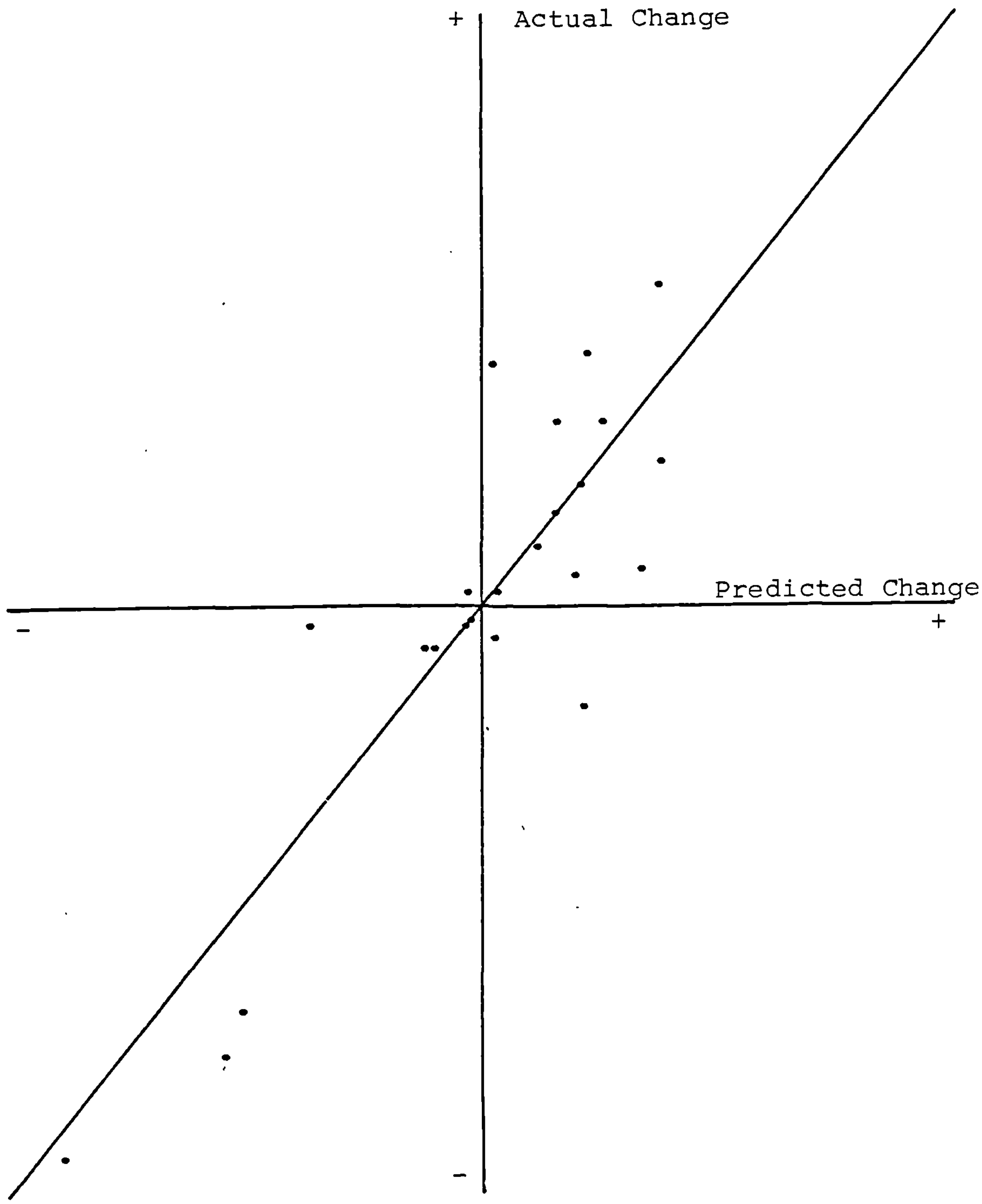


Figure 7.10

Money Stock: Prediction-Realisation Diagram

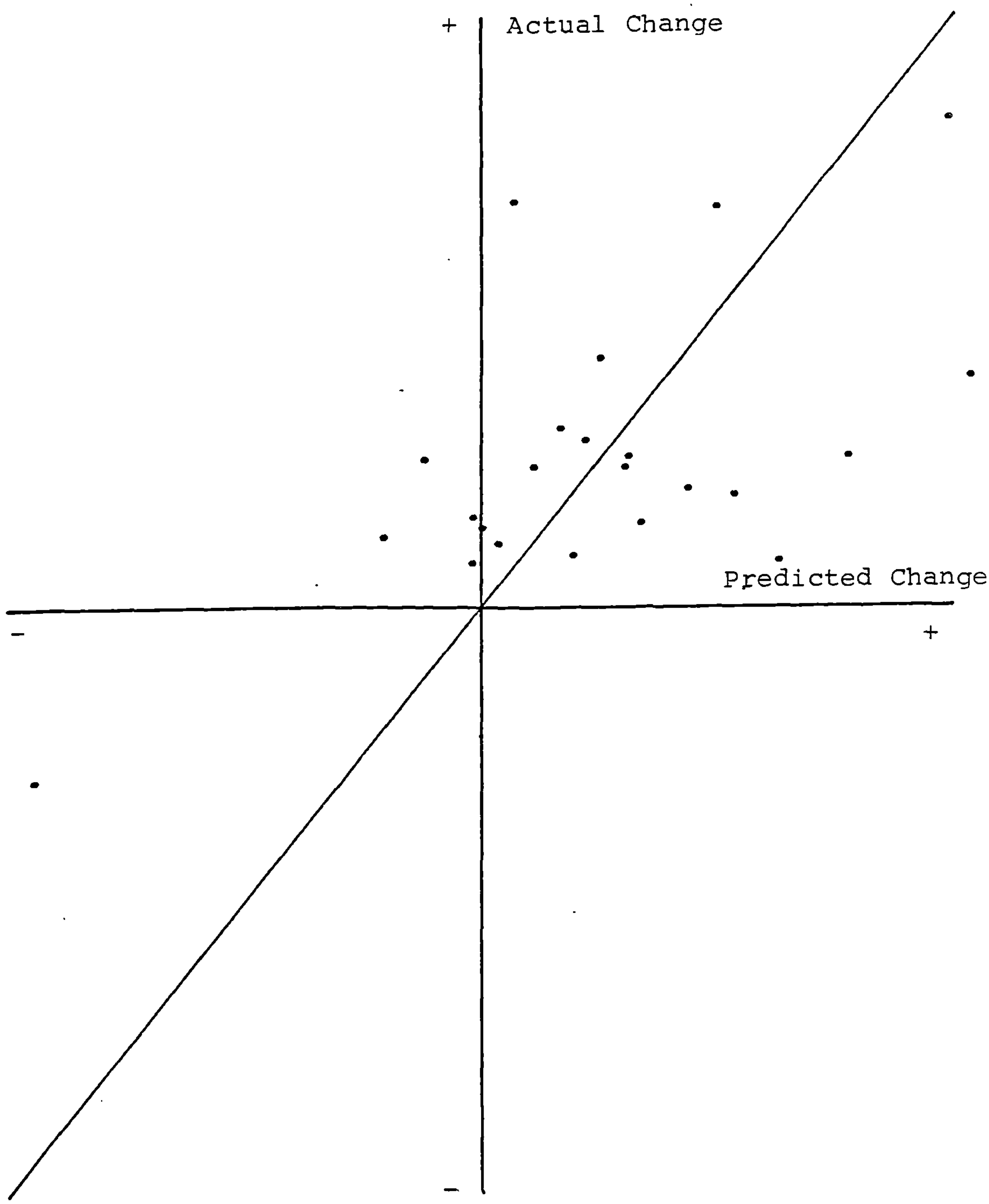


Figure 7.11

Credit to the Private Sector: Prediction-Realisation Diagram

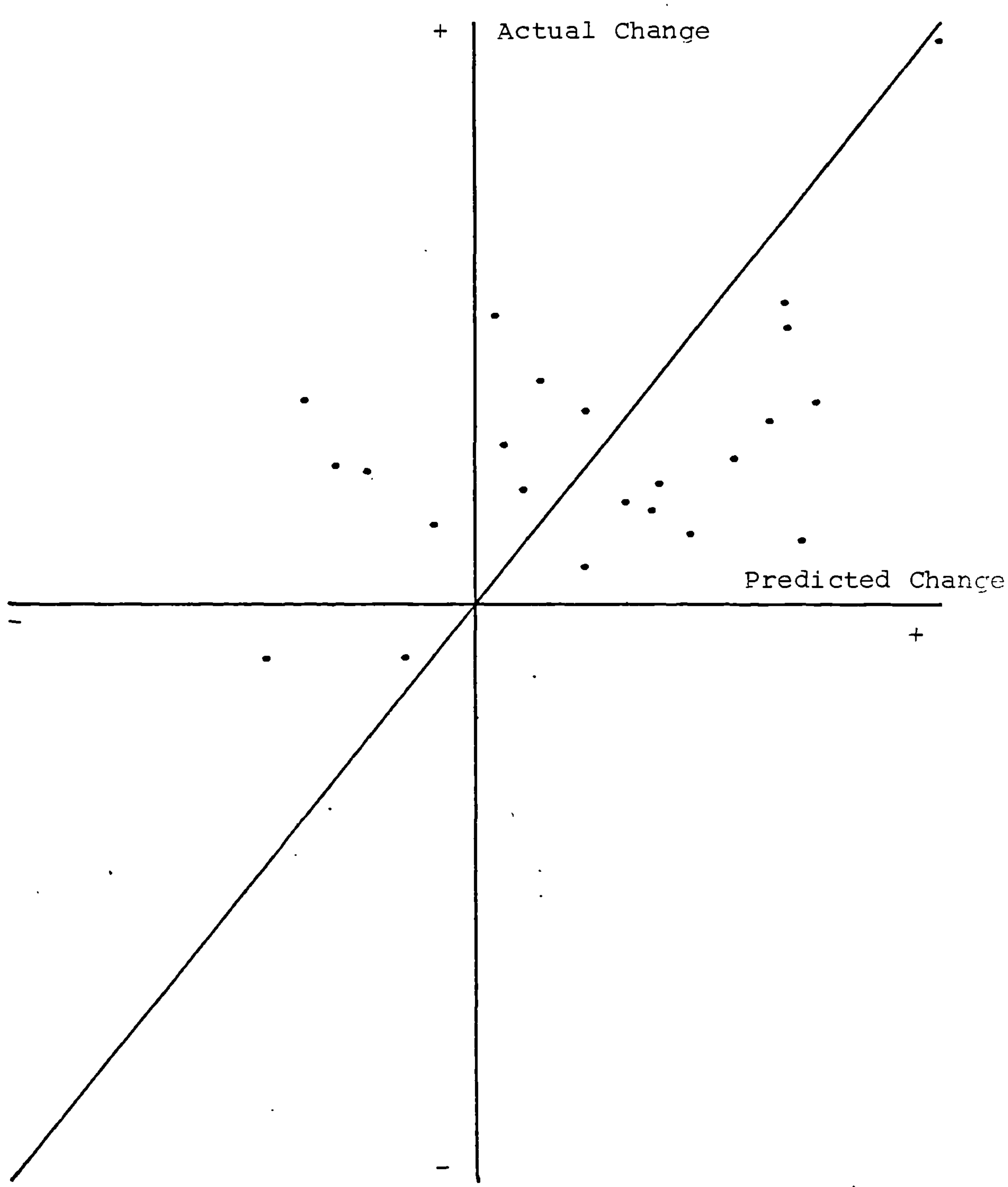
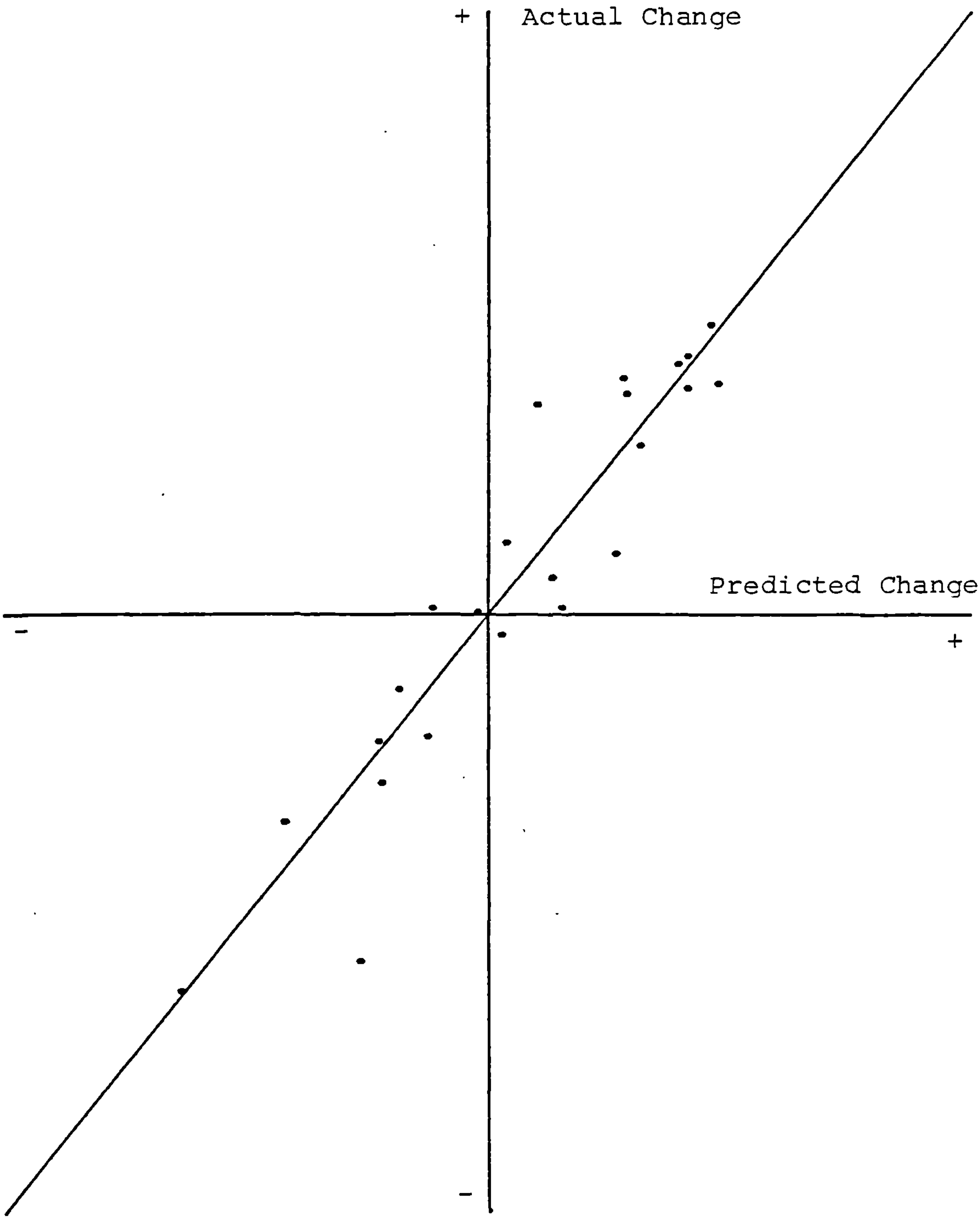


Figure 7.12

Imports: Prediction-Realisation Diagram



However, I tend to suspect the accuracy of the published 1983 CPI figures. These figures imply an annualised inflation rate of 6.5 percent in the first quarter, which declined in the three subsequent quarters to 0.9, 0.4 and 0.3 percent. This is difficult to comprehend as no drastic policy or other changes took place in that period. Out-of-sample predictions for real output and interest rate are good in the particular sense of structural stability. The ratio of out-of-sample mean square error to within-sample mean square error for the two variables is 0.8 and 1 respectively. A value of this ratio close to unity is suggestive of structural stability (see Wold (1964) pp. 229-35).

7.4. Dynamic Stability of the Model

In this section the dynamic stability of the model is examined with respect to the effect of a once and for all exogenous shock. This property is important because if the model is not stable, any economic implications drawn from it would lose their credibility.

Stability testing will be confined to the effect of fiscal and monetary shocks on the price level and real output. Stability requires that the system tends to return to the original equilibrium state that existed before the shock was given. The following shocks will be given to the price level:

(i) 50 percent cut in government expenditure in each quarter of 1976.

(ii) 50 percent reduction in total deposits in the third and fourth quarters of 1976.

And the following shocks will be given to real output:

(iii) The growth rate of government expenditure is left unchanged in the first quarter of 1977 (22.9 percent), but raised in the second quarter from the original 15 percent to 130 percent.

(iv) The growth rate of total deposits is left unchanged in the fourth quarter of 1976 (6.1 percent) but lowered in the first quarter of 1977 from the original 7.7 percent to -28 percent.

The model was simulated over the estimation period using these four changes. The newly-simulated series (after the shock) were compared with the originally-simulated series (base run). For the model to be stable, the ratio of the new series to the original series should tend back to unity after a while.

Figures 7.13-7.16 illustrate the results of this exercise. Figure 7.13 shows that the effect of shock (i) is to reduce the price level in 1977, but the initial equilibrium state is restored after four quarters as the ratio of the two series converges on unity. Figure 7.14 shows that the effect of a two-quarter monetary contraction on the price level is felt in four quarters, then the initial state is restored. Figure 7.15 shows that the effect of shock (iii) is to boost real output since the deviation of actual from trend values of output depends in part on contemporaneous growth rate of government expenditure. Finally, Figure 7.16 shows that the effect of shock (iv) is an initial contraction of real output. In both cases (iii and iv), the initial equilibrium state is restored after two quarters. These results provide evidence on the proposition that the model will eventually return to the original equilibrium with varying degress of speed of adjustment following a shock disturbance. Therefore, the model is stable.

7.5. Properties of Symmetry

Zellner and Peck (1973) have demonstrated that it is important from an economic point of view to examine asymmetric responses of econometric models.

Figure 7.13

Response of Price Level to Fiscal Shock

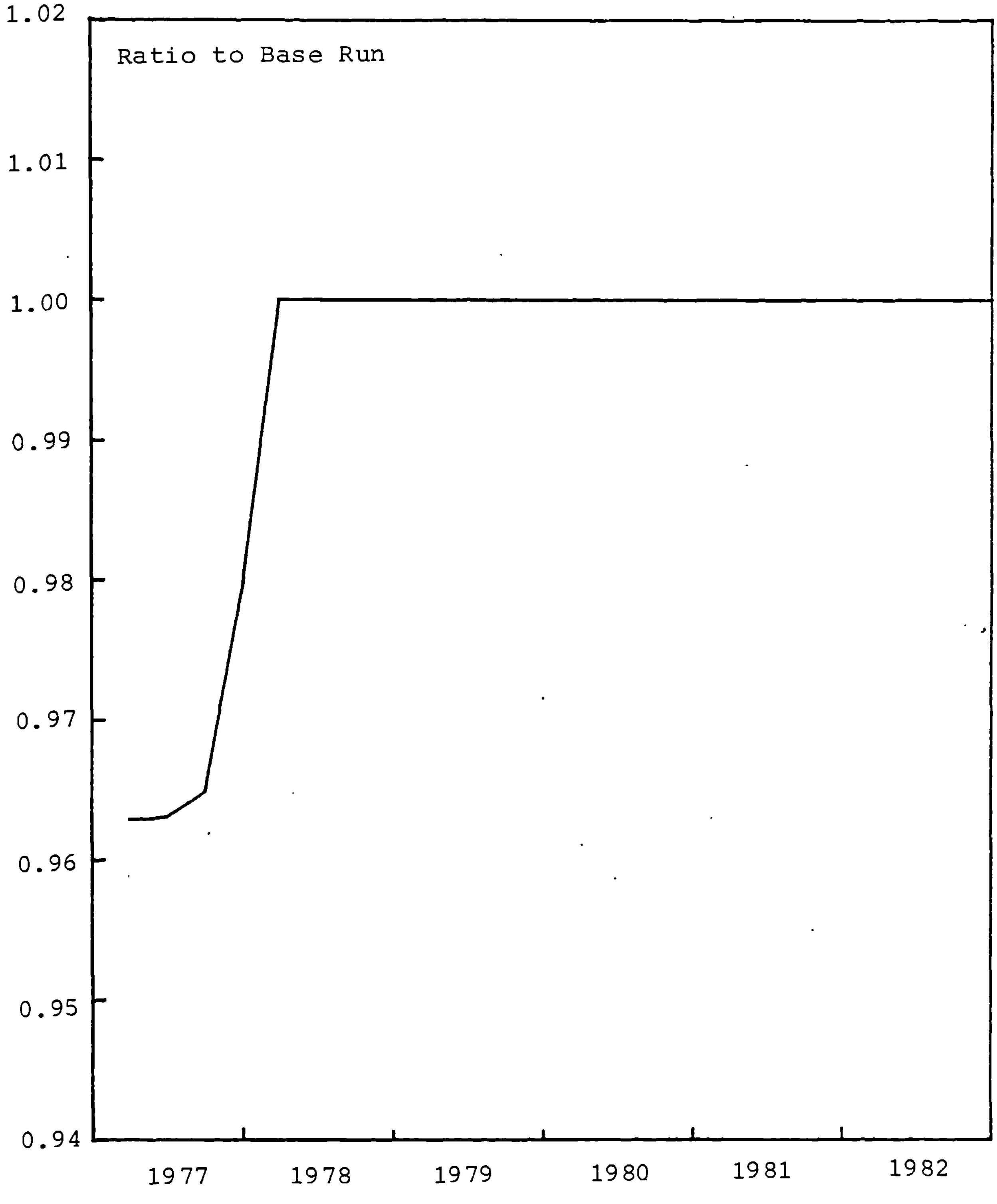


Figure 7.14

Response of Price Level to Monetary Shock

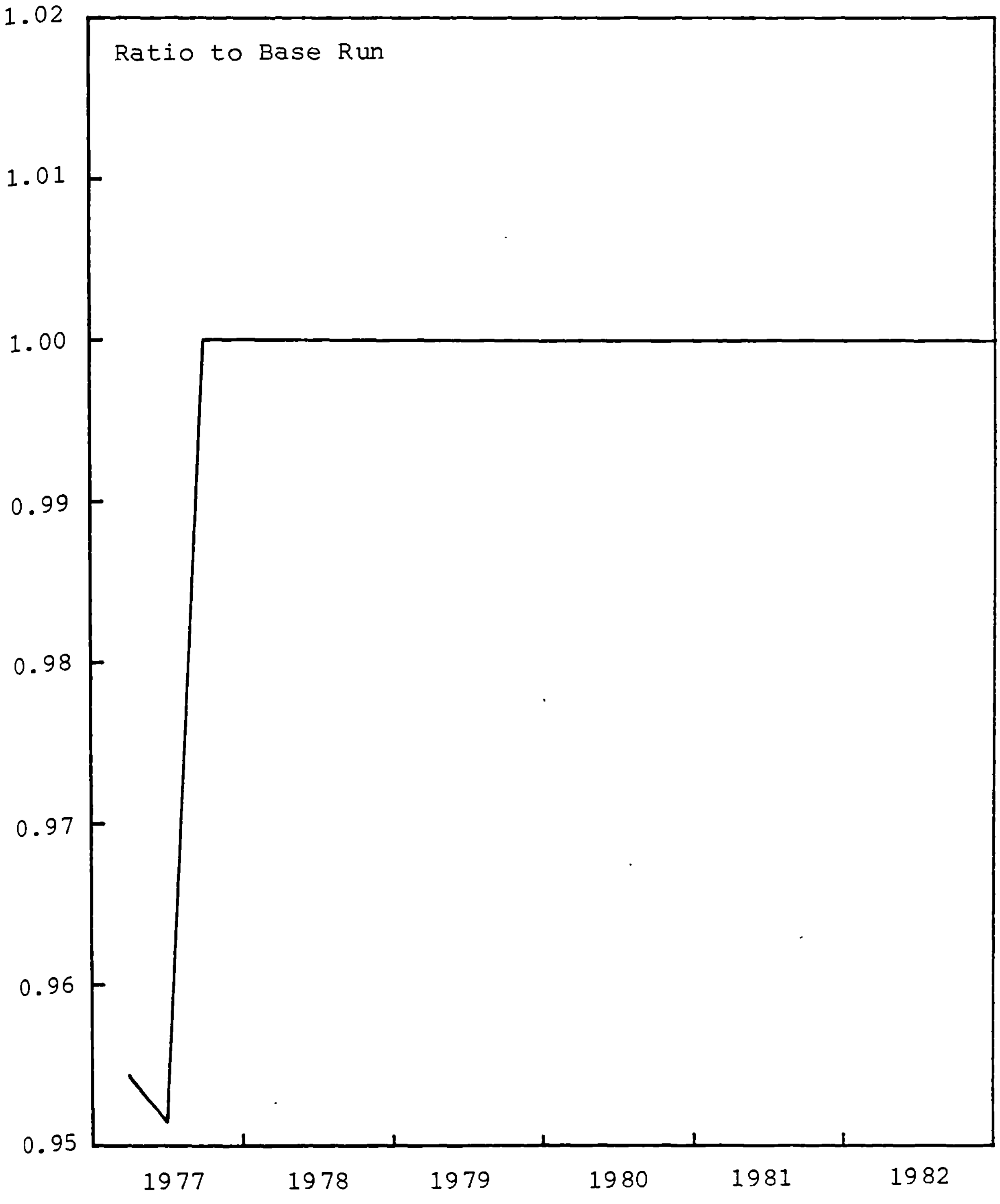


Figure 7.15

Response of Real Output (Yd) to Fiscal Shock

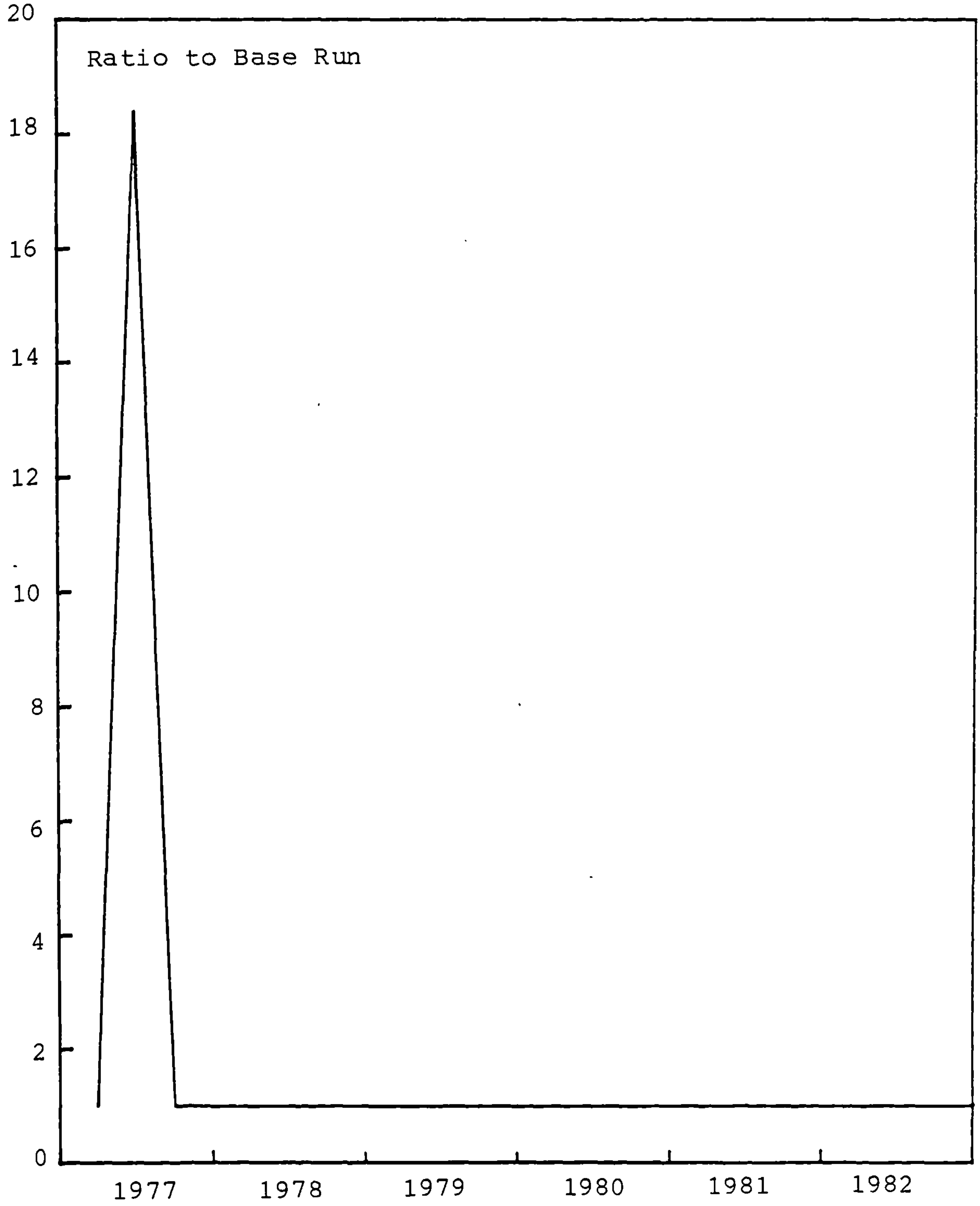
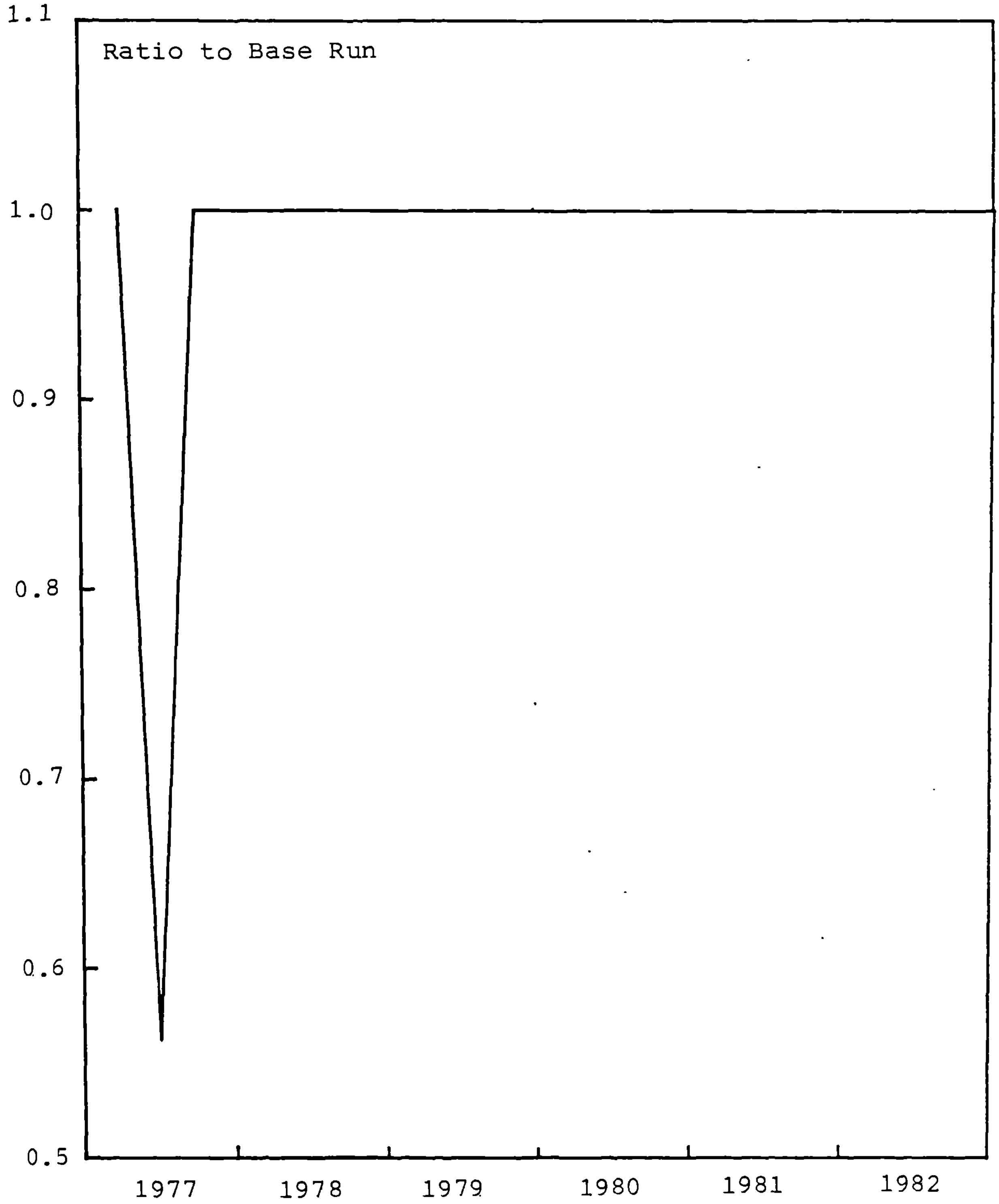


Figure 7.16

Response of Real Output (Yn*) to Monetary Shock



For example, does an x percent increase in government expenditure have the same extent of inflationary impact as an equivalent decrease has a deflationary effect? The following analysis is confined to two endogenous variables: price level and real output. Similar tests can, of course, be carried out for other endogenous variables.

The experimental design is as follows. First, the estimated price and output equations are simulated over the period 1977(1) to 1982(4) using the historically observed values. Second, the output of this "base run" is compared with the output of other runs in which certain exogenous and policy variables are changed from their observed values. Specifically, the following changes are introduced:

(i) 20 percent change in import prices

(ii) 20 percent change in total deposits

(iii) 20 percent change in government expenditure

(iv) 20 percent change in the growth rate of total deposits

(v) 20 percent change in the growth rate of government expenditure

In particular, the results are related to the symmetry of the response of price level to changes (i),(ii) and (iii), and the symmetry of the response of real output to changes (iv) and (v).

The results of experiments are shown in Figures 7.17 and 7.18. We can see that the price and output responses to fiscal and monetary changes are remarkably symmetric, and so is the case with the response of price level to import prices. Figure 7.17 shows that upward and downward deviations of the price level from the base run values are identical in magnitude, which is represented graphically by the fact that the curves in the upper half of the diagram are mirror images of those in the lower half. The same is true for the response of output as shown in Figure 7.18.

In addition to this visual examination, Table 7.4 presents some numerical measures of symmetry. The measure AD is the average deviation of the endogenous variable from the base run value, such that equal absolute values indicate high degree of symmetry. The measure SM is the ratio of absolute deviations on the plus and minus sides, such that values close to unity indicate a high degree of symmetry. Obviously, results presented in the table substantiate results of the visual inspection of Figures 7.17 and 7.18.

Table 7.4: Numerical Measures of Symmetry

Change in	Price Level		Real Output	
	AD	SM	AD	SM
G	+2.5371	0.999	+40.6150	0.999
	-2.5392		-40.6188	
TD	+3.8017	0.999	+113.2850	0.999
	-3.8038		-113.2888	
Pm	+4.5896	0.999		
	-4.5917			

It must be mentioned that symmetry, in this case, is due to the fact that the price and output equations are already in the reduced form, in the sense that there are no endogenous variables on the right hand side. In testing their model of the Korean economy, Otani and Park (1976) found some asymmetric responses (for example net foreign assets to changes in interest rate), which they attributed to the fact that some of the endogenous variables are affected

Figure 7.17

Symmetry of Price Level Response to Exogenous Changes

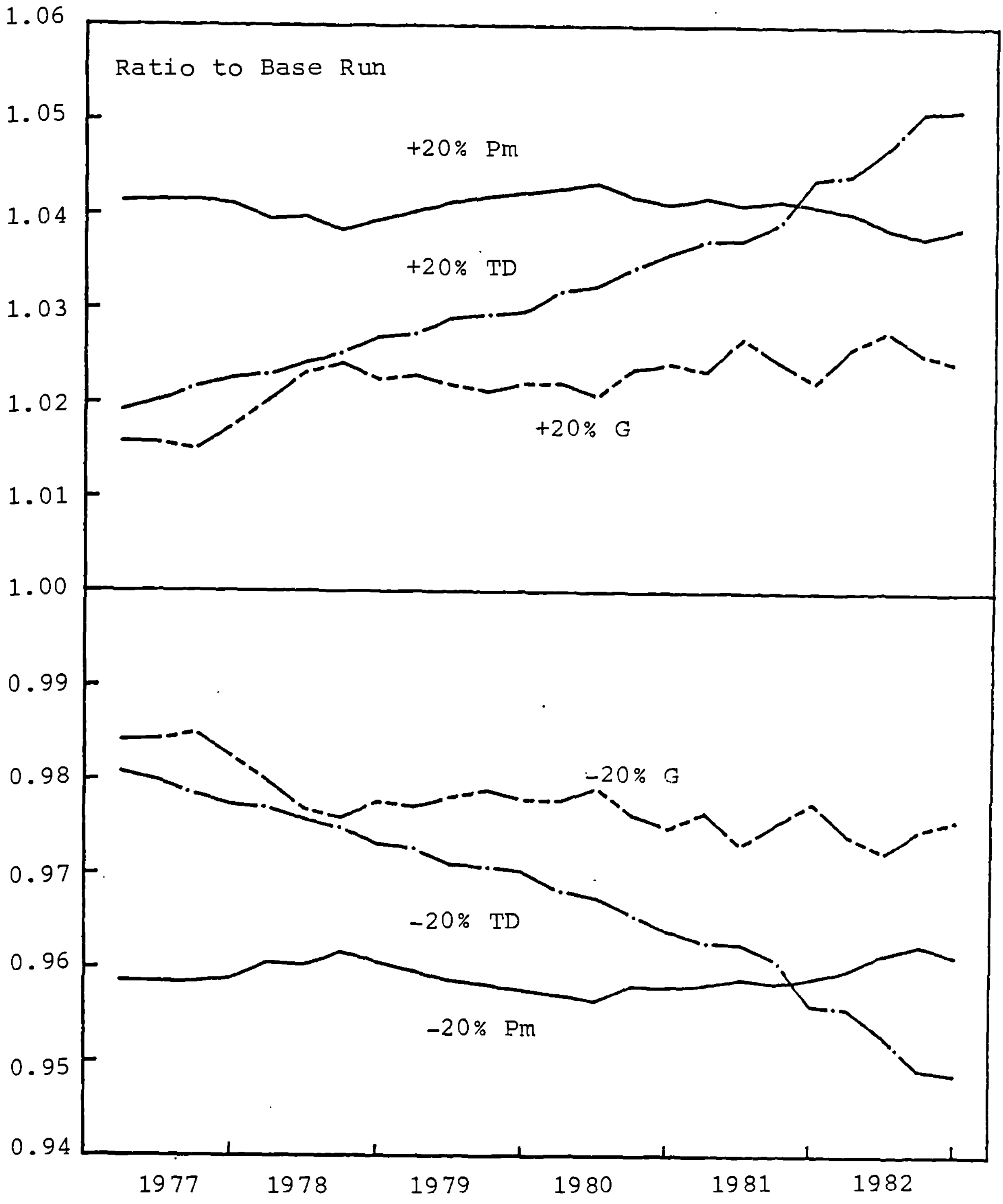
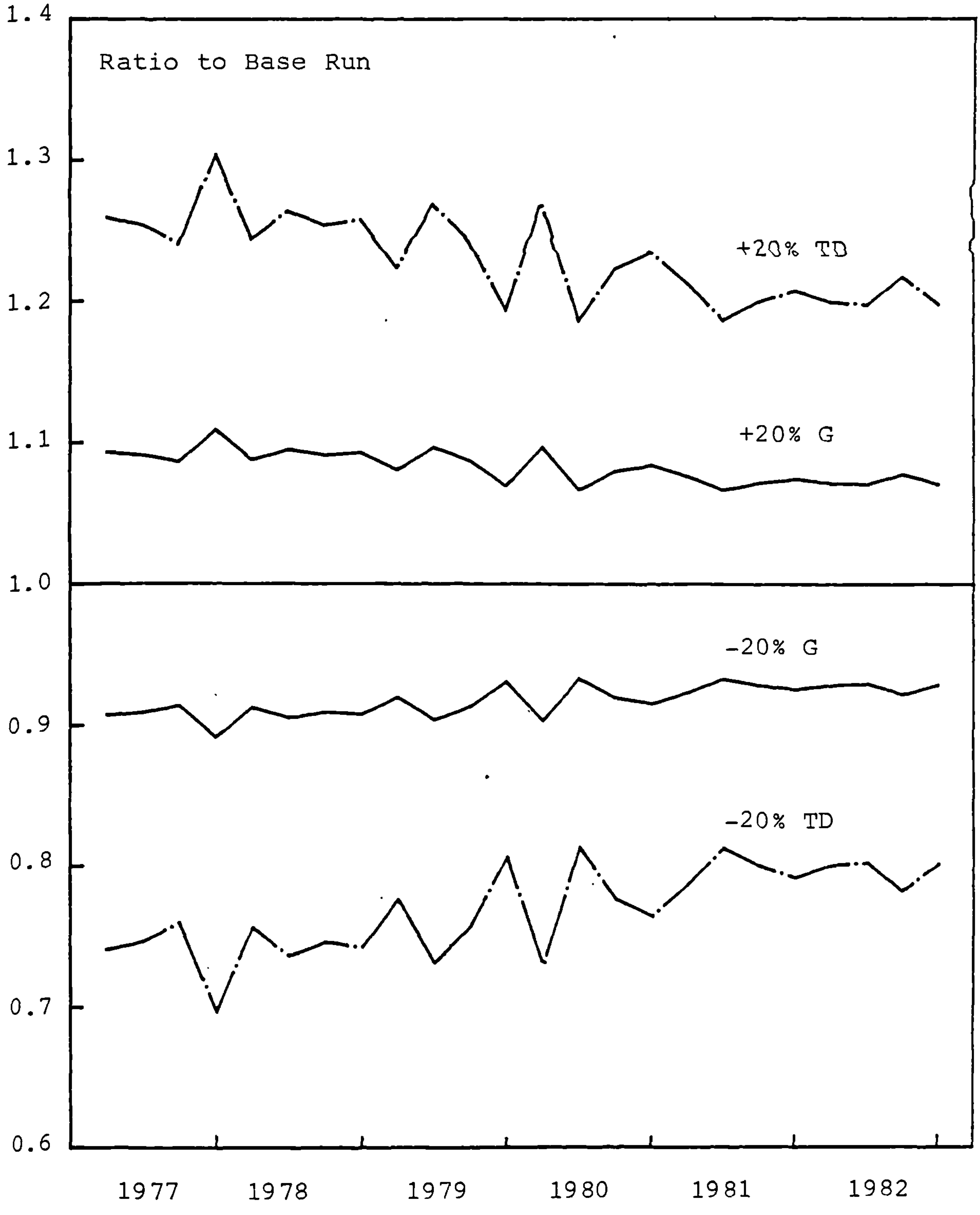


Figure 7.18

Symmetry of Real Output Response to Exogenous Changes



not only directly, by the exogenous variable in question, but also indirectly, by other endogenous variables.

7.6. Dynamic Elasticities

Dynamic elasticities indicate how the demand for goods (in this case money) changes over time, in response to a change in one of the explanatory variables. In Chapter 6, the interest and income elasticities of the demand for demand deposits and quasi-money were calculated without explicitly recognising that the value of the elasticity depends on how much time is allowed to elapse after the interest rate or income has changed. Because of the time factor, it is much more meaningful to look at dynamic elasticities.

The dynamic interest elasticity after time s is defined as

$$E_r(s) = \frac{r_t}{M_t} \cdot \frac{M_{t+s} - M_t}{\Delta r_t}$$

where

r_t = interest rate at time t

M_t = demand for money at time t

Δr_t = change in interest rate occurring at time t

$M_{t+s} - M_t$ = change in the demand for money after a time interval s has elapsed

Similarly, the dynamic income elasticity Ey is defined as

$$Ey(s) = \frac{y_t}{M_t} \cdot \frac{M_{t+s} - M_t}{\Delta y_t}$$

Figure 7.19 shows the behaviour of the dynamic interest elasticity of demand

Figure 7.19

Dynamic Interest Elasticity

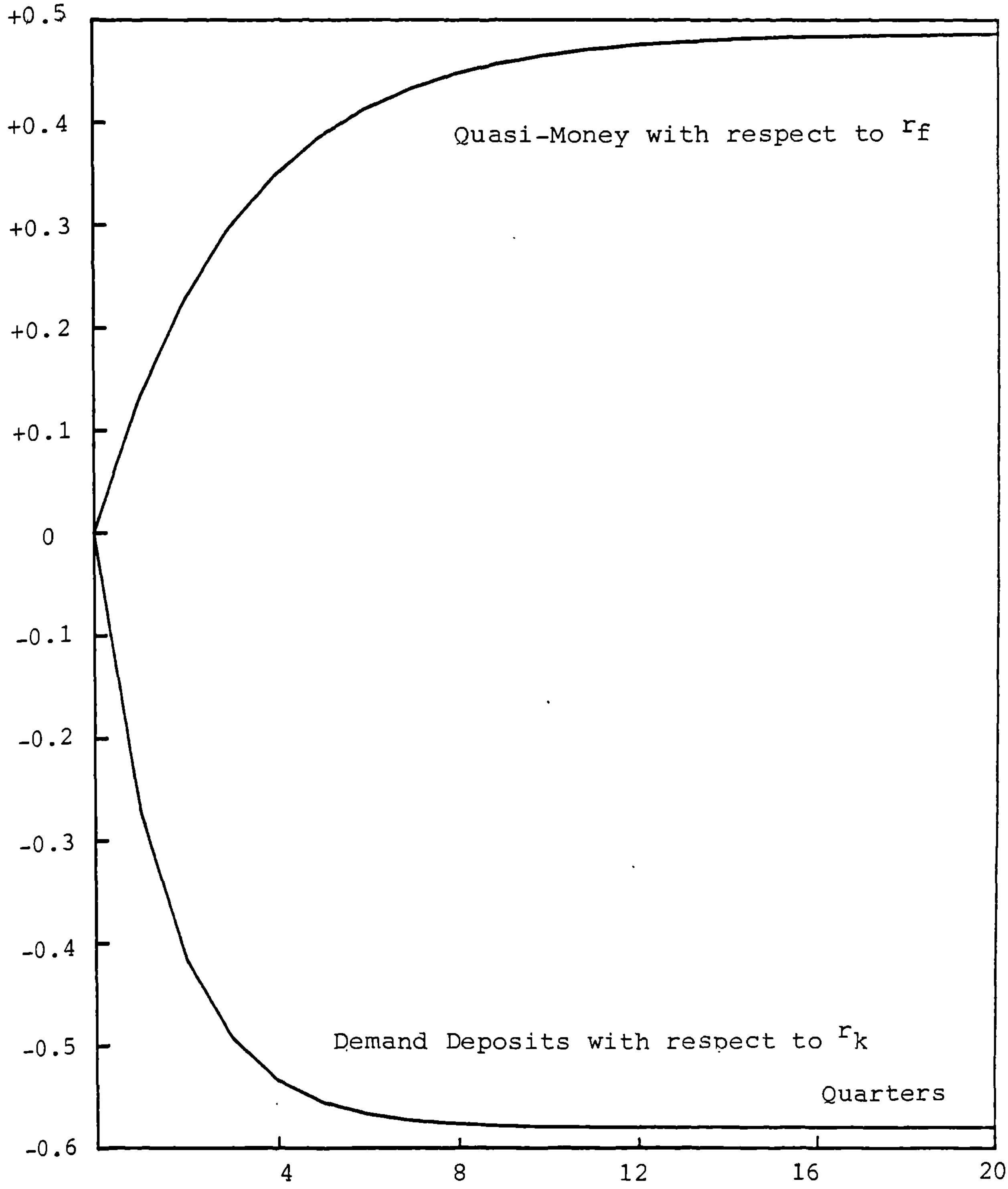
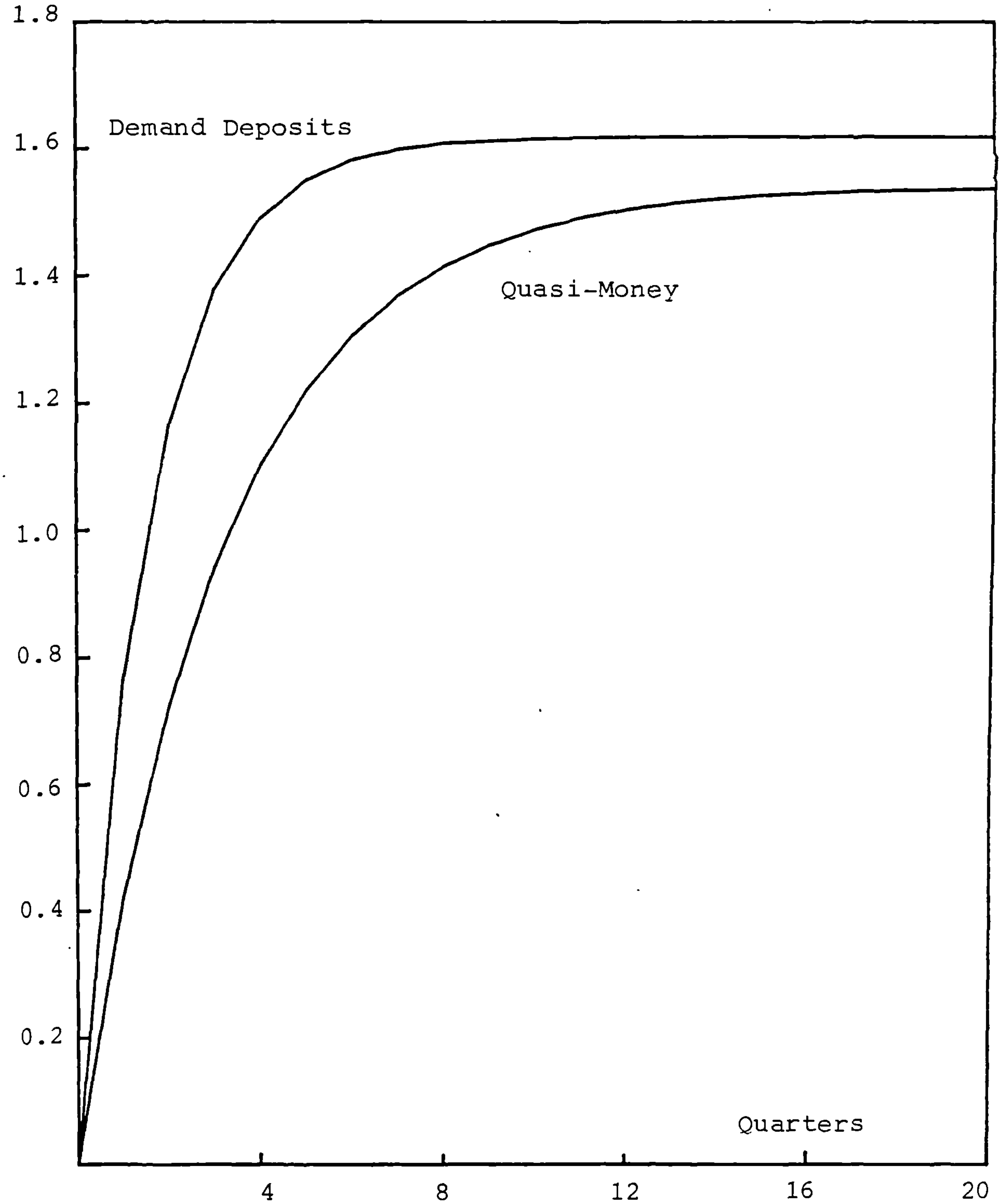


Figure 7.20

Dynamic Income (Yp) Elasticity



deposits (with respect to ^{r}k), and quasi-money (with respect to ^{r}f), as derived from the model. In the case of the former, the elasticity increases rapidly (in absolute value) with time, then approaches the asymptotic value of -0.58. Similarly, the dynamic interest elasticity of the demand for quasi-money increases rapidly at first, then approaches the asymptotic value of 0.49, although it takes a longer time period to approach this value than in the case of demand deposits. This difference is due to the unequal speeds of adjustment as reflected in the coefficient of lagged dependent variables in the two demand equations.

Figure 7.20 shows the dynamic elasticities with respect to (permanent) income of demand deposits and quasi-money. Both increase rapidly at first, then approach the asymptotic values of 1.62 and 1.54 respectively. It is noteworthy that all of the asymptotic values are higher than the short-run and long-run elasticities which were calculated at the means and presented in Chapter 6.

7.7. Stochastic Simulations

So far attention has been focused on the deterministic solution and simulation of the model. In all of the simulation exercises, deterministic values have been assumed for the estimated coefficients and zero error terms. In the case of stochastic simulations these two assumptions are discarded, and a probability distribution is specified for the error term and estimated coefficients of each equation of the model. Using these probability distributions, a large number of simulations can be performed, such that the error term and estimated coefficients assume different values chosen from their respective probability distributions. Thus, for each endogenous variable, a set of predictions equal to the number of performed simulations is obtained, and can be subsequently used to define a confidence interval.

The appropriate probability distribution for the error terms and estimated coefficients can be obtained by making the following assumptions:

(i) Error terms are normally distributed with zero mean and standard deviation equal to the standard error of the regression.

(ii) The estimated coefficients of each equation follow a joint normal distribution, where the mean of each coefficient is given by its estimated value, the standard deviation of each coefficient is given by its estimated standard error, and the covariances between coefficients are given by the estimated covariance matrix. Furthermore, it is reasonable to assume that the covariances between ceofficients are zero, although this results in overestimating the prediction error (Pindyck and Rubinfeld (1976) p. 362).

The procedure can be explained by referring to the price equation, which is rewritten as follows

$$P = (58.2 + v_1) + (0.012 + v_2)\ G_{t-3} + (0.016 + v_3)\ G_{t-4} + (0.0088 + v_4)\ TD_{t-2} + (0.177 + v_5)\ Pm + u_1$$

Thus, the random variables $v_1, \ldots\ldots, v_5$ and u_1 are normally distributed with means and standard deviations as shown in Table 7.5.

Table 7.5: Probability Distributions of Random Variables (Price Equation)

Random Variable	Mean	Standard Deviation
v_1	0	3.71629
v_2	0	0.00343
v_3	0	0.00348
v_4	0	0.00071
v_5	0	0.03410
u_1	0	1.02632

Now, suppose that we would like to obtain a stochastic one-period-ahead forecast of the price level, say for the first quarter of 1983. We do this by performing a large number of simulations. In each simulation we select, at random, a value from a normal distribution with mean zero and standard deviation 3.72 and repeat the procedure for the rest of the random variables $v_2, \ldots, u_1$. Thus, we obtain a set of predicted values for which we can calculate the mean and standard deviation to determine a confidence interval. To forecast over a time horizon longer than one period, we select a different random value for u_1 for each period, but use the same random value for $v_1, \ldots, v_5$ during the whole simulation because the equations of the model were specified and estimated under the assumption that the coefficients are constant over time (Pindyck and Rubinfeld (1976) p. 363). Two further important points should be clarified:

(i) In the case of linear models, as the number of simulations increases, the sample mean will approach the deterministic forecast.

(ii) To conduct ex-ante stochastic simulations, the exogenous variables are treated as normally distributed random variables with means equal to their predicted values, and standard deviations equal to their standard errors of prediction.

This methodology can be used to simulate six endogenous variables (price level, real output, interest rate, money stock, credit, and imports) over four periods, beginning with the first quarter of 1983 and ending with the last quarter of that year. The simulations are conducted using the actual values of the exogenous variables.

The results of a sample of 20 simulations are shown in Figures 7.21-7.26 where each simulation is represented by a different path for the endogenous variable that resulted from different random errors. The starting point is the actual value of the endogenous variable at the fourth quarter of 1982. It is obvious that there is considerable dispersion in the simulated values, this is partly due to the fact that the covariances between the coefficients of each equation are not accounted for. This procedure tends to overestimate the prediction error because negative covariances cancel part of the variance in each coefficient. However, this procedure is followed because of the difficulty of generating random numbers from joint probability distributions. Another reason for the dispersion is that random numbers were generated from a 99 percent confidence interval, i.e. three standard deviations above and below the mean (see computer program listing in Appendix 7.1). Dispersion would have been less considerable if the random numbers were generated from a 95 percent confidence interval, i.e. two standard deviations above and below the mean. With reference to the computer program listed in Appendix 7.1, this can be done by changing statements 100-140 inclusive and statement 180. For example, the number 11.15 (three standard deviations of the constant term in the price equation) should be changed to 7.45 (two standard deviations) and so on. In fact if the program is re-run using a 95 percent confidence interval, dispersion -as measured by the standard deviation of the simulated values of the price level- will be reduced drastically. For example, the standard deviation for the first quarter will fall from 14.2 to 7.9.

It is a property of linear models that as the number of stochastic simulations becomes large, their mean will approach the deterministic simulation. In practice the choice of how many simulations to perform depends partly on computation cost. In the present case, the mean of 20 stochastic simulations turned out to be close to the deterministic simulations as calculated in section 7.3. Table 7.6 shows the values of deterministic and mean stochastic (in parentheses) simulations for four endogenous variables over the period 1983(1) - 1981(4).

Table 7.6: Comparison of Deterministic and Stochastic Simulations

Variable	1983(1)	1983(2)	1983(3)	1983(4)
Price Level	132.8	132.1	132.1	134.5
	(131.3)	(131.1)	(130.3)	(133.5)
Real Output	587.5	580.6	554.6	597.5
	(600.6)	(594.8)	(573.4)	(611.0)
Interest Rate	4.81	6.61	7.47	8.46
	(5.40)	(7.00)	(7.90)	(8.80)
Money Stock	3700.7	3643.4	3651.9	4270.8
	(3635.0)	(3580.9)	(3581.4)	(4225.2)
Credit	4017.2	4138.0	3753.0	3863.9
	(3967.2)	(4084.9)	(3718.2)	(3792.3)
Imports	508.9	490.4	446.8	516.0
	(492.3)	(474.5)	(428.4)	(498.0)

7.8. Conclusion

Chapters 6 and 7 have been devoted to the task of formulating, estimating and validating a quarterly econometric model of Kuwait's monetary sector. It must be stressed here that the exercises conducted in this chapter on the basis of the model are not all that can be done. The model seems sufficiently robust to be useful for policy analysis, and virtually unlimited number of policy and other simulations can be performed using the relationships that comprise the model. However, this model is by no means the only one that can be built, and its empirical performance leaves some room for improvement. Thus, it opens up a potentially fruitful line for further research, and creates some sort of standard against which any future empirical work on the Kuwaiti economy can be evaluated.

Once again, it must be emphasised that building an econometric model to capture the structure of an economy or a sector is not an easy task. No matter how large or complex a model may be, it is still very simple compared with reality, and one can only strive to achieve a close approximation to the real world. As Franco Modigliani distinctly puts it, "the problem is not that econometric models fail to capture the real world, but that the real world is difficult for policy makers to control."*

* This statement was made in a general discussion during a 1978 conference organised by the Federal Reserve Bank of Boston on "Persistence of High Inflation and High Unemployment." Modigliani's position is also supported by Richard Lipsey (1981). See also Lang (1983) for a simplified but a very interesting discussion of the issue.

Figure 7.21

Price Level: Stochastic Simulations

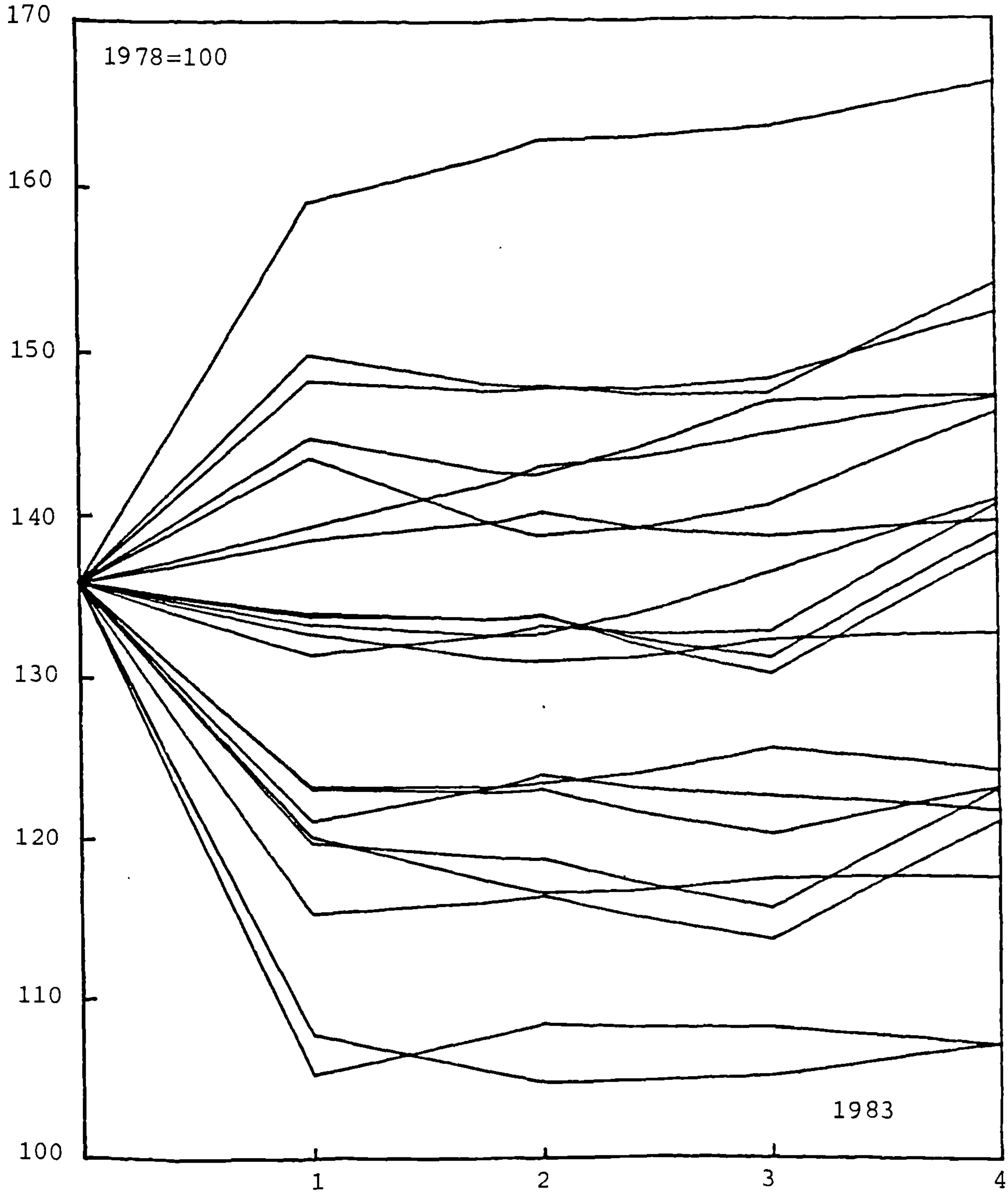


Figure 7.22

Real Output: Stochastic Simulations

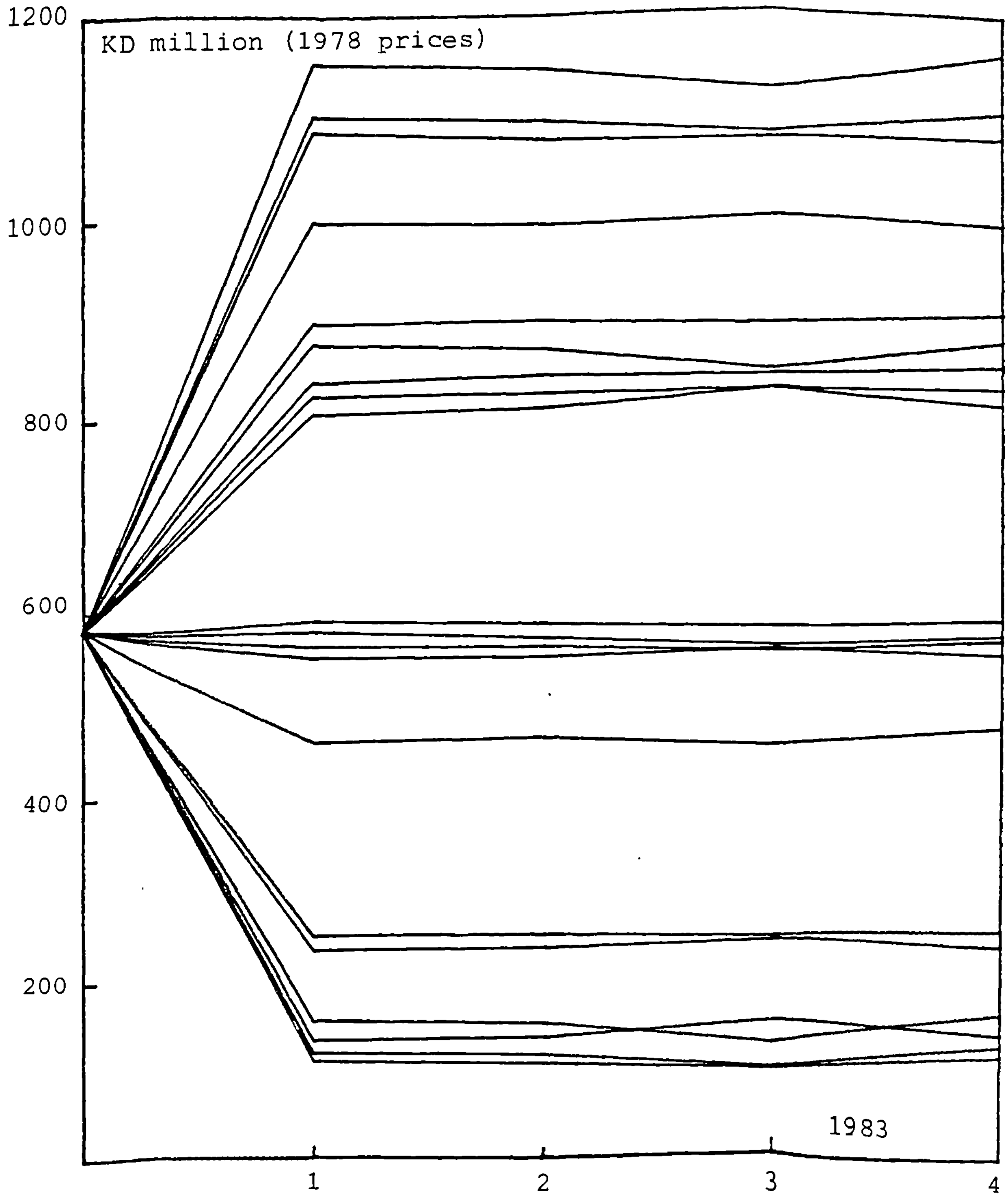


Figure 7.23

Interest Rate: Stochastic Simulations

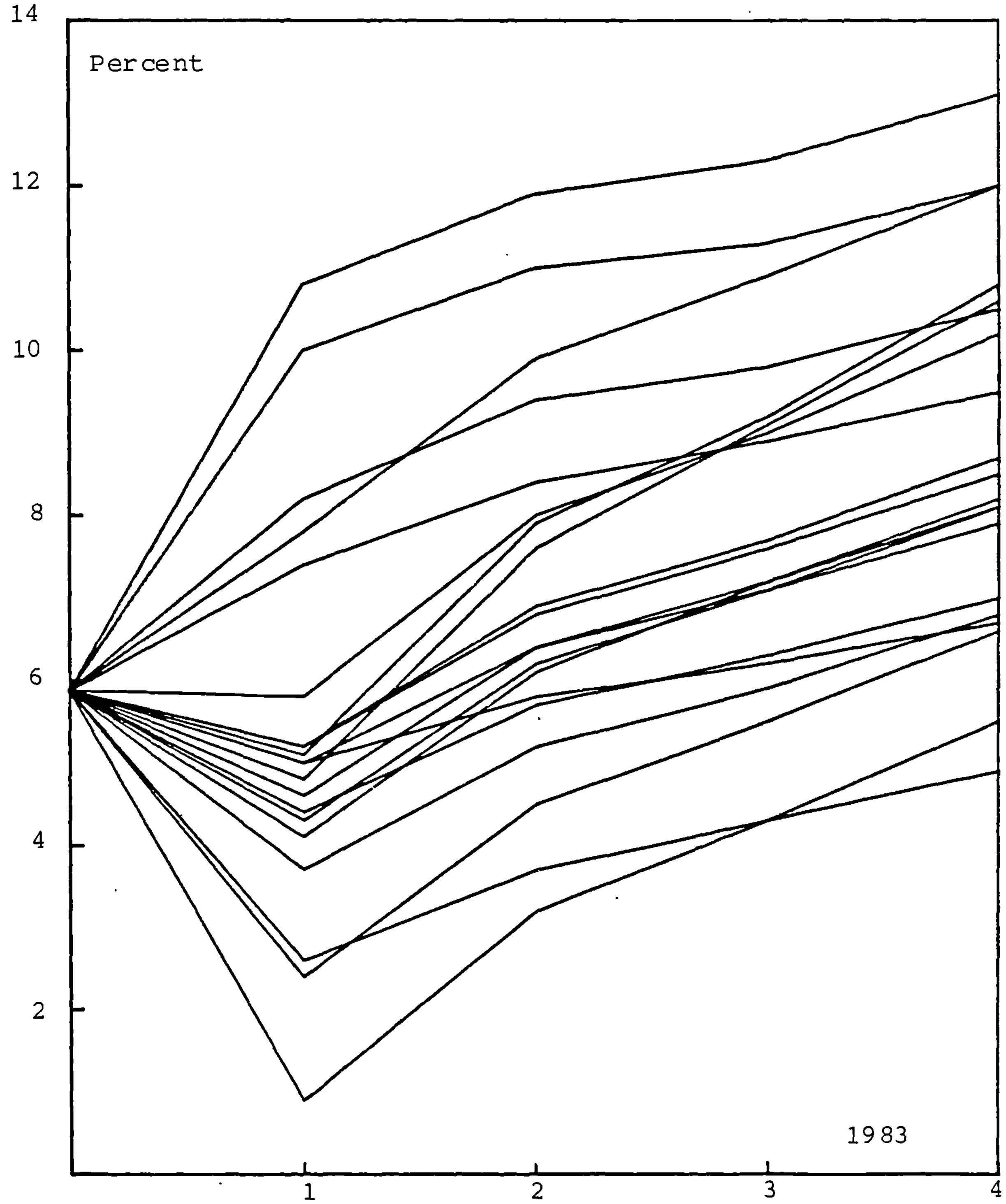


Figure 7.24

Money Stock: Stochastic Simulations

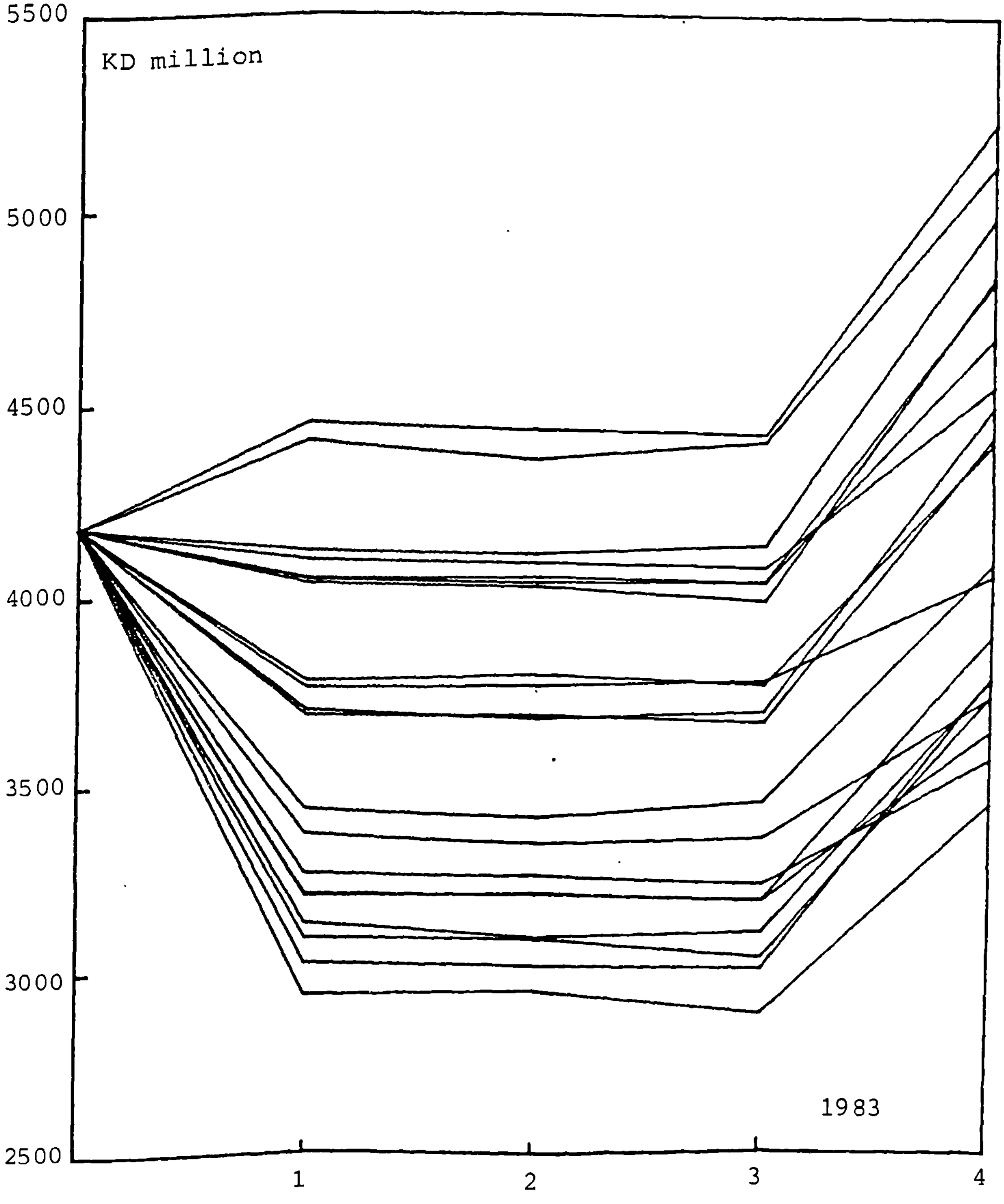


Figure 7.25

Credit: Stochastic Simulations

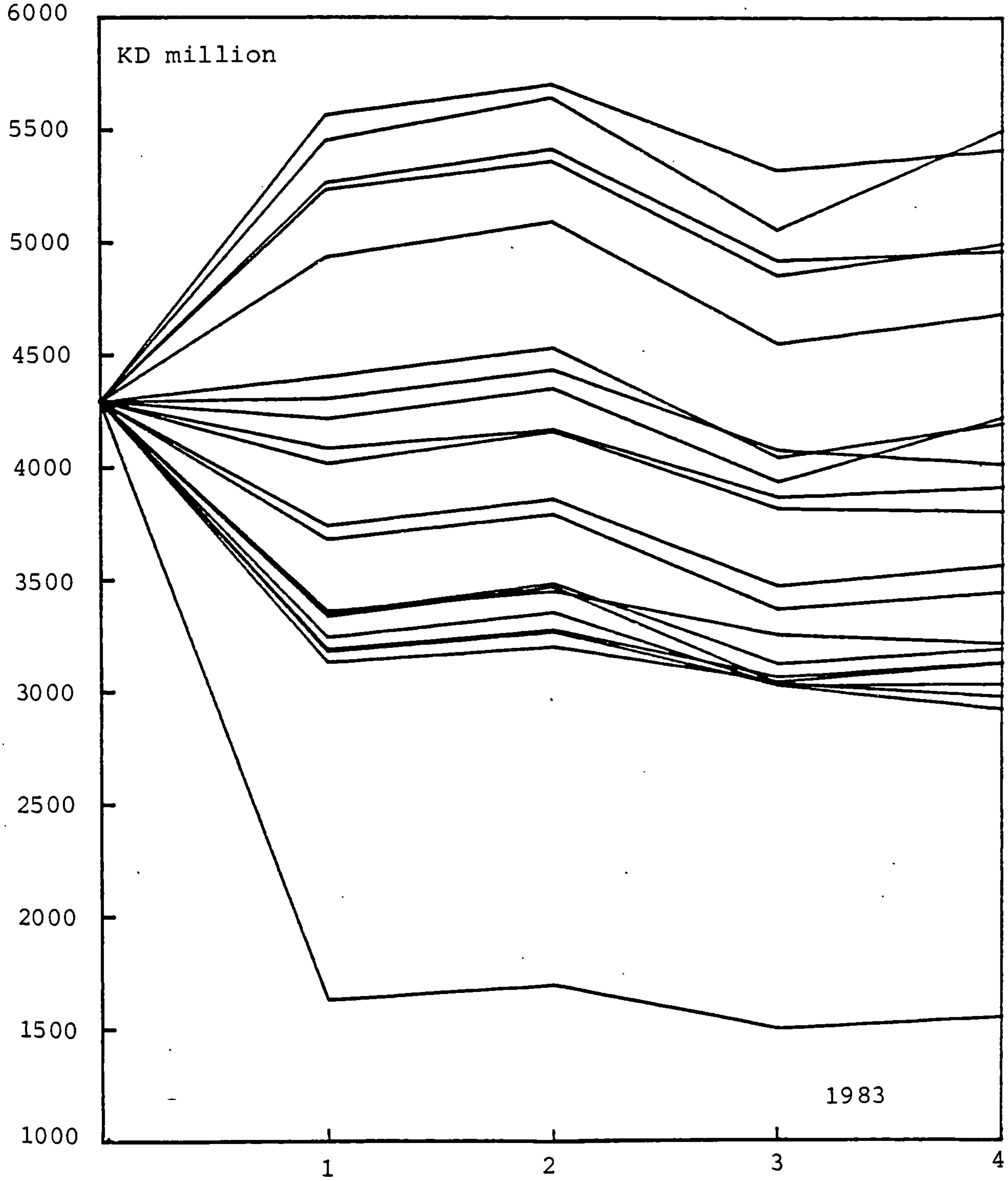
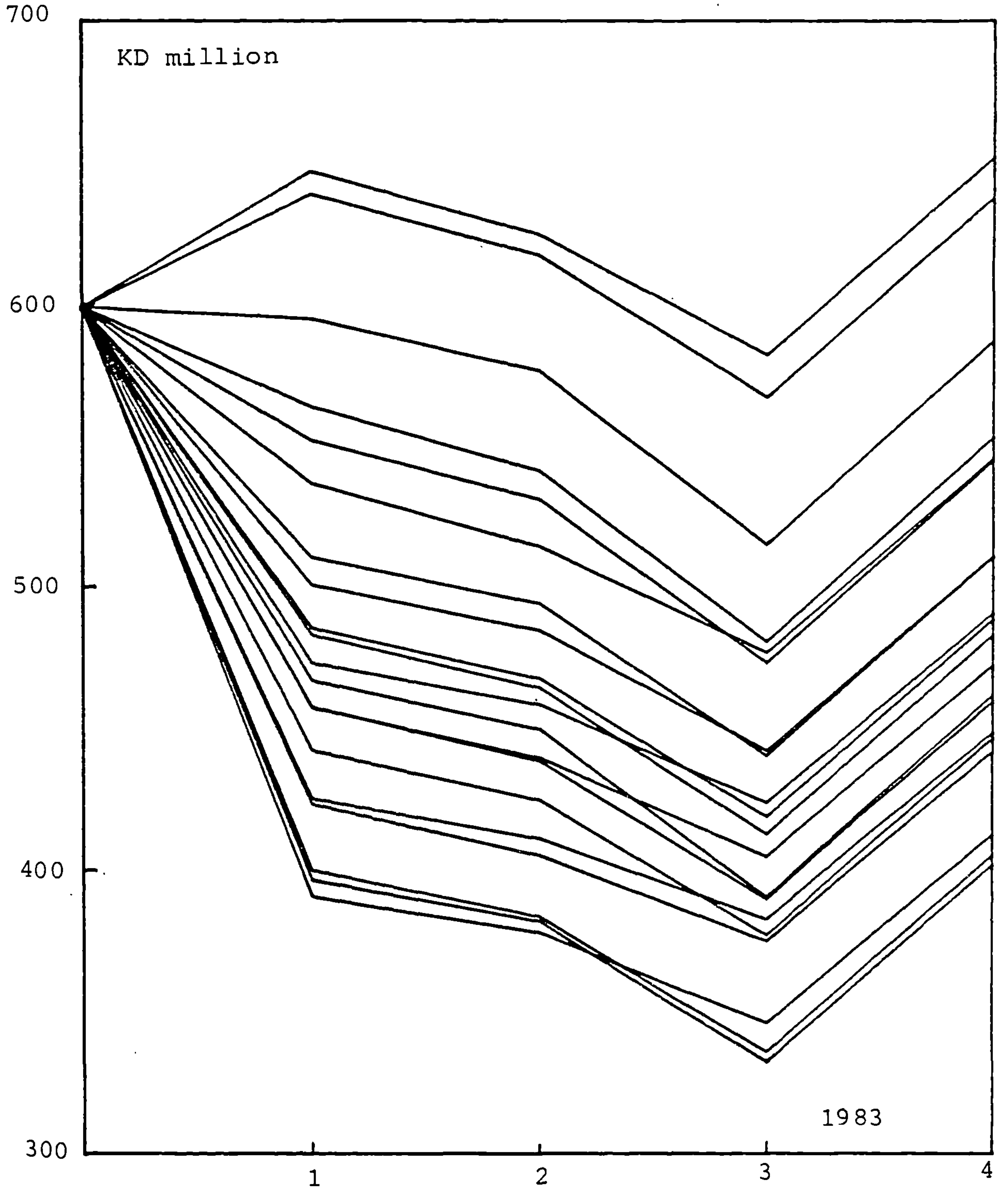


Figure 7.26

Imports: Stochastic Simulations



APPENDIX 7.1

COMPUTER PROGRAM LISTING

This appendix contains a listing of the BASIC program used to generate random numbers and conduct 20 stochastic simulations on the price level using the procedure outlined in section 7.7. The following notation was used in the program

V1(20)...V5(20)	vectors of random numbers used to adjust the coefficients
U1(20,4)	20x4 matrix of stochastic error terms
X(4,4)	4x4 matrix of actual (1983) values of exogenous variables
S(20,4)	20x4 matrix of simulated values of endogenous variables

The following is a brief explanation of the program by statement numbers

10-20	Initialising the program
30-70	Reading actual data of exogenous variables
80-150	Generating random numbers for $v_1, \ldots, v_5$
160-200	Generating random numbers for u_1
210-300	Calculating and printing simulated values of endogenous variables
310-410	Calculating and printing means and standard deviations of simulated values
420-450	Actual data of exogenous variables

```
10 OPTION BASE 1
20 DIM V1(20),V2 20),V3(20),V4(
   20),V5(20),U1(20,4),X(4,4),S
   (20,4)
30 FOR I=1 TO 4
40 FOR J=1 TO 4
50 READ X(I,J)
60 NEXT J
70 NEXT 1
80 RANDOMIZE
90 FOR I=1 TO 20
100 V1(I)=11.15*RND*(-1)^IP(100*
    RND)
110 V2(I)=.01029*RND*(-1)^IP(100
    *RND)
120 V3(I)= 01044*RND*(-1)^IP(100
    *RND)
130 V4(I)=.00213*RND*(-1)^IP(100
    *RND)
140 V5(I)=.1152*RND*(-1)^IP(100*
    RND)
150 NEXT I
160 FOR I=1 TO 20
170 FOR J=1 TO 4
180 U1(I,J)=3.08*RND*(-1)^IP(100
    *RND)
190 NEXT J
200 NEXT I
210 FOR I=1 TO 20
220 PRINT "SIMULATION NO.";I
230 FOR J=1 TO 4
240 R=58.2+V1(I)+(.012+V2(I))*X(
    1,J)+( 016+V3(I))*X(2,J)
250 T=(.0088+V4(I))*X(3,J)+(.177
    +V5(I))*X(4,J)+U1(I,J)
260 S(I,J)=R+T
270 PRINT USING "5D.D" , S(I,J)
280 NEXT J
290 PRINT "............" @ PRINT
300 NEXT I
310 PRINT "QUARTER   MEAN       S
    TD.DEV."
320 PRINT "...................
    ..........."
330 FOR J=1 TO 4
340 S1,S2=0
350 FOR I=1 TO 20
360 S1=S1+S(I,J)
370 S2=S2+S(I,J)^2
380 NEXT I
390 PRINT USING "3X,D,6X,3D.D,5X
    ,2D.D" ; J,S1/20,SQR((S2-S1*
    S1/20)/19)
400 NEXT J
410 PRINT "....................
    ..........."
420 DATA 520 5,438 8,525.4,564 6
    DATA 555.6,52  5,436 8,525.4
    DATA 3778.3,3640.1,3864.4,39
    00
450 DATA 148.2,155.1,150.3,156.6
460 END
```

```
SIMULATION NO. 1
  107.8
  104.8
  104.9
  106.[illegible]
. .   . ....

SIMULATION NO. 2
  [illegible].2
  1[illegible]4.0
  121.8
  120 8
....    ....

SIMULATION NO. 3
  144.8
  142.4
  145.9
  146.1
... ........

SIMULATION NO. 4
  143.6
  138.7
  139.5
  145.1
............

SIMULATION NO. 5
  123.2
  123.1
  119.5
  122.2
............

SIMULATION NO. 6
  105.3
  108.5
  107.8
  106.7
............

SIMULATION NO. 7
  139.4
  142.9
  143.9
  146.0
............

SIMULATION NO. 8
  134.1
  133 8
  130.2
  137.7
.......... .

SIMULATION NO. 9
  120.2
  116 7
  116.8
  116.8
 .... .....

SIMULATION NO. 10
   19.8
   18 8
   15.0
   22.1
  . . . ....
```

SIMULATION NO. 11
132.8
131.0
131.3
[illegible]5
......

SIMULATION NO. 12
133.4
132.7
135.4
139.7
....

SIMULATION NO. 13
123.3
123.5
124.7
123.2
....

SIMULATION NO. 14
159.1
162.7
163.1
165.9
....

SIMULATION NO. 15
149.9
147.8
146.4
153.1
....

SIMULATION NO. 16
133.9
133.9
129.2
136.6
....

SIMULATION NO 17
131.5
133.2
131.8
139.4
....

SIMULATION NO. 18
115.4
116.5
113.1
120.2
....

SIMULATION NO. 19
148.3
147.7
147.3
151.3
....

SIMULATION NO. 20
138.6
140.1
137.6
138.4
....

QUARTER	MEAN	STD.DEV.
1	131.3	14.2
2	131 1	14 4
3	130.3	15.1
4	133.5	15.8

CHAPTER 8

FINDINGS, RECOMMENDATIONS AND CONCLUSIONS

8.1. Recapitulation and Main Findings

The recent monetary history of Kuwait has provided substantial evidence on the lack of "monetary discipline" in this small open economy. It has also become apparent that the monetary phenomena of the 1970s and early 1980s have had a direct impact on all sectors of the economy.

The pro-cyclical activities of commercial banks, coupled with the lack of effective monetary policy, have pushed the Kuwaiti economy into turbulent waters on several occasions. Indeed, these factors taken together contributed to the emergence of inflationary pressures, recession and the collapse of the stock market on two occasions in less than five years, not to mention the sharp ups and downs of the real estate market and the recurring problem of capital outflows. Moreover, the pattern of sectoral growth, which has been inappropriate for development, has largely been guided by the credit policy of the commercial banks.

Such observations prompted the initiation of this study, with two objectives in mind: (i) to provide guidelines and tools enabling the monetary authorities in Kuwait to conduct a more effective monetary policy, i.e. one that should facilitate the avoidance of the upheavals experienced in the 1970s and early 1980s; and (ii) to illuminate some of the still mysterious aspects of the structure and working of Kuwait's monetary sector.

Monetary policy has failed, particularly as a short-run stabilisation tool via the control of the money supply. This study represents an attempt to find out whether or not it was feasible to control the money supply in Kuwait, identify the reasons for failure and sketch broad guidelines for a programme of monetary control. The following are the broad characteristics of the Kuwaiti economy which provide a framework for studying monetary phenomena:

(i) The Kuwaiti economy is extremely open and depends heavily on the external world for imports, foreign currency earnings and labour force.

(ii) The volatile pattern of economic growth is due mainly to fluctuations in the oil sector, triggered by exogenous factors.

(iii) The relationship between growth of the oil sector and non-oil sectors is long-term, i.e. a drop in oil GDP in one year does not necessarily lead to a drop in non-oil GDP in that year.

(iv) There is no one-to-one relationship between the government's total revenue and total expenditure, and the latter is more influenced by oil revenue than by investment income.

(v) Oil exports are the prime determinant of the balance of trade, whereas imports have no significant effect.

It is argued that because of property (iv) above, domestic money supply tends to be insulated from the effect of the balance of payments in the short run, indicating that there is scope for short-run manipulation of the money supply.

In order to design a programme for monetary control, this study considered the four points which comprise the components of a policy in terms of the money stock; they are as follows:

(i) The most appropriate definition of money.

(ii) The relationship between money and real and price variables.

(iii) The process by which the stock of money is determined.

(iv) The role played by the Central Bank's policy instruments in that process.

Point (i) was treated both theoretically and empirically. Empirical testing was carried out on various monetary aggregates ranging from the narrow M1 to M2A which includes government as well as private deposits. Three kinds of tests were used: the Friedman-Meiselman test for correlation with real economic activity, stability (Chow) test for the relationship between the demand for money and income, and a test for the predictability of this functional relationship. The results were in favour of using the broad M2 for conducting monetary policy, and it was shown that the addition of government deposits to this aggregate did not alter the results significantly. Moreover, a version of the Granger-Sims causality test revealed a unidirectional effect from money to income, although some reservations were expressed concerning this result.

Point (ii) was studied within the framework of a structural econometric model. It was found that the deviation of real output (non-oil GDP) from its trend depends on the contemporaneous growth rate of government expenditure and the lagged growth rate of the money supply (excluding currency); also that the monetary stimulus is approximately three times stronger in its effect than the fiscal stimulus. While the monetary stimulus was also found to have a considerable effect on the price level, both in terms of strength and speed, no factor exerted a greater influence on domestic prices than import prices. However, this multi-factorial syndrome tends to discredit the traditional view that inflation in Kuwait is purely imported.

Point (iii) was dealt with using two models, a reduced-form model and a structural model. In the first model, the money supply process was formulated in terms of the multiplier framework, such that the money stock was envisaged to be some multiple of the monetary base. A Chow test showed that the relationship between the money stock and monetary base has been unstable. Evidence was also found to support the hypothesis that changes in the base tend to affect the multiplier through interest rate, although the effect was found to be small. This approach showed that the money supply can be controlled if it is possible to forecast the multiplier and control the monetary base. Therefore, two behavioural equations were estimated for the components of the multiplier: the currency to deposits ratio, and the reserve to deposits ratio; it was shown that such a model can be used to forecast these two ratios, the multiplier and, consequently, the money supply. The control of the monetary base was found to be more feasible with the joint collaboration of the Central Bank and the Ministry of Finance because one of the components of the base, government deposits with the Central Bank, is under the control of the Ministry of Finance. The second component, discounts, can be controlled directly by the Central Bank but the third component, net foreign assets of the Central Bank, is rather difficult to control because it depends on the balance of payments position. Since exports are exogenously determined and imports are insignificant in determining the balance of payments, the only way to control net foreign assets is through the control of capital flows.

The process by which the stock of money is determined was also dealt with in the framework of a disaggregated structural supply-demand model in which broad money is disaggregated into currency, demand deposits and quasi-money. Disaggregated demand functions were estimated on the grounds that an aggregate function would distort the interest rate effect. A deposits-supply function was also estimated, showing that the supply depends on reserves and interest rate. According to the model, the equilibrium stock of money is determined by the solution of the model, and so both supply and demand factors are effective. The model also suggests that controlling banks' reserves can, in part, accomplish the objective of controlling the money supply. It must be mentioned, however, that the examination of within-sample predictive power of the model suggested that a re-specification of the deposits supply function was warranted, but the estimation of the re-specified function can only be possible in the future when longer time-series on required and excess reserves are available. The model also determines interest rate, banks' credit to the private sector and the effect of the monetary sector on output and prices.

The failure of monetary policy in Kuwait to control monetary growth can be attributed to a lack of understanding of the growth process; the commitment of the Central Bank to accommodate fiscal expansion; and the shortage, inadequacy and misuse of policy tools implied by point (iv). It was shown that the discount window has been inappropriately used, i.e. only to boost banks' ability to grant credit rather than to affect the level of borrowed reserves, this has fuelled inflation and speculation. The discount rate has been changed only once since the system was introduced in 1975, which implies that this important policy variable has neither been effective in controlling the cost of borrowed reserves, nor in influencing the structure of interest rates. Moreover, up to June 1980, there had been no required reserve ratio, rendering the liquidity system limited in its usefulness as a controlling device. Normally, liquid asset ratios are used to reinforce the effect of changes in the reserve ratio, for without the former, banks can offset changes in the latter simply by liquidating some of their liquid assets. Even the reserve ratio has been ineffective in controlling reserves, firstly because the prescribed 3 percent level was too low, and secondly, because the commercial banks in Kuwait, due to the unavailability of diversified money market instruments and the fact that part of the reserves (Central Bank bills) are interest-bearing assets, tend to hold substantial excess reserves. Rather like the discount rate, the required reserve ratio has remained unaltered since its introduction in 1980, when one expects this tool to be used in a flexible manner and as dictated by monetary and economic conditions. Finally, while open market operations were non-existent, the Central Bank of Kuwait has taken a step in this direction by the issuance of bills with the ultimate objective of using them as a vehicle for conducting open market operations. However, Central Bank bills cannot perform this function effectively because they are, themselves, part of the reserves; thus, any measure by the Central Bank to reduce banks' reserves by selling bills will fail because it will only affect the composition, not the size, of reserves. This is so, because Central Bank bills are a perfect substitute for cash as far as the reserve requirements are concerned, and because there is no minimum required cash reserve ratio.

Moreover, monetary policy has failed in curbing capital outflows despite the preoccupation of the monetary authorities with this particular problem. Ironically, it is the combination of interest rate and exchange rate policies that has provided a wide differential between KD and dollar deposit rates, and a stable KD/dollar exchange rate. Such a combination has created the ideal environment for interest rate arbitrage and, hence, capital outflows, particularly since there are no restrictions on capital transfers. These two policies have proved inadequate in other respects. Firstly, the interest rate policy has been concerned primarily with the role of interest rate as a loan rate i.e. the means of regulating the cost, availability, and sectoral distribution of bank credit. As such, it has overlooked other functions of the interest rate, i.e. the mobilisation of resources (resulting in capital outflows), and the optimum allocation of savings between consumption and investment. Secondly, the interest rate policy has also failed in diverting resources (bank credit) to productive sectors and contributed to boosting speculative activity and eventually the collapse of the stock market. Thirdly, the exchange rate policy has only resulted in the stability of the KD/dollar exchange rate and its consequences have not been significantly different from those of pegging to a single currency (the dollar), which was originally abandoned in favour of the present policy.

8.2. Other Findings

This study contains many other findings which were reached either via a thorough theoretical discussion or, whenever possible, through empirical work. Major findings are as follows:

There has, indeed, been evidence of financial development in Kuwait since the foundation of the Central Bank of Kuwait. Positive indicators include the opening of more bank branches, the emergence and growth of specialised banks and other financial institutions, the general increase and diversity of banking activities, and increased sophistication of financial markets. Estimation of the demand-for-money functions over the two periods 1975-78 and 1979-82 provides evidence of growing financial sophistication, and examination of the DW statistics of equations containing income and lagged dependent variable as explanatory variables reveal that there are missing variables in the equations estimated over the period 1979-82. This has been interpreted to mean that the missing variable (interest rate) was more important in the latter period, again indicative of growing financial sophistication. However, there is still room for significant improvement especially in the area of diversification of financial instruments.

It was argued in this study that the lack of autonomy and independence of the Central Bank of Kuwait has not only constrained its proper functioning, but is also in direct contrast with article 13 of the Central Bank Law. Another finding concerns the role of the bank-client relationship as a rationing device in the process of granting credit to the private sector. The Central Bank was found to play a rationing role in the process due to its power to restrict credit to any single borrower. The model presented in Chapter 6 showed that the demand for credit is not sensitive to interest rate, at least in the period under consideration (1977-82), because of the then prevailing high rates of return on real and financial investment. Thus, there was always excess demand for credit but interest rate did not have any rationing role.

It was shown that the velocity of circulation of money was positively correlated with per capita real income, and negatively correlated with interest rate. The implication of this finding is that financing economic development by expanding the money supply is inflationary in the short run, though not necessarily so in the long run.

Time-series analysis of the broad monetary aggregate M2 showed that there is no seasonal variation in the money supply. However, this was due to the inclusion of currency in M2 because when a different seasonality test was conducted on total deposits (M2 less currency), by examining the empirical residuals of a regression equation containing reserves and interest rate as explanatory variables, it was found that there is seasonal variation in the supply of deposits. This seasonality can be attributed to excess reserves, these tend to increase in the fourth quarter due to accumulation by banks for the purpose of "window dressing" towards year-end.

It was also argued that a rule of constant monetary growth is not feasible in the long run, because given an exchange rate system of managed floating, domestic money supply is determined by the balance of payments position. However, it was argued that a rule for government expenditure could be useful as a "disciplinary tool."

Some additional conclusions can be drawn from the econometric model presented in Chapter 6. Firstly, the model revealed that a one percentage point increase in the 3-month Eurodollar rate will induce a reduction of banks' excess reserves holdings by about KD 15 million, an increase of 23 basis points in the 3-month KD interbank rate, and KD 112 million increase in the potential supply of deposits. Secondly, the model shows that banks' supply of credit is governed by a desired ratio of credit to total private deposits, with deviations from this ratio caused by the differential between foreign and local interest rates. The sum of private and government deposits of commercial banks seems to be the factor that determines banks' ability to grant credit, and thus government deposits can be used as a policy variable to influence the volume of credit to the private sector. Thirdly, it was found that the Iraq-Iran war had but an initial depressive impact on the level of imports. While a drop was experienced in 1981, the original trend was restored in 1982 as people realised that the war would continue for some considerable time and adapted to the new situation.

Further experimentation with the model showed that it was dynamically stable, i.e. it tended to return to the original equilibrium with varying degrees of speed of adjustment following a shock disturbance. The model also showed symmetrical reactions of output and price level to exogenous shocks. Finally, various validation tests showed that the model was sufficiently robust to be useful in practice. It can, thus, be used by policy makers to test a variety of specific policy actions.

8.3. Policy Recommendations

In the light of the findings of this study, the following recommendations can be made. If followed, these are likely to prevent a recurrence of the misfortunes of the 1970s and the early 1980s, which undoubtedly resulted from the lack of an effective monetary policy. Specifically, these recommendations will result in tighter control and a more well-behaved monetary growth, curb capital outflows, and achieve a distribution of bank credit that is compatible with development priorities.

(1) The Central Bank should be given more autonomy in formulating and executing monetary policy.

(2) The Central Bank should embark on a programme aiming at improving its research capabilities to support its policy actions.

(3) Urgent attention must be given to the development of financial markets, especially in the direction of introducing a variety of financial instruments that can be acquired by financial institutions and the public. There has already been some move in this direction, since from September 1985, KD-denominated bonds were listed on the Kuwait Stock Exchange and market makers were allowed to operate.

(4) Banks' reserves must be controlled more effectively through the discount window, reserve and liquidity ratios, and open market operations. In particular, the discount window should no longer be a source of cheap funds for banks. The discount rate and reserve ratio should be changed frequently in accordance with monetary conditions, and the latter should be raised. To upgrade open market operations, Central Bank bills should no longer be considered as part of the reserves, and operations should be based on other financial instruments, e.g. KD bonds or financial papers issued by the Ministry of Finance. The latter may be issued to finance, partially, domestic expenditure by borrowing from the public, and could serve the additional purpose of insulating the money supply from the influence of the external sector.

(5) The Ministry of Finance could assist by controlling its deposits with the Central Bank (component of the monetary base) and with commercial banks (a determinant of banks' ability to grant credit). It would also be useful if the Ministry of Finance adopted a simple constant change rule as far as government expenditure is concerned.

(6) The present structure of interest rates and, in particular, the system of differential ceilings on loan rates should be abolished. All interest rates should be left to be determined by market forces, as is the case with the interbank rates.

(7) The present exchange rate policy of pegging the KD to a basket of currencies heavily weighted in dollar should be abandoned, and replaced by a policy whereby the KD is pegged to an import-weighted basket that reflects its effective exchange rate.

(8) Some measures must be taken to ensure that more bank credit goes to productive sectors, and less to finance speculation. Selective credit controls should be imposed by the Central Bank on commercial banks by

introducing differential reserve ratios and discount rates. The traditional fears of commercial banks concerning medium-term or long-term loans to productive sectors should be allayed by appropriate government guarantees. Bank credit to productive sectors should be increased via the following channels: pressure from government representatives on banks' boards of directors, moral suasion, or by the estabilishment of more specialised banks, an agricultural bank (for example). All of these factors affect supply, but demand can also be influenced by some government action e.g. subsidisation and protection from foreign competition.

(9) The Central Bank should be empowered to specify the margin requirement in transactions involving the sale and purchase of shares, and to act in the field of consumer credit control.

8.4. Concluding Remarks

This study is the most comprehensive on Kuwait's monetary sector but it is by no means the end. In addition to its findings concerning policy and other issues, the study opens new horizons for research. The various models presented in the previous chapters can be re-specified, updated and re-estimated in the light of new findings or when more data series are available, as suggested on more than one occasion. Specific areas of further research include: the analysis of residuals of the structural model to arrive at a better specification as suggested by Ashley and Granger (1979), studying the effect of monetary phenomena on various economic sectors as shown by Wenninger (1984), and more detailed empirical work on all of the issues pertaining to the rules versus discretion controversy for the special case of Kuwait.

The immediate benefit of this work lies in the determination and specification of policy changes, which, if adopted, should avoid a recurrence of earlier misfortunes. A positive indicator regarding the usefulness of this study, and the need to conduct further work of this kind to support monetary policy, is found in the words of the Central Bank Governor at a conference on banking control and supervision held in London in May 1985. He said, "the Central Bank must broaden the spectrum of monetary policy tools at its disposal and increase their effectiveness. The Bank will be required to continue to redirect bank credit away from overdrafts and towards credit for productive purposes through programmed lending." This study has been motivated by the desire to find the means to accomplish objectives such as those just mentioned. Now that it is finished, it can, hopefully, serve as a spring-board for further empirical research on Kuwait's monetary sector.

STATISTICAL APPENDIX

This appendix contains data series used throughout this study. The main source of these data is the Central Bank's quarterly bulletins and annual economic reports, but other sources have been used as indicated. The following notes should be pointed out:

(i) Some data series were calculated by interpolating annual data (non-oil and oil GDP).

(ii) Data on the trend value of real non-oil GDP were estimated by a simple regression on time.

(iii) The import price index Pm was calculated as a weighted average of the unit values of exports of the four major exporters to Kuwait.

It must also be mentioned that there is a great deal of inconsistency in data series obtained from the Central Bank's publications in the sense that some numbers change from one issue to another. This, indeed, is a problem that was explicitly stated in every major empirical study on Kuwait (see for example Khouja and Sadler (1979) and El-Mallakh and Atta (1981)). However, every endeavour was made to reconcile conflicting data series and pick the most reasonable ones as presented in this appendix.

Table A.1: Gross Domestic Product at Current Prices (KD million)

	1970	1971	1972	1973	1974	1975	1976
GDP	1026.3	1381.8	1464.0	1604.1	3853.0	3487.0	3839.7
Oil	618.8	907.8	914.5	996.6	3022.6	2459.0	2524.1
Non-oil	407.5	474.0	549.5	607.6	790.3	1028.0	1315.6
Agriculture and Fisheries	2.9	3.2	3.8	4.7	5.9	8.8	10.3
Manufacturing Industry	42.8	54.2	65.4	77.8	168.6	195.1	229.8
Electricity, Gas and Water	7.2	9.3	10.8	11.8	12.6	13.1	18.8
Construction	28.1	33.3	38.4	44.4	62.8	73.7	122.6
Wholesale and Retail Trade	81.0	90.0	106.4	112.7	140.4	211.3	288.7
Transport & Communications	29.3	31.8	34.5	41.8	50.4	60.1	72.4
Financial Institutions	20.9	23.3	25.3	27.7	29.9	45.2	65.2
Other	195.3	228.9	265.0	286.7	319.7	420.7	507.7

	1977	1978	1979	1980	1981	1982
GDP	4049.1	4264.7	6743.4	7451.2	6772.2	5727.5
Oil	2483.0	2530.3	4420.4	5062.2	4125.1	2766.6
Non-oil	1566.1	1734.4	2323.0	2388.9	2647.1	2960.8
Agriculture and Fisheries	13.1	13.5	16.7	17.3	28.0	31.0
Manufacturing Industry	239.5	280.3	574.3	439.9	372.8	373.4
Electricity, Gas and Water	19.9	24.2	26.6	25.0	26.8	30.1
Construction	158.4	176.1	210.0	220.0	263.0	283.0
Wholesale and Retail Trade	370.6	390.5	426.0	468.0	485.0	521.0
Transport & Communications	77.4	90.6	106.4	124.3	145.5	171.8
Financial Institutions	84.7	116.1	148.6	183.5	232.3	288.0
Other	602.6	643.0	814.4	910.8	1093.7	1262.5

Table A.2: Gross Domestic Product as Measured by Expenditure (KD million)

	1970	1971	1972	1973	1974	1975	1976
Consumption:							
Government	139.3	173.3	198.7	214.6	279.1	385.5	432.3
Private	396.3	420.0	427.4	438.7	563.8	758.7	1029.8
Total	535.6	593.3	626.1	653.3	842.9	1144.2	1462.1
Gross Capital Formation	126.0	126.6	127.3	145.8	221.7	417.6	563.1
Change in Inventory	-2.1	3.0	8.9	6.8	36.7	26.1	72.1
Exports	613.9	916.8	1004.3	1153.9	3239.5	2806.0	2992.4
Imports	247.5	257.9	302.6	355.6	527.8	907.0	1250.0
GDP	1026.3	1381.8	1464.0	1604.1	3813.0	3487.0	3839.6

	1977	1978	1979	1980	1981	1982
Consumption:						
Government	589.0	615.9	757.2	857.2	988.8	1188.6
Private	1319.3	1478.0	1741.6	2200.2	2457.6	2969.5
Total	1908.3	2093.9	2498.8	3057.4	3446.4	4158.1
Gross Capital Formation	853.5	793.9	789.6	878.8	1072.8	1277.5
Change in Inventory	129.4	69.0	93.0	105.0	89.0	137.0
Exports	2918.0	3008.0	5333.0	6065.0	4840.0	3393.0
Imports	1760.0	1700.0	1971.0	2655.0	2676.0	3238.0
GDP	4049.1	4264.7	6743.4	7451.2	6772.2	5727.5

Table A.3: Public Finance: Revenue (KD million)

Fiscal Year*	Oil Revenue	Investment Income	Other Revenue	Total Revenue
1969/70	291.8	36.5	23.2	351.5
1970/71	321.1	31.8	44.4	397.3
1971/72	500.9	42.2	27.6	570.7
1972/73	537.5	50.8	40.9	629.2
1973/74	584.0	89.0	42.3	715.3
1974/75	2534.8	152.1	63.0	2749.9
1975/76	2793.3	328.1	103.0	3224.4
1976/77	2598.2	329.4	105.5	3033.1
1977/78	2575.3	384.2	133.9	3093.4
1978/79	3036.1	521.4	140.3	3697.8
1979/80	5940.5	880.3	147.5	6968.3
1980/81	4434.2	1743.9	225.1	6403.2
1981/82	2764.1	1364.0	221.1	4349.2

* Fiscal years 1969/70 - 1974/75 inclusive start in April
Fiscal years 1976/77 - 1981/82 inclusive start in July
Fiscal year 1975/76 was extraordinary, stretching between March 1975 and June 1976.

Table A.4: Public Finance: Expenditure (KD million)

Fiscal Year	Current	Investment	Land Acquisition	Foreign	Total
1969/70	173.2	65.1	9.6	51.7	299.6
1970/71	180.2	68.9	24.4	50.7	324.2
1971/72	243.4	73.5	19.9	32.9	369.7
1972/73	277.0	99.1	15.7	44.9	436.7
1973/74	280.9	146.3	19.4	106.3	552.9
1974/75	431.8	359.3	47.7	324.1	1162.9
1975/76	658.4	454.5	147.0	77.5	1337.4
1976/77	746.0	563.4	108.4	101.5	1519.3
1977/78	759.5	797.6	188.4	213.7	1959.2
1978/79	881.4	761.1	107.4	194.0	1943.9
1979/80	1252.6	694.2	263.9	213.0	2423.7
1980/81	1483.4	1240.6	391.8	262.1	3377.9
1981/82	1745.0	1344.0	449.2	244.8	3783.0

Table A.5: Foreign Trade (KD million)

	Oil Exports	Other Exports	Total Exports	Imports	Trade Balance
1970	564.5	26.4	590.9	223.3	367.6
1971	859.4	34.4	893.8	232.3	661.5
1972	931.7	49.6	981.3	262.2	719.1
1973	1059.9	69.8	1129.7	310.6	819.1
1974	3097.5	117.2	3214.7	455.1	2759.6
1975	2492.6	170.4	2663.0	693.2	1969.8
1976	2658.9	215.5	2874.4	972.0	1902.4
1977	2557.1	235.5	2792.6	1387.1	1405.5
1978	2628.7	235.4	2864.1	1263.9	1600.2
1979	4735.7	307.4	5043.1	1437.0	3606.1
1980	4960.8	408.1	5368.9	1764.9	3604.0
1981	3969.2	561.6	4530.8	1945.4	2585.4
1982	2614.5	572.6	3187.1	2370.0	817.1

Table A.6:: Central Bank: Assets and Liabilities (KD million)

	Foreign Assets	Discounts	Monetary Base	Govt. Deposits	Capital & Reserves	Total Assets = Total Liabilities
1969	65.2	--	50.8	7.1	5.0	77.5
1970	72.5	--	51.1	14.7	5.0	72.9
1971	96.7	--	59.0	30.9	5.0	98.9
1972	121.6	--	71.0	36.6	5.0	122.1
1973	148.2	--	95.8	28.4	5.0	151.9
1974	393.7	--	129.1	213.1	5.0	398.0
1975	486.6	4.5	169.2	271.5	5.0	499.9
1976	548.5	2.1	224.8	270.8	5.0	554.2
1977	817.0	20.7	431.5	325.1	8.0	843.8
1978	700.7	30.6	318.7	274.8	27.9	738.1
1979	812.8	195.3	379.2	446.1	27.9	1014.3
1980	1094.3	298.6	506.2	768.1	30.0	1424.2
1981	1172.7	282.4	679.3	671.3	30.0	1479.4
1982	1737.9	276.7	1097.7	796.1	30.0	2039.7

Assets = Foreign Assets + Discounts + Other Assets.

Liabilities = Monetary Base + Govt. Deposits + Capital and Reserves + Other Liabilities.

Table A.7: Central Bank: Foreign Assets (KD million)

	Gold	Reserve Position in IMF	Deposits	Other	Total
1969	30.8	4.5	20.6	9.3	65.2
1970	30.8	7.6	33.0	1.1	72.5
1971	31.0	9.4	52.5	3.8	96.7
1972	31.0	9.4	76.6	4.6	121.6
1973	35.6	6.9	101.0	4.7	148.2
1974	43.6	89.4	200.3	60.4	393.7
1975	49.9	201.7	152.6	82.4	486.6
1976	69.7	249.2	199.5	30.1	548.5
1977	31.4	240.8	495.0	49.8	817.0
1978	31.6	199.3	413.7	56.1	700.7
1979	31.7	138.9	508.6	133.6	812.8
1980	31.7	144.3	906.3	12.0	1094.3
1981	31.7	144.3	988.7	8.0	1172.7
1982	31.7	164.7	1534.5	7.0	1737.9

Table A.8: Central Bank: Composition of Monetary Base (KD million)

	Issued Currency	Banks' Deposits	Central Bank Bills	Total
1969	48.7	2.1	--	50.8
1970	49.4	1.7	--	51.1
1971	56.0	3.0	--	59.0
1972	61.6	9.4	--	71.0
1973	75.8	20.0	--	95.8
1974	86.9	42.2	--	129.1
1975	107.8	61.4	--	169.2
1976	137.0	87.8	--	224.8
1977	161.3	270.2	--	431.5
1978	188.3	130.4	--	318.7
1979	229.5	136.2	13.5	379.2
1980	268.7	129.5	108.0	506.2
1981	303.5	208.4	167.4	679.3
1982	365.5	244.2	488.0	1097.7

Table A.9: Commercial Banks: Assets and Liabilities (KD million)

	Reserves	Foreign Assets	Claims on Private Sector	Private Deposits	Govt. Deposits	Foreign Liabi- lities	Total Assets = Total Liabi- lities
1969	6.5	369.2	135.0	334.8	54.2	78.4	531.5
1970	6.2	439.5	141.2	317.3	80.9	115.6	610.6
1971	8.5	477.9	161.4	405.6	72.4	104.2	679.8
1972	13.8	513.5	187.4	466.6	62.5	103.6	736.7
1973	26.9	479.1	266.3	500.8	50.7	136.1	803.4
1974	58.0	561.4	361.9	638.9	73.2	143.4	1037.6
1975	67.2	616.1	506.7	789.5	87.3	169.0	1300.7
1976	92.4	674.9	934.3	1091.2	71.0	324.1	1839.0
1977	270.9	823.2	1238.5	1432.4	114.9	419.8	2398.6
1978	122.7	1214.2	1559.4	1773.3	99.3	601.5	2967.2
1979	143.3	1407.5	2119.3	2073.8	139.9	803.9	3787.9
1980	221.7	1880.0	2671.4	2606.2	171.3	1134.3	4896.5
1981	321.6	2245.4	3453.6	3583.0	211.0	1264.1	6319.7
1982	625.9	2251.0	4292.5	3840.1	393.8	1526.5	7373.0

Assets = Reserves + Foreign Assets + Claims on Private Sector + Other Assets.

Liabilities = Private Sector Deposits + Govt. Deposits + Foreign Liabilities + Capital and Reserves + Other Liabilities.

Table A.10: Commercial Banks: Claims on Private Sector (KD million)

	Credit Facilities	Other*	Total
1969	135.0	--	135.0
1970	137.1	4.1	141.2
1971	146.9	14.5	161.4
1972	175.7	11.7	187.4
1973	247.6	18.7	266.3
1974	351.7	10.2	361.9
1975	462.5	44.2	506.7
1976	849.3	85.0	934.3
1977	1072.6	165.9	1238.5
1978	1374.5	184.9	1559.4
1979	1917.5	201.8	2119.3
1980	2418.5	252.7	2671.2
1981	3172.7	280.8	3453.5
1982	3897.2	395.1	4292.3

* Claims on specialised banks and local investments.

Table A.11: Commercial Banks: Foreign Assets (KD million)

	Deposits	Loans	Investments*	Total
1969	272.4	67.0	29.8	369.2
1970	354.1	55.5	29.9	439.5
1971	394.6	49.2	34.1	477.9
1972	369.4	61.1	83.0	513.5
1973	293.9	86.7	98.5	479.1
1974	384.3	98.3	78.8	561.4
1975	392.5	127.8	95.8	616.1
1976	459.1	89.2	126.6	674.9
1977	626.3	81.2	115.7	823.2
1978	923.9	104.3	186.0	1214.2
1979	1028.9	203.3	175.3	1407.5
1980	1436.7	252.7	190.7	1880.1
1981	1738.5	305.9	201.1	2245.5
1982	1673.8	382.5	194.8	2251.1

* Mostly shares and bonds.

Table A.12: Consolidated Balance Sheet of the Monetary Sector: Selected Items
(KD million)

	Net Foreign Assets	Claims on Private Sector	Narrow Money	Quasi-Money	Govt. Deposits	Other (Net)
1969	356.0	135.0	107.6	271.5	61.3	50.6
1970	396.4	137.1	95.2	266.9	95.6	75.8
1971	470.4	161.4	112.3	343.7	103.3	72.5
1972	531.5	187.4	145.7	378.0	99.1	96.1
1973	491.2	266.3	174.7	397.2	79.1	106.5
1974	811.7	361.9	199.5	521.0	286.3	166.8
1975	933.7	506.7	290.3	600.9	358.8	190.4
1976	899.3	934.3	393.8	826.5	341.8	271.5
1977	1220.4	1238.5	490.6	1092.7	440.0	435.6
1978	1313.4	1559.4	599.0	1351.3	374.1	548.4
1979	1416.4	2119.3	626.5	1663.2	586.0	660.0
1980	1838.4	2671.4	669.7	2187.8	939.3	713.0
1981	2139.8	3453.6	1214.8	2652.9	882.3	843.3
1982	2439.2	4292.5	1179.7	3003.1	1189.9	1358.9

Table A.13: Specialised Banks: Assets and Liabilities (KD million)

	1977	1978	1979	1980	1981	1982
Assets						
Cash and Deposits with Central Bank	9.2	6.9	7.4	16.4	24.6	33.3
Deposits with Commercial Banks	126.3	141.5	182.2	202.9	287.6	377.7
Local Loans	301.7	410.9	473.7	576.6	704.4	993.9
Local Investments	14.1	31.3	29.1	29.5	32.0	41.1
Foreign Assets	196.2	216.4	224.2	254.5	267.7	267.0
Other Assets	57.7	61.5	71.9	86.9	117.5	63.2
Total Assets	705.2	868.5	988.5	1166.8	1433.8	1776.2
Liabilities						
Capital and Reserves	206.0	282.2	351.9	412.8	513.4	713.3
Private Sector Deposits	237.9	237.6	261.7	286.8	367.6	465.8
CDs and Bills	28.3	67.8	64.3	68.5	69.9	72.5
Govt. Deposits & Loans	73.8	94.5	115.8	156.2	234.2	260.7
Foreign Liabilities	95.0	105.0	111.4	115.3	134.1	101.2
Other Liabilities	64.2	81.4	83.4	127.2	114.6	162.7
Total Liabilities	705.2	868.5	988.5	1166.8	1433.8	1776.2

Table A.14: Investment Companies: Assets and Liabilities (KD million)

	1977	1978	1979	1980	1981	1982
<u>Assets</u>						
Cash and Deposits with Commercial Banks	63.4	75.0	22.4	35.8	33.0	92.5
Local Loans	34.3	52.0	80.1	124.0	261.2	467.5
Local Investments	56.5	78.0	115.8	164.7	194.8	352.8
Foreign Assets	274.5	359.5	429.3	545.9	754.7	828.1
Other Assets	41.8	46.5	67.8	81.8	187.4	245.5
Total Assets	470.5	611.0	715.4	952.2	1431.1	1986.4
<u>Liabilities</u>						
Capital and Reserves	87.8	103.1	155.4	162.2	224.9	404.6
Resources from Residents	164.2	217.6	237.4	317.7	429.2	560.0
Foreign Liabilities	130.7	217.8	255.1	403.9	610.6	762.9
Other Liabilities	87.8	72.5	67.5	68.4	166.4	258.9
Total Liabilities	470.5	611.0	715.4	952.2	1431.1	1986.4

Table A.15: The Composition of M2 (KD million)

	Currency in Circulation	Demand Deposits	Saving Deposits	Time Deposits+CDs	Foreign Currency Deposits
1975 1	86.1	132.2	151.5	223.2	110.5
2	93.9	164.5	165.2	240.8	102.7
3	94.3	169.3	172.6	266.6	121.0
4	101.7	188.6	175.8	303.5	121.6
1976 1	106.2	241.7	187.4	331.1	98.0
2	114.2	287.8	209.1	366.0	124.2
3	116.2	271.2	203.4	414.6	139.5
4	129.1	264.7	204.6	456.2	165.7
1977 1	136.9	287.2	230.4	527.2	130.8
2	139.8	309.2	244.0	619.2	102.5
3	143.4	304.4	247.5	637.4	110.4
4	150.9	339.7	253.6	737.0	87.5
1978 1	160.3	389.7	275.4	712.0	105.9
2	167.1	427.9	302.6	758.2	105.2
3	178.2	416.2	315.5	787.0	129.9
4	177.0	422.0	313.4	856.6	181.3
1979 1	187.8	410.8	319.4	857.6	210.6
2	189.7	442.1	308.3	873.4	225.0
3	212.4	474.4	309.3	963.8	287.8
4	215.9	410.6	302.1	1005.5	355.6
1980 1	222.3	431.6	298.9	1089.6	439.8
2	223.6	499.7	297.6	1141.3	470.2
3	237.0	500.5	288.8	1242.5	489.9
4	251.3	418.4	272.5	1327.4	588.0
1981 1	248.3	502.7	276.1	1368.9	578.8
2	261.6	682.7	293.5	1488.2	659.5
3	264.3	662.9	291.8	1675.9	630.6
4	284.7	930.1	307.7	1750.1	595.2
1982 1	310.7	1215.7	322.9	1888.5	467.2
2	324.4	1281.8	319.5	1860.7	476.1
3	334.8	851.3	307.8	2271.3	347.9
4	342.7	837.0	336.8	2333.2	333.0

Table A.16: Monetary Aggregates (KD million)

	M1	M2	B		M1	M2	B
1970 - JAN	108.6	340.8	52.7	1971 - JAN	100.7	359.0	50.9
FEB	107.9	342.3	50.9	FEB	104.0	369.1	50.4
MAR	111.8	345.2	51.3	MAR	105.9	371.4	49.7
APR	109.3	357.9	50.9	APR	101.5	371.9	50.0
MAY	111.7	361.9	54.8	MAY	112.0	385.3	56.5
JUN	107.8	362.5	51.2	JUN	106.6	389.6	50.9
JUL	103.2	359.8	49.7	JUL	104.7	382.4	48.5
AUG	100.8	359.1	49.5	AUG	104.8	384.4	46.8
SEP	98.6	353.6	47.1	SEP	108.6	385.0	49.5
OCT	101.1	356.6	50.3	OCT	109.9	388.3	51.8
NOV	101.3	358.2	51.9	NOV	108.4	415.4	49.9
DEC	99.0	362.1	51.1	DEC	113.8	418.7	59.0
1972 - JAN	126.7	426.2	60.2	1973 - JAN	144.1	494.4	71.0
FEB	120.9	423.6	57.0	FEB	169.6	502.9	71.2
MAR	140.3	432.8	60.6	MAR	170.0	510.4	79.0
APR	135.5	455.4	65.8	APR	171.5	494.3	83.9
MAY	139.9	482.1	70.9	MAY	171.2	511.9	120.2
JUN	140.4	485.1	70.3	JUN	171.3	513.1	115.6
JUL	138.8	474.6	68.1	JUL	170.3	512.7	131.0
AUG	132.6	474.6	62.9	AUG	169.1	520.1	109.1
SEP	137.3	480.5	69.1	SEP	177.1	528.7	109.2
OCT	137.9	482.9	70.0	OCT	182.5	530.1	113.4
NOV	142.8	496.3	73.0	NOV	178.3	530.0	100.5
DEC	147.5	493.6	71.0	DEC	182.9	536.3	95.8
1974 - JAN	184.4	543.7	89.7	1975 - JAN	220.8	656.4	121.7
FEB	191.7	585.3	111.1	FEB	222.2	648.8	139.5
MAR	195.9	606.6	105.8	MAR	218.3	703.5	168.3
APR	195.8	609.9	98.9	APR	223.3	719.0	151.9
MAY	202.0	634.4	121.4	MAY	266.1	773.7	228.4
JUN	203.3	647.0	110.0	JUN	258.4	767.1	192.8
JUL	199.8	651.8	99.6	JUL	254.8	779.0	167.3
AUG	201.4	668.7	102.6	AUG	255.2	804.4	172.1
SEP	218.0	693.5	131.3	SEP	263.6	823.8	155.0
OCT	231.7	718.5	112.7	OCT	277.8	835.7	166.5
NOV	214.9	697.4	138.0	NOV	278.0	866.6	177.2
DEC	206.9	684.6	129.2	DEC	290.3	891.1	169.2

Table A.16: .... continued

		M1	M2	B			M1	M2	B
1976 -	JAN	310.1	926.0	164.5	1977 -	JAN	423.9	1250.7	185.1
	FEB	320.6	936.3	217.8		FEB	418.7	1237.1	162.0
	MAR	348.6	964.2	189.0		MAR	424.1	1312.4	240.3
	APR	363.2	1012.1	192.3		APR	434.2	1317.1	259.1
	MAY	375.9	1046.8	204.4		MAY	440.2	1351.8	295.4
	JUN	402.0	1101.3	190.4		JUN	449.0	1405.8	266.4
	JUL	357.3	1101.5	155.9		JUL	439.2	1413.4	290.8
	AUG	376.0	1115.5	160.0		AUG	446.2	1429.5	310.3
	SEP	387.6	1145.1	157.3		SEP	447.8	1443.0	363.2
	OCT	389.8	1180.1	183.9		OCT	461.4	1459.8	302.7
	NOV	392.1	1199.0	194.3		NOV	465.2	1515.7	343.5
	DEC	393.7	1220.1	224.8		DEC	490.7	1568.7	431.5
1978 -	JAN	542.3	1577.4	451.4	1979 -	JAN	604.1	1858.4	312.3
	FEB	525.1	1606.2	481.0		FEB	666.6	1971.5	300.8
	MAR	550.4	1611.7	468.7		MAR	666.9	1986.2	255.7
	APR	547.9	1625.0	486.5		APR	622.8	1931.7	289.8
	MAY	574.0	1680.4	452.3		MAY	642.3	1993.6	282.0
	JUN	596.0	1724.0	446.7		JUN	675.3	2038.4	260.3
	JUL	596.0	1764.6	383.9		JUL	655.6	2073.3	271.4
	AUG	634.8	1798.5	421.1		AUG	676.3	2084.6	282.2
	SEP	630.6	1845.6	397.1		SEP	725.8	2247.6	277.4
	OCT	640.9	1850.5	375.2		OCT	622.5	2146.9	270.3
	NOV	629.3	1897.6	319.4		NOV	666.9	2254.3	265.7
	DEC	636.4	1950.4	318.7		DEC	669.4	2262.7	379.2
1980 -	JAN	690.4	2368.5	290.2	1981 -	JAN	770.0	2855.7	454.7
	FEB	720.2	2418.9	308.0		FEB	829.5	2927.0	445.4
	MAR	699.6	2482.2	327.5		MAR	823.7	2974.7	447.5
	APR	702.5	2509.9	343.6		APR	866.7	2999.9	463.1
	MAY	764.2	2631.0	352.6		MAY	945.2	3228.1	478.5
	JUN	792.7	2632.4	419.1		JUN	1041.9	3385.6	545.8
	JUL	827.2	2687.5	431.6		JUL	1005.4	3438.3	457.9
	AUG	815.3	2766.0	390.4		AUG	936.3	3467.3	484.9
	SEP	795.5	2758.7	395.8		SEP	1019.9	3525.4	474.7
	OCT	778.0	2732.3	397.0		OCT	1107.9	3641.6	461.2
	NOV	776.5	2814.8	460.8		NOV	1170.5	3725.5	517.7
	DEC	720.8	2857.6	506.2		DEC	1290.2	3866.0	679.3
1982 -	JAN	1547.5	4028.4	623.3					
	FEB	1673.0	4132.9	565.0					
	MAR	1629.9	4205.0	593.9					
	APR	1596.0	4202.6	569.0					
	MAY	1662.3	4148.0	652.7					
	JUN	1695.7	4262.4	685.0					
	JUL	1508.9	4160.0	656.1					
	AUG	1317.8	4082.2	676.4					
	SEP	1263.7	4113.2	688.9					
	OCT	1203.0	4073.3	825.6					
	NOV	1269.8	4168.8	1027.3					
	DEC	1247.6	4182.7	1097.6					

Source: IMF

Table A.17: Exchange Rates vis-a-vis the U.S. Dollar

	KD/$	STG/$	DM/$	YEN/$	SF/$
1977 - JAN	0.2870	0.5839	2.3491	292.10	2.4473
FEB	0.2894	0.5829	2.4218	288.00	2.5178
MAR	0.2885	0.5834	2.3909	281.95	2.5509
APR	0.2885	0.5811	2.3917	276.99	2.5463
MAY	0.2868	0.5815	2.3503	276.75	2.5187
JUN	0.2872	0.5817	2.3587	277.23	2.5009
JUL	0.2878	0.5811	2.3405	267.69	2.4652
AUG	0.2851	0.5763	2.2584	264.78	2.3957
SEP	0.2866	0.5738	2.3164	267.40	2.3919
OCT	0.2863	0.5691	2.3042	260.56	2.3363
NOV	0.2850	0.5439	2.2475	247.84	2.2200
DEC	0.2838	0.5505	2.2273	245.05	2.1646
1978 - JAN	0.2800	0.5263	2.1130	240.34	2.0213
FEB	0.2810	0.5131	2.1121	241.56	1.9827
MAR	0.2737	0.5153	2.0116	237.94	1.8284
APR	0.2752	0.5336	2.0254	217.17	1.8660
MAY	0.2779	0.5472	2.0770	226.08	1.9588
JUN	0.2776	0.5480	2.0965	222.17	1.8992
JUL	0.2735	0.5342	2.0510	201.18	1.8077
AUG	0.2722	0.5192	2.0425	186.05	1.7208
SEP	0.2735	0.5159	1.9933	190.00	1.6530
OCT	0.2715	0.5030	1.8934	186.38	1.5613
NOV	0.2712	0.5074	1.8782	187.28	1.6195
DEC	0.2748	0.5130	1.9230	196.55	1.7270
1979 - JAN	0.2735	0.4969	1.8513	197.10	1.6535
FEB	0.2746	0.5014	1.8633	201.27	1.6911
MAR	0.2746	0.4943	1.8506	202.32	1.6675
APR	0.2771	0.4839	1.8824	214.47	1.7042
MAY	0.2796	0.4831	1.8988	224.76	1.7207
JUN	0.2792	0.4860	1.9191	221.03	1.7389
JUL	0.2759	0.4490	1.8334	216.77	1.6502
AUG	0.2746	0.4404	1.8275	215.83	1.6565
SEP	0.2765	0.4457	1.8215	221.60	1.6537
OCT	0.2764	0.4559	1.7516	223.50	1.5670
NOV	0.2791	0.4803	1.8040	237.84	1.6626
DEC	0.2785	0.4595	1.7475	245.91	1.6069
1980 - JAN	0.2740	0.4485	1.7155	238.50	1.5800
FEB	0.2724	0.4419	1.7350	239.20	1.6190
MAR	0.2738	0.4451	1.7861	246.89	1.7096
APR	0.2759	0.4578	1.8915	251.00	1.7915
MAY	0.2719	0.4437	1.7985	238.64	1.6640
JUN	0.2684	0.4303	1.7760	221.62	1.6502
JUL	0.2666	0.4211	1.7360	218.57	1.5870
AUG	0.2677	0.4224	1.7638	226.38	1.6255
SEP	0.2671	0.4140	1.7805	217.26	1.6371
OCT	0.2681	0.4160	1.8015	216.06	1.6490
NOV	0.2684	0.4091	1.9435	212.05	1.7462
DEC	0.2729	0.4266	1.9415	214.60	1.7515

Table A.17: .... continued

	KD/$	STG/$	DM/$	YEN/$	SF/$
1981 - JAN	0.2720	0.4188	1.9589	203.25	1.7695
FEB	0.2730	0.4252	2.1222	203.00	1.9180
MAR	0.2745	0.4514	2.1196	207.56	1.9265
APR	0.2743	0.4460	2.0973	211.65	1.9159
MAY	0.2761	0.4668	2.2095	214.49	2.0125
JUN	0.2794	0.4966	2.3633	223.95	2.0911
JUL	0.2825	0.5234	2.4072	227.96	2.0586
AUG	0.2856	0.5537	2.5089	240.79	2.1880
SEP	0.2831	0.5429	2.4374	229.70	2.1445
OCT	0.2837	0.5562	2.3181	232.39	1.9739
NOV	0.2822	0.5330	2.2133	227.81	1.7870
DEC	0.2822	0.5137	2.2272	216.15	1.7867
1982 - JAN	0.2812	0.5186	2.2471	218.75	1.7985
FEB	0.2845	0.5346	2.3435	233.10	1.8775
MAR	0.2845	0.5491	2.3672	235.95	1.8750
APR	0.2861	0.5613	2.4155	247.16	1.9370
MAY	0.2861	0.5549	2.3220	235.22	1.9422
JUN	0.2873	0.5603	2.3830	245.26	2.0342
JUL	0.2875	0.5746	2.4578	255.14	2.1022
AUG	0.2876	0.5771	2.4735	260.13	2.1009
SEP	0.2913	0.5814	2.4922	259.20	2.1230
OCT	0.2900	0.5880	2.5237	268.37	2.1675
NOV	0.2936	0.5949	2.5540	276.20	2.1948
DEC	0.2915	0.6120	2.4572	248.11	2.1132
1983 - JAN	0.2898	0.6164	2.3484	229.06	1.9641
FEB	0.2910	0.6579	2.4830	241.10	2.0365
MAR	0.2925	0.6616	2.4246	237.08	2.0484
APR	0.2924	0.6620	2.4111	237.17	2.0476
MAY	0.2912	0.6317	2.4439	236.78	2.0588
JUN	0.2923	0.6275	2.5411	239.71	2.1025
JUL	0.2935	0.6533	2.5375	238.92	2.0983
AUG	0.2961	0.6542	2.6216	240.91	2.1154
SEP	0.2925	0.6700	2.7066	246.76	2.1924
OCT	0.2900	0.6727	2.5958	232.39	2.0978
NOV	0.2918	0.6741	2.6509	234.54	2.1542
DEC	0.2923	0.6835	2.7018	233.85	2.1690

Source: Orion Royal Bank

Table A.18: Exchange Rates vis-a-vis the Kuwaiti Dinar

	STG/KD	DM/KD	YEN/KD	SF/KD
1977 - JAN	2.0346	8.1849	1017.74	8.5271
FEB	2.0141	8.3680	995.12	8.6995
MAR	2.0222	8.2878	977.33	8.8424
APR	2.0144	8.2903	960.16	8.8263
MAY	2.0274	8.1948	964.98	8.7820
JUN	2.0252	8.2125	965.26	8.7075
JUL	2.0189	8.1323	930.11	8.5656
AUG	2.0213	7.9214	928.72	8.4031
SEP	2.0022	8.0826	933.04	8.3460
OCT	1.9877	8.0482	910.09	8.1604
NOV	1.9085	7.8862	869.66	7.7898
DEC	1.9398	7.8483	863.46	7.6272
1978 - JAN	1.8798	7.5468	858.40	7.2191
FEB	1.8260	7.5162	859.64	7.0560
MAR	1.8828	7.3494	869.33	6.6803
APR	1.9390	7.3599	789.18	6.7807
MAY	1.9692	7.4739	813.51	7.0485
JUN	1.9740	7.5524	800.35	6.8415
JUL	1.9534	7.4994	735.58	6.6098
AUG	1.9074	7.5041	683.54	6.3223
SEP	1.8864	7.2881	694.71	6.0439
OCT	1.8527	6.9740	686.47	5.7505
NOV	1.8708	6.9254	690.54	5.9716
DEC	1.8667	6.9976	715.22	6.2842
1979 - JAN	1.8168	6.7692	720.69	6.0458
FEB	1.8259	6.7856	732.96	6.1584
MAR	1.8003	6.7393	736.80	6.0725
APR	1.7463	6.7933	773.98	6.1500
MAY	1.7280	6.7911	803.87	6.1543
JUN	1.7408	6.8735	791.65	6.2280
JUL	1.6275	6.6451	785.71	5.9813
AUG	1.6039	6.6554	786.01	6.0325
SEP	1.6120	6.5877	801.46	5.9811
OCT	1.6495	6.3373	808.66	5.6696
NOV	1.7209	6.4637	852.19	5.9570
DEC	1.6497	6.2746	882.95	5.7695
1980 - JAN	1.6369	6.2609	870.47	5.7665
FEB	1.6222	6.3692	878.10	5.9434
MAR	1.6257	6.5233	901.72	6.2439
APR	1.6593	6.8558	909.72	6.4934
MAY	1.6319	6.6147	877.72	6.1201
JUN	1.6032	6.6171	825.74	6.1484
JUL	1.5796	6.5119	819.88	5.9531
AUG	1.5778	6.5886	845.64	6.0781
SEP	1.5499	6.6657	813.37	6.1289
OCT	1.5516	6.7191	805.85	6.1505
NOV	1.5243	7.2411	790.06	6.5061
DEC	1.5632	7.1143	786.38	6.4181

Table A.18: .... continued

	STG/KD	DM/KD	YEN/KD	SF/KD
1981 - JAN	1.5398	7.2023	747.27	6.5059
FEB	1.5575	7.7738	743.58	7.0257
MAR	1.6445	7.7217	756.14	7.0183
APR	1.6260	7.6461	771.61	6.9850
MAY	1.6907	8.0025	776.85	7.2889
JUN	1.7775	8.4588	801.57	7.4845
JUL	1.8527	8.5209	806.90	7.2868
AUG	1.9387	8.7849	843.14	7.6613
SEP	1.9177	8.6100	811.40	7.5753
OCT	1.9603	8.1707	819.13	6.9576
NOV	1.8889	7.8431	807.28	6.3328
DEC	1.8206	7.8927	765.97	6.3314
1982 - JAN	1.8442	7.9913	777.94	6.3962
FEB	1.8790	8.2371	819.30	6.5992
MAR	1.9301	8.3201	829.28	6.5902
APR	1.9617	8.4426	863.87	6.7700
MAY	1.9396	8.1158	822.13	6.7885
JUN	1.9503	8.2941	853.65	7.0802
JUL	1.9984	8.5488	887.43	7.3119
AUG	2.0064	8.6000	904.45	7.3047
SEP	1.9959	8.5558	889.84	7.2882
OCT	2.0274	8.7027	925.41	7.4741
NOV	2.0263	8.6991	940.79	7.4756
DEC	2.0993	8.4292	851.10	7.2492
1983 - JAN	2.1269	8.1037	790.41	6.7775
FEB	2.2607	8.5325	828.51	6.9983
MAR	2.2618	8.2890	810.51	7.0030
APR	2.2642	8.2460	811.14	7.0029
MAY	2.1693	8.3925	813.11	7.0698
JUN	2.1469	8.6933	820.08	7.1929
JUL	2.2258	8.6455	814.03	7.1491
AUG	2.2093	8.8536	813.61	7.1441
SEP	2.2906	9.2532	843.62	7.4954
OCT	2.3199	8.9510	801.37	7.2337
NOV	2.3101	9.0849	803.80	7.3824
DEC	2.3385	9.2430	800.03	7.4202

Source: Orion Royal Bank

Table A.19: Data Used to Estimate the Model of Chapter 6*

		C	CR	D1	D2	D3	D4
1975	1						
	2						
	3						
	4						
1976	1						
	2						
	3						
	4						
1977	1	136.9	947.1	0	0	0	0
	2	139.8	1082.8	0	0	0	0
	3	143.4	1177.5	0	0	0	0
	4	150.9	1242.3	0	0	1	0
1978	1	160.3	1190.0	0	0	0	0
	2	167.1	1277.0	0	0	0	0
	3	178.2	1349.8	0	0	0	0
	4	177.0	1559.4	0	0	1	0
1979	1	187.8	1665.9	0	0	0	0
	2	189.7	1814.4	0	0	0	0
	3	212.4	2085.1	0	0	0	0
	4	215.9	2118.3	0	0	1	0
1980	1	222.3	2241.9	0	0	0	0
	2	223.6	2300.0	0	0	0	0
	3	237.0	2559.2	0	0	0	0
	4	251.3	2671.4	0	0	1	0
1981	1	248.3	2800.3	0	0	0	1
	2	261.6	2989.5	0	0	0	1
	3	264.3	3170.6	0	0	0	1
	4	284.7	3453.6	1	0	1	1
1982	1	310.7	3984.3	1	0	0	0
	2	324.4	4155.5	1	0	0	0
	3	334.8	4346.2	0	1	0	0
	4	342.7	4292.5	0	1	1	0

* Some data series start before 77(1) to take account of the values of lagged variables.

Table A.19: ....continued

	DD	G	GD	IM	NP	P
1975 1						
2						
3						
4						
1976 1		211.0				85.6
2		252.7				86.7
3		206.8				87.9
4	264.7	256.8				90.5
1977 1	287.2	315.5	70.5	340.0	81.9	93.5
2	309.2	362.9	74.8	340.1	91.6	93.5
3	304.4	455.9	77.1	314.5	91.0	95.5
4	339.7	397.0	112.8	392.5	160.0	98.1
1978 1	389.7	429.9	74.6	276.1	264.8	98.7
2	427.9	447.9	77.0	331.6	285.1	103.9
3	416.2	425.2	71.1	290.1	246.7	103.8
4	422.0	427.5	99.2	366.1	156.7	105.6
1979 1	410.8	498.2	62.1	323.0	44.6	105.9
2	442.1	439.6	59.7	346.2	-91.5	106.4
3	474.4	454.9	62.4	347.5	-207.4	107.5
4	410.6	624.3	149.0	420.2	-246.5	108.4
1980 1	431.6	469.7	159.7	363.3	-306.7	111.4
2	499.7	684.0	160.0	437.8	-323.2	113.7
3	500.5	695.7	150.3	439.3	-321.2	114.9
4	418.4	567.8	171.3	524.5	-361.0	117.8
1981 1	502.7	626.3	183.8	397.9	-361.3	120.1
2	682.7	863.8	186.0	493.3	-292.0	122.7
3	662.9	746.7	182.8	485.8	-246.3	123.2
4	930.1	760.2	211.0	568.4	-171.0	125.6
1982 1	1215.7	710.6	204.7	579.9	-172.0	127.9
2	1281.8	688.1	193.7	649.1	-294.7	132.2
3	851.3	587.6	191.3	579.2	-242.0	133.9
4	837.0	714.0	393.8	598.8	123.7	135.9

Table A.19: ....continued

		Pm	QM	R	RX	r_f	r_k
1975	1						
	2						
	3						
	4						
1976	1						
	2						
	3						
	4		826.5				
1977	1	110.2	888.4	98.8	45.7	5.25	6.38
	2	111.5	965.7	119.1	49.1	5.81	5.88
	3	112.1	995.3	118.3	36.4	6.91	5.69
	4	114.1	1078.1	271.0	46.2	7.19	5.44
1978	1	110.7	1093.4	26.3	43.1	7.50	4.94
	2	115.6	1166.0	38.6	43.0	8.69	5.06
	3	112.0	1232.3	31.2	34.2	9.53	5.19
	4	116.0	1351.4	94.7	46.6	11.69	6.50
1979	1	121.0	1387.7	29.7	49.2	10.66	7.13
	2	125.6	1406.7	54.2	59.0	10.59	7.44
	3	127.6	1560.9	54.7	50.0	12.66	9.00
	4	131.0	1663.2	143.4	62.7	14.50	11.00
1980	1	136.0	1828.2	92.7	69.4	19.94	13.75
	2	137.8	1909.0	154.6	83.2	9.75	8.75
	3	137.4	2021.2	120.7	79.4	13.94	12.25
	4	137.2	2187.8	221.7	70.8	17.75	14.88
1981	1	140.6	2223.8	159.6	91.7	14.25	10.38
	2	142.7	2441.3	196.6	107.8	17.63	9.25
	3	143.9	2598.3	167.0	112.1	17.88	9.63
	4	145.0	2652.9	321.6	108.1	13.63	9.25
1982	1	147.2	2678.7	325.0	94.4	15.50	10.25
	2	145.9	2656.2	308.3	97.8	15.38	12.25
	3	143.0	2927.0	309.1	98.5	11.31	12.00
	4	147.9	3003.1	625.9	107.3	9.19	5.88

Source:

r_f, r_k: Kuwait International Investment Company

Pm : Weighted Average of unit values of exports of Germany, Japan, the U.K, and the U.S., calculated from data supplied by the Central Bank of Kuwait and the International Monetary Fund. Base period is 76(1).

Table A.19: ....continued

		TD	X	Yn	Yo	Y_T
1975	1			233.9	619.4	
	2			280.1	604.5	
	3			228.8	656.6	
	4			283.2	578.5	
1976	1	858.2		299.4	542.4	
	2	987.1		358.5	526.2	
	3	1028.7		293.4	602.7	
	4	1091.2		364.3	852.8	
1977	1	1175.6	664.6	322.7	590.3	403.1
	2	1265.9	645.5	371.2	590.9	411.4
	3	1299.7	662.7	466.2	603.3	419.7
	4	1417.8	819.8	406.0	698.4	428.0
1978	1	1483.0	617.3	430.7	560.6	436.3
	2	1593.9	636.7	448.9	549.2	444.6
	3	1648.6	744.8	426.2	684.7	452.9
	4	1773.4	865.3	428.6	735.9	461.2
1979	1	1798.4	950.0	573.8	842.6	469.5
	2	1848.8	1185.4	506.3	989.9	477.8
	3	2035.2	1364.6	523.9	1178.6	486.1
	4	2073.9	1588.5	719.0	1409.3	494.4
1980	1	2259.9	1663.6	464.2	1483.1	502.7
	2	2408.7	1214.4	676.0	1184.1	511.0
	3	2521.6	1159.7	687.6	1120.6	519.3
	4	2606.3	1331.2	561.1	1273.7	527.6
1981	1	2726.5	1543.5	553.2	1441.8	535.9
	2	3123.9	1012.4	763.0	950.6	544.2
	3	3261.2	1032.7	659.5	865.2	552.5
	4	3583.0	942.2	671.4	867.4	560.8
1982	1	3894.4	767.8	786.9	620.5	569.1
	2	3938.0	726.0	762.0	667.0	577.4
	3	3778.3	820.3	650.7	729.8	585.8
	4	3840.1	814.2	790.6	768.6	594.1

Source:

Yn and Yo: interpolated from annual data.

Y_T: Calculated by regressing Yn/P on time T such that T = 1 in 1976(1).

Table A.20: Unit Value of Exports of Kuwait's Major Trading Partners (1975=100)

Period		U.S.A.	Japan	Germany	U.K.
1976	1	102.1	94.2	100.5	110.7
	2	103.1	96.5	101.0	116.1
	3	104.3	98.1	103.3	123.1
	4	106.5	103.3	102.9	130.5
1977	1	107.4	105.3	103.7	136.2
	2	109.0	103.3	103.4	141.9
	3	108.4	100.3	103.6	145.8
	4	109.2	98.1	103.6	148.5
1978	1	111.0	95.4	104.5	149.6
	2	113.4	100.0	104.8	153.7
	3	116.6	92.3	105.3	157.6
	4	120.2	91.0	106.3	161.1
1979	1	127.7	95.7	106.6	166.0
	2	132.1	102.3	107.4	169.2
	3	136.2	106.4	108.8	173.2
	4	139.3	111.0	110.8	178.8
1980	1	142.9	116.6	113.5	187.2
	2	143.8	117.5	115.0	191.7
	3	149.1	113.9	116.5	195.7
	4	156.0	112.9	118.9	196.7
1981	1	159.5	113.8	120.6	200.5
	2	161.2	117.8	122.3	206.3
	3	162.4	121.7	124.7	213.4
	4	163.8	122.7	125.2	218.8
1982	1	166.6	123.3	126.9	220.9
	2	164.9	126.3	128.4	220.8
	3	162.8	126.8	129.7	226.3
	4	162.5	125.7	129.8	230.4

Source: IMF

Table A.21: Kuwait's Imports from Major Exporters (KD million)

Period	U.S.A.	Japan	Germany	U.K.
1976 1	34.3	42.4	22.5	17.6
2	34.5	49.7	26.1	23.9
3	32.7	49.9	24.3	15.8
4	46.8	59.7	33.2	21.9
1977 1	50.7	68.6	35.0	27.5
2	48.0	68.7	34.3	31.4
3	29.6	61.9	30.1	25.8
4	60.9	76.1	29.0	52.8
1978 1	36.8	58.1	26.5	27.0
2	48.7	60.8	31.1	36.4
3	33.9	66.2	21.8	28.4
4	46.7	61.4	35.3	37.4
1979 1	43.4	54.0	28.2	38.7
2	50.6	59.3	29.2	36.5
3	47.1	65.7	24.1	31.6
4	66.5	83.4	33.3	37.6
1980 1	46.9	72.2	28.7	33.5
2	72.7	82.5	34.9	37.9
3	59.9	88.5	39.8	38.0
4	76.3	127.3	48.1	42.7
1981 1	56.8	91.4	47.2	38.8
2	71.8	118.0	49.8	41.4
3	64.4	110.7	55.9	33.5
4	78.9	121.8	81.0	38.3
1982 1	86.8	119.1	93.1	41.6
2	82.0	161.4	89.4	42.3
3	66.5	144.0	74.8	38.3
4	67.7	151.3	75.3	45.3

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