

A MONETARY BASE ANALYSIS AND CONTROL
MODEL FOR TURKEY

By

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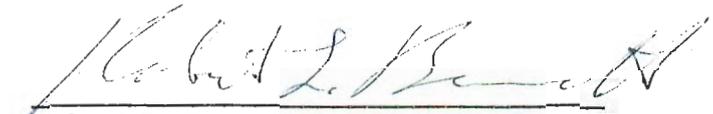
Thesis submitted to the Faculty of the Graduate
School of the University of Maryland in partial
fulfillment of the requirements for the degree
of Master of Arts, 1976

APPROVAL SHEET

Title of Thesis: A Monetary Base Analysis and Control Model for Turkey

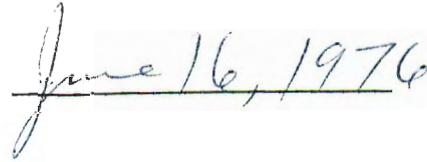
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ABSTRACT

Title of Thesis: A Monetary Base Analysis and Control Model for Turkey

Haluk Ferden Gursel, Master of Arts, 1976

Thesis Directed by: Robert L. Bennett, Associate Professor, Department of
Economics

A monetary base analysis and control model is the focus of the paper. In the first chapter, the monetary base approach is presented and the links between monetary base, money supply and money income are shown. Further, the monetary policy problems of the developing countries are reviewed.

The second chapter describes the institutional framework for Turkey. Here, as background information, the Central Bank, the Treasury and the State Economic Enterprises are examined from a monetary policy viewpoint. Also the stability of prices, the credit system, interest rates, money and security markets and foreign sector developments in recent decades are summarized.

In the third chapter, the model which highlights the essentials of monetary base control is constituted. Here, the "direct" control of reserve money sources is suggested, and given the exogenously determined components of reserve money sources, the limits on the range of deliberate Central Bank-Treasury asset changes, through exchange rate, rediscount rate, open market interventions, etc., are estimated. The recommended use of the policy variable defined is explained in the last chapter.

INTRODUCTION

Perhaps the oldest and best established proposition in monetary theory states that the government or central bank controls the nominal stock of money while the public decides on the price level at which it willingly holds the nominal stock.¹

But the question for most underdeveloped countries (as well as some developed countries recently) is to limit the growth of money supply without prejudicing economic stability and existing employment in an effort to control the movement of prices and money income. For such a task, many instruments are available and different policies may be formulated.

In this study, we will concentrate in a short-run monetary analysis and control model for Turkey, formulated in terms of monetary base source control.

In the first chapter the monetary base control approach is explained and, in a money stock adjustment model, the effectiveness of the control of the monetary base is investigated.

A second chapter gives the institutional characteristics of the Turkish economy in various areas which are important in the determination of money.

The next chapter explains the monetary base model used. Here, starting with the assumption of at least partial exogeneity of the money supply, the relations between nominal income, money supply and the monetary base are empirically

¹Meltzer, Allan H., "Controlling Money," Federal Reserve Bank of St. Louis Review, May 1969, p. 21.

tested. The model also assumes that in the short-run foreign reserve accumulation and commercial banking system credit from central bank are essentially determined exogenously to the model. Then, recognizing that the monetary authorities can only indirectly affect endogenously determined variables, we examine the components of the base separately in an attempt to assess their individual susceptibility to policy control.

Having distinguished the exogeneously determined variables and those which can be controlled by the monetary authorities we can then determine the desired change in the base and design a method for implementing it through the control variables.

Finally tentative policy recommendations derived from the model, which could be useful for other similar developing countries, are summarized in the last chapter.

It should be stressed however that it is different and an easier matter to identify a set of recommended policy measures than to implement them. Required measures of the necessary magnitude and timing may not be politically feasible, with the possible consequences of continuing or accelerating inflation and unstable growth which pose the threat of an ultimately more painful and large scale adjustment process in the future.

ACKNOWLEDGEMENTS

I would like to express my deep gratitude to Professors Robert L. Bennett, Charles Lieberman and John E. Morton for their advice and comments which were most helpful to me in the preparation of this thesis. I would also like to thank the Computer Science Center at University of Maryland and USAID for their support. I also appreciate the comments of Phillip Rourk.

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CHAPTER 1

The Monetary Base and Its Importance in Controlling Money

A. Definition of the Monetary Base

In recent years, there has been much research on the relationship between total expenditures, prices, and monetary aggregates. This discussion also addresses the question of which monetary aggregate is the most influential and which should be used as a target policy variable. While some writers¹ present evidence supporting the effectiveness of discretionary monetary policy, others² question the ability of monetary authorities to control the quantity of the money supply in the short run.

The proponents of the use of monetary aggregates as policy variables do not agree as to which of these aggregates have stable relationships. Evidence from discussions suggests that the monetary base recently has achieved prominence as a measure of monetary influence on the economy.³ The monetary base⁴ can be

¹For example see: Meltzer, Allan H., "Controlling Money," Federal Reserve Bank of St. Louis Review, May 1969, pp. 16-24.

²See: Maisel, Sherman, "Controlling Monetary Aggregates, University of Michigan, March 11, 1969 Speech," Federal Reserve of St. Louis, 1970.

³Andersen, Leonall C. and Jerry L. Jordan, "The Monetary Base - Explanation and Analytical Use," Federal Reserve Bank of St. Louis Review, August 1968, p. 7.

⁴Sometimes called "reserve money," "source base" (Andersen-Jordan), "high-powered money" (Friedman-Schwartz-Cagan); Brunner-Meltzer prefer "monetary base."

expressed in the following form:

$$M^S = RE \cdot r \quad (1)$$

where M^S = properly defined money supply, r = money supply multiplier and RE = base. "Use" of the monetary base consists of non-borrowed reserves of the commercial banking system and currency holdings of the commercial banking system plus public currency holdings. On the other side, "sources" of reserve money can be expressed as gold and foreign reserve holdings of the Central Bank plus Central Bank credits in various forms (i.e., rediscounts, advances or direct credits).

"Base use" is equal to "base sources."

If income and price changes are associated with changes in the money supply, then controlling the money supply would allow control of the former variables. In turn, it should be demonstrated that there exists a stable relationship between the money supply and the monetary base which can be defined through the money multipliers. Meanwhile, the monetarist proposition also assumes that fiscal policy is not important in affecting output. Meltzer says that "evidence from past periods suggests that the monetary base is the most important determinant of the money supply and there is a high degree of association between the base and money stock."⁵

The control of the money supply through the monetary base, in the first place would depend on the availability of information about the components of the base and their predictability. If the current monetary base figures would be obtained promptly and changes of each variable would be estimated with sufficient precision, the money supply changes can be analyzed as a monetary base stock adjustment form, the

⁵Meltzer, "Controlling Money," p. 18.

adjustment period depending on the time required for the availability of data and reaction of the monetary authorities.

B. Operation of Reserve Money Models

In such a model, the first set of problems involves:

1. To get an accurate estimate of the size of the current change in the target variable,
2. To have a clear idea of the desired value of the target variable (monetary base in our case),
3. An ability to translate the longer term goals of monetary policy into a desired current value of the target and to translate changes in the target into changes in the rate of inflation, level of employment or balance of payments.⁶

Obviously, the last one is the most difficult task to accomplish.

After calculating the size of the desired change in the target variable, the question becomes how a desired change can be implemented. Clearly, not all the components of the monetary base are equally sensitive for defensive operations. That is, certain components are more amenable and effective policy instruments. One can make a distinction between "autonomously determined" (or so-called non-controlled) and "control" variables. In other words, some components of the reserve money, determined elsewhere in the economy, would follow their paths, while some others could be changed by policy actions.

⁶Meltzer, "Controlling Money," p. 20.

C. Policy Problems in Developing Countries

Having our "control base" variable we can accomplish the desired changes using various measures.

The policy measures available for developing countries are, in general, somewhat different from the ones available to the developed countries. In fact, following Dorrance, they can be classified in five groups.⁷

1. Direct regulation of deposit-money bank lending,
2. Open market operations,
3. Variation of deposit-money bank reserve requirements,
4. Manipulation of government accounts,
5. Control of central bank credit to the deposit-money banks.

Another measure, changes in the exchange rates should be added to this list.

One can object to the use of the first measure by developing countries on the grounds that such a system of controls, since it would involve specific controls over the actions of the individual institutions, is more likely to freeze the status quo rather than to encourage competitive portfolio adjustment.⁸

Open market operations, as their names suggest, are the purchases or the sales of securities in a money market. Although for developed countries this tool is considered one of the most effective control mechanisms, for developing

⁷Dorrance, Graeme S., "Instruments of Monetary Policy in Countries Without Highly Developed Capital Markets", International Monetary Fund Staff Papers, Vol. XII, July 1965, p. 272.

⁸Op. cit., p. 273.

countries it can be dismissed for at least two reasons: there is no money market, and there are few bonds. In fact, money is used strictly for transaction purposes and has little speculative value. However, money may be used as a store of value. Polak⁹ explains this situation saying:

There is little in between. Treasury bills, government bonds, prime industrial bonds, readily marketable shares -- all these assets that form the transition between money and real assets in countries with fully developed financial systems play a minor role in the asset structure of the less developed countries -- (And) there is little room for short-run changes between money and real assets on the basis of changes in the rate of interest.

A third measure which does not require any change in monetary authorities' (Central Bank) assets is changes in legal reserve requirements. However, there is a possibility that if, due to their expectations, the banking system would change their cash reserves legal reserve deposit relation, then, the effectiveness of this measure would be reduced. In other words, if cash reserves, expressed as a ratio of legal reserve requirements are constant, then this measure is likely to have a larger impact. In particular, it may prove to be a most useful instrument in dealing with crisis or near-crisis situations (putting a general contractionary pressure on the monetary system).¹⁰

Manipulation of government accounts refers to where government deposits are to be held. If they are in deposit-money banks, they are adding to the reserves of the banks; therefore, they are contributing to the increases in money supply. Transfer of these funds to the central bank or treasury would have an effect similar

⁹Polak, J.J., "Monetary Analysis of Income Formation and Payment Problems" International Monetary Fund Staff Papers, Vol. XI (1947-58), p. 39.

¹⁰Dorrance, op cit., p. 276.

to the reduction of the monetary base or sale of securities, if it could be assumed that the public could not entirely offset the effect of the Central Bank action.

Another measure we can include in this category, among the ones available to the developing countries, is the control of central bank credit to the commercial banking system. For developed countries this type of credit is considered, among other things, as a function of the interest rate paid on rediscounted papers by the commercial banking system. In fact, in most developing countries, where financial markets are in an early stage of evolution, the desire of a community to borrow is likely to be almost insatiable at any reasonable level of interest rates.¹¹ In this case, the Central Bank may exercise other types of controls (for example, credit limits or selective credit preferences, etc.).

The last tool, changing the exchange rates, requires a closer look. Although it is primarily suggested to restore the balance of payments,¹² there are monetary consequences arising from it. Suppose a small country which cannot affect the world monetary system had devalued its currency. That means in terms of foreign currency its real cash balances are reduced and the people in this country are induced to restore their real cash balances to previous levels. That is an inducement toward a higher nominal money supply. Meanwhile there is a once-for-all balance of payment surplus in terms of domestic currency arising from this government operation. The foreign reserves evaluated at the new rate now have a higher value in terms of domestic

¹¹Dorrance, op. cit., p. 278.

¹²For example see: Mundell, Robert L., "The Appropriate Use of Monetary and Fiscal Policy for Internal and External Stability," International Monetary Fund Staff Papers, Vol. IX (March 1962), pp. 70-85.

currency. Since this "impact effect" of the devaluation is a result of a monetary authority's (government) decision, the change should be considered autonomous in nature.

But the developments following the change in the exchange rate, that is, new export earnings and capital inflow less import expenditures, shortly balance the movements arising from the application of the new rates and are not determined by monetary authorities' action itself; they result from the operation of the economy. At this stage, the foreign reserve accumulation is exogenous to the monetary system. If there is no sterilization (or neutralization) of the inflow, then the money supply would be increased through an increase in reserve money caused by the increased foreign asset holdings of the monetary system. Also in most developing countries, since imports are heavily taxed, import proceeds would increase by devaluation (or vice versa). This may be considered as an alternative to government credit from the Central Bank, at least in the short-run.¹³

Most countries feel that some amount of foreign asset holdings is required either to avoid interruptions in foreign transactions or, since changes in the reserve accumulation are considered a signal of over- or under-valuation of the domestic currency, to assure the confidence in their currency by foreigners and by their own citizens. So, almost every country holds a foreign asset reserve, the size depending on various variables .

¹³ Strictly speaking, this increase in import tax proceeds would depend on the demand elasticities of import goods. Since the goods upon which tariffs are imposed are necessities, a higher tariff rate will reduce demand but will increase tariff revenues.

Now suppose that a country, because of capital outflow, is running down its foreign reserves. Since this signals that the domestic currency is over-valued, it requires, among other things, a decrease in the value of domestic currency to reach its equilibrium value, that is to obtain balance of payments. But government may require a certain size of foreign reserve stock adjustment also. In this case, in general, to obtain the desired amount through the balance of payments, the country is willing to pay a premium over the discounted value of the future price of its currency. That means a country should apply an exchange rate below its equilibrium value or it should accept an under-valued domestic currency price. In this case the under-valuation would depend on the size of the desired foreign exchange stock and the time available to obtain this stock.

In general, the faster an accumulation of reserves is desired, the greater domestic price changes take place; since during a quick accumulation, sterilization and/or similar resulting operations cannot be accomplished, at the same speed as contributions of the new reserves acquired, then monetary base will grow faster, which, in turn, would lead to a relatively higher increase in money supply and domestic prices. When prices and the money supply are high enough to restore the old real cash balances, foreign reserve accumulation will stop. And thereafter to start the cycle a new devaluation would be required.

The equilibrium value of domestic currency (including desired foreign reserve stock) cannot be calculated easily in developing countries and these countries have a tendency to under-value their currency by a substantial margin, which in turn usually will cause a larger inflationary impact. To prevent this, the monetary

base and the money supply should be severely restricted. Among the other ways leading to sterilization, a trial and error mechanism could be suggested. In other words, one could begin with a greater devaluation than required; when a larger (than desired) capital inflow was observed, then one could proceed with a revaluation of the currency, and following the results resort to further devaluation or revaluation as required to move towards the equilibrium path of the value of the currency. Such a program would be appropriate under the following circumstances:

1. If the central bank has reliable information about the price elasticity of foreign currencies.
2. If frequent changes do not change the expectations about future prices of domestic currency; that is, first, in terms of speculation which might be unstabilizing, second, in terms of businessmen, who would seek greater profit margins to hedge against the variations in exchange rates.

In practice, these conditions cannot be fulfilled easily. Although in the case of over-valuation of the domestic currency, devaluation is recognized as a means of restoring the balance of payments, in the case of an under-valued currency, the alternative revaluation, is not in general widely accepted.

Turkey, as a developing country, is experiencing nearly all of the above conditions. In the following chapters we will try to develop a monetary base control model taking into consideration the limitations mentioned above.

So far, we explained the analytical grounds behind a monetary base control mechanism. In the following chapters, we will present the model constructed for this purpose. But first, we would like to demonstrate some characteristics of the Turkish economy.

CHAPTER II

Institutional Framework for Monetary Policy in Turkey

A. Monetary Authorities and Institutions

1. Central Bank

After declaration of the Republic in 1923, one of the first steps taken by Ataturk, the founder of modern Turkey, toward an independent economy was the constitution of a Central Bank, distinct from the government body. Although it was initially intended that the Central Bank be autonomous, in practice, until 1970 the Bank was effectively under the control of the Ministry of Finance. In 1970, a new Law,¹ after a many-year passage through the National Assembly, brought a partial degree of independence to the Central Bank. It provided greater autonomy to the Bank in the exercise of its constituted responsibilities, the issuance of currency (except coin issues), the determination of rediscount rates on commercial paper, interest rate ceilings for the commercial banking sector and the reserve requirement ratios, the undertaking of open market operations, serving as the nation's foreign exchange reserve repository, and the determination of foreign exchange rates. In addition, the Bank was empowered to regulate the terms of consumer credit and private sector bond issues. However, the central banks cannot engage in some transactions; it cannot provide any direct credit to the individuals, it cannot accept deposits from individuals, and it cannot rediscount Treasury short-term bonds.

¹Law No. 1211, Publication in "Official Gazette" of Turkey, 1.12, 1970.

SEE's more on the basis of pragmatism and expediency than on the basis of any doctrine, although it was influenced by the 1930's experiences of State Capitalism.³ SEE's operate in manufacturing, transportation, mining, storage and sales of major agricultural products, and in the form of specialized public financial institutions. Until the early 1960's, the growth of the SEE's was substantial and was supported by large government subsidies to compensate for deficits incurred through artificial price ceilings and managerial inefficiency. Following the 1960 military coup d'etat, the Government ordered an investigation which resulted in a new organization which brought the SEE's under stricter Treasury control. The new Laws⁴ established the State Investment Bank to supply long-term investment funds to the SEE's and effected reorganization intended to raise their productivity and stimulate internal savings.

Most of the outstanding debts of the SEE's were already consolidated in 1961.⁵ The new system also severely restricted SEE access to new direct credits from the Central Bank. These credits were limited to SEE's dealing in support purchase of surplus crops and manufacturing of agricultural products. All other credits to the SEE's must now be obtained through the Treasury.

B. Stability of Prices and Financial Institutions

1. Prices

The domestic currency in Turkey is the "lira" whose value (at the end of

³World Bank Report: Turkey, Prospects and Problems of an Expanding Economy, Washington, D.C., February, 1975, p. 73.

⁴Law 440 and 441 which replace Law 3460.

⁵Law 154, in 1961.

1974) equals 1 Turkish Lira (TL) = \$.066 (approximately) or \$1 = TL 15 (approximately). In 1946, this value was determined as \$1 = TL 2.80. But price increases averaging 10% a year, during the period 1950-60 led to a 68.9% devaluation in 1958-1960 (in two steps) and another 40.0% devaluation in 1970. In the 1960-1970 period, average price increases were about 6%. However, this low rate was obtained by controlling the prices of basic products produced by SEE's. Transportation, fuel, electricity and basic foods were among those controlled commodities. The huge deficits incurred by these institutions were paid by the Treasury having recourse Central Bank resources. The accumulated effect of this policy resulted in a 14% price change in 1970. However, in that year, some other factors contributed to this development. For instance, the Law which brought as much as 100% increase in government employees' salaries passed the National Assembly that year. This in turn encouraged private sector employees to strike for wage increases. Also, carryover agricultural surpluses caused by good weather conditions in previous years, and the devaluation which resulted in increased remittances from Turkish workers in Europe whose numbers had been sharply increasing both contributed to accelerating inflation after 1970. Price increases accelerated to about 20% in 1973 and 1974 in terms of GNP deflator. Then, the need for the control of inflation was recognized to be urgent, "in order to protect the benefits of rapid growth and balance of payment improvement in recent years."⁶

⁶ World Bank Report, p. 19.

2. Interest Rates

In Turkey, most interest rates charged by licensed credit institutions are under strict official control of the Government. To give an idea of the course of regulated interest rates Table 1 was prepared.

Table 1
Interest Rates in Turkey
(1961, 1970)

	Nominal Interest <u>(1961)</u>	Nominal Interest <u>(1970)</u>
Credits		
Ordinary and open cr.	10.5	11.5
Agricultural, export financing, artisans and small traders (the last two through the People's Bank)	9.0	10.5
Medium and long-term credits of the Agricultural Bank	7.0	10.5
Credits opened according to Act No. 5389 by the Agricultural Bank	3.0	3.0
Deposits		
Sight - 4 months time (excluding saving deposits)	2.0	1.0
Sight - 4 months time (only savings deposits)	3.0	3.0
4-6 months time	4.0	4.0
6-12 months time	5.0	6.0
12-18 months time	6.0	9.0
Over 18 months time	6.5	9.0

Source: Central Bank of the Republic of Turkey, Summary of Money and Credit Statistics, 1968 and 1971 issues.

In practice, however, banks can easily evade these regulations by adding various transaction costs. In addition, it should be pointed out that the secondary unorganized money market in Turkey, which is beyond Government control, is estimated to be of considerable size and importance.

Interest rates in these markets are even higher than those charged by licensed institutions including transactions costs. According to a 1972 study by Fry, "there have been reports that loans for construction in the Capital, Ankara, stand at around 70%. Much higher rates in rural areas have been reported."⁷ Real transactions costs and changes are difficult to measure, so that the difference between rates actually charged and market equilibrium rate is difficult to estimate, though it is fairly certain that the equilibrium rate is higher than that fixed by regulation.

3. Credit System

Given the regulated structure of the legitimate credit market in Turkey, and the specialized sectors in which they are primarily intended to serve, it would be difficult to say that credit is allocated according to objective criteria. Imperfect market and social conditions interpose themselves in the availability and distribution of financial resources. Practices such as preferential treatment of established customers are common.

The Government attempts to allocate credits in conformity with development and other objectives through the instrument of interest rate differentials and rebates to favored sectors. But it is not certain that credits given on this basis are used completely for their stated purposes.

⁷Fry, op. cit., p. 114.

Central Bank rediscounts and credits to the commercial banking system are relatively low in volume relative to total credits. That means the banking system relies more on its own resources. Even interest differentials on rediscounts and advances from Central Bank to priority sectors did not become an effective tool until recent years. But after 1970, with the acceleration of inflation a considerable demand increase was observed. However, in general the Central Bank primarily finances the Government sector and SEE's.⁸ The priority relationship between the Central Bank and Government-SEE's is the main reason for limited nature of Central Bank-commercial banking system relations.⁹

4. Money and Security Markets

Security markets are almost non-existent in Turkey.¹⁰ However, the total of the outstanding securities is relatively high. The private sector share is modest, and, until recent years, privately owned bonds typically were not marketed. Most securities are government issues. But the short-coming of these securities is that they were sold and are held by savings-generating Government institutions (such as compulsory insurance companies, created by special laws), rather than by the public. Also, Banking Law requires that a certain percentage of the profits of the banks be used in purchasing government securities. So that, most of these securities could be thought as perpetual debt, as they usually are renewed at their maturities.

⁸State Planning Organization, The New Strategy for Development Plans, Third Five-Year (1973-77), Ankara, 1973, pp. 875-876.

⁹Akguc, Oztin, Cumhuriyet Devrinde Bankacilik Alaninda Gelismeler (Developments in the Banking Sector After Independence), Banks Association of Turkey, Ankara, 1975, p. 59.

¹⁰World Bank Report, op. cit., p. 20.

To give an idea about the components of the internal debt and its developments

Table 2 was prepared.

Table 2
Internal Public Debt, Selected Years
(TL million; outstanding as of end-December)

	<u>1963</u>	<u>1970</u>	<u>1971</u>	<u>1972</u>
I. General Budget	<u>3.672</u>	<u>18.402</u>	<u>23.190</u>	<u>25.171</u>
1. Treasury Bills	344	--	--	--
2. Treasury Placement Bonds	187	978	2.240	1.326
3. Long-term Government Bonds ¹	737	2.818	3.238	6.286
4. Domestic Consolidated Debts ²	7.036	7.340	7.283	7.380
5. Consolidated Municipalities Debts ³	--	892	2.907	2.488
6. Savings Bonds	1.232	6.244	7.397	7.592
7. Other Debts ⁴	136	130	125	105
II. Annexed Budget ⁵ - State Water-works Bonds	<u>20</u>	<u>9</u>	<u>7</u>	<u>5</u>
III. State Investment Bank Bonds ⁶	<u>669</u>	<u>6.776</u>	<u>7.926</u>	<u>8.590</u>
IV. State Economic Entr. ⁷	<u>573</u>	<u>548</u>	<u>507</u>	<u>467</u>
V. Municipal Bonds	<u>96</u>	<u>203</u>	<u>192</u>	<u>180</u>
TOTAL	<u>11.030</u>	<u>25.938</u>	<u>31.822</u>	<u>34.419</u>

¹Treasury

²Consolidated debts under Law 154 and 250

³Consolidated debts under Law 691

⁴Exchange losses paid to the Central Bank under Law 65.

⁵Treasury-guaranteed bond of State Highways and Monopoly Administration are excluded since they have a maturity of not more than a year.

⁶Including Amortization and Credit Fund Bonds

⁷Agriculture Bank, Real Estate and Credit Bank and People's Bank.

Source: Ministry of Finance of Turkey and World Bank Report: Turkey, Prospects and Problems of an Expanding Economy, Washington, D.C., February 1975, p. 73.

As can be seen from the examination of Table 2, the only remarkable change in domestic debt took place in Treasury long-term bonds. For these bonds, especially after 1971-72 marketing efforts gave good results and the amount of 3,238 million TL long-term bonds went up to 6,286 million TL. The distribution by ownership of the additional 4,000 million TL long-term government debt is given in Table 3.

Table 3
Long-Term Government Bonds by Ownership
(in million TL)

<u>Year</u>	<u>Total Issue</u>	<u>Purchasers</u>			
		<u>Banks</u>	<u>Private Companies</u>	<u>Public Institutions</u>	<u>Other</u>
1972	4 000	1905.1	156.3	1298.1	640.5

Source: Ministry of Finance of Turkey and World Bank Report: Turkey, Prospects and Problems of an Expanding Economy, Washington, D.C., February 1975, p. 399.

With continuing marketing efforts, the amount of outstanding bonds could continuously be increased, and, this would certainly be useful in husbanding Central Bank resources in the short-run.

5. Foreign Sector

The foreign sector of Turkey, until the 1970 devaluation was characterized by a continuous shortage of foreign exchange reserves; exports did not increase, imports had to be financed with the continuous help of foreign aid. 1970 was a turning point in this situation. Suddenly prospering Turkish workers in Europe

affected the balance of payments figures in favor of Turkey through their remittances, at least until 1974. It is also said, however, that these remittances were involved in the accelerating inflation of the early 1970's, through their impact on the money supply owing to the lack of proper sterilization measures.

With these words, we have completed the general description of the Turkish economy for our purposes. In the next chapter, we will try to describe a monetary base model whose properties are appropriate to such an economy.

CHAPTER III
A MONETARY BASE AND POLICY DETERMINATION
ANALYSIS MODEL FOR TURKEY

To this point we set the stage for a model to determine the monetary base for Turkey. In this chapter our purpose will be to form such a model for the Turkish economy.

In doing so, first we will present the monetarist model, then, show the justification for using the monetary base in determining monetary policy, in Turkey. Here, our purpose is to employ the close relationship between nominal income, money supply and reserve money variations, implied by the monetarist position.

Then we will investigate the possibilities for the change in monetary reserves required by chosen policies, taking into consideration each item in the monetary reserves. In other words, we will try to demonstrate the degree of autonomy and the limitations of each item as a policy variable.

A. Presentation of the Model

Following Polak and Argy,¹ let us define:

$$Y \equiv v M^S \quad (2)$$

where Y = Money income, M^S = Money supply.

This equation represents the monetarist view in which money is considered as the determinant of the nominal income, where (v) is the income velocity of

¹Polak, J. J. and Victor Argy, "Credit Policy and the Balance of Payments", International Monetary Fund, Staff Papers, Vol. 18, p. 2; See also, Polak, J. J. "Monetary Analysis of Income Formation and Payments Problems," International Monetary Fund, Staff Papers, Vol. 6, pp. 1-50; and Polak, J. J. and Lorette Boissonneault, "Monetary Analysis of Income and Imports and Its Statistical Application," Staff Papers, Vol. 7, pp. 349-415.

money demand (= supply). But we know that, in turn, the money supply is a function of money multipliers, and changes in money supply can be expressed as the changes in the monetary base and money multiplier.

$$\Delta M^S = \Delta RE \cdot \hat{\Delta r} + \Delta r \cdot RE + \Delta RE \cdot r \quad (3)$$

$$\text{where } RE = R + D \quad (4)$$

$$\text{and } \Delta RE = \Delta R + \Delta D \quad (5)$$

\hat{r} = Estimated money multiplier, R = Foreign reserve assets

RE = Reserve money, D = Domestic assets of Central Bank

For Turkey's case net foreign reserves can be expressed as:

$$R = R_g - FL \quad (6)$$

where R_g = Gross foreign reserve assets

FL = Foreign liabilities

Now suppose that domestic assets of the Central Bank can be expressed in the following composition:

$$D = G + S + B + O + B_A \quad (7)$$

where $G = G_o + T$ and

T = Treasury short-term credit from Central Bank

G_o = Other Government accounts at Central Bank

B = Claims on deposit money banks

B_A = Agricultural credit

S = SEE's credit from Central Bank

O = Other accounts in Central Bank

Also assume that in reserve money equation (4), R is exogenously determined and has the following implicit form:

$$R = f(X, K, M) \quad (8)$$

where X = Exports, K = Capital movements, M = Imports

Further, let B, commercial banking credits from Central Bank be determined elsewhere in the system and it is a function of certain specified variables such as production level, price expectations, rediscount rate of Central Bank, etc.

$$B = g(y, (\dot{p}/p)^e, i) \quad (9)$$

where y = Production in real terms,

$(\dot{p}/p)^e$ = Price change expectations,

i = Nominal rediscount interest rate of Central Bank

Then the equation (5) can be expressed as:

$$\Delta RE = \Delta(f(X, K, M)) + \Delta(G_o + T + S + O + B_A + g(y, (\dot{p}/p)^e, i)) \quad (10)$$

If we define the exogenously determined variables as E, this will have the following form:

$$E = ((f(X, K, M)) + g(y, (\dot{p}/p)^e, i)) + G_o \quad (11)$$

where E = Exogenously determined variables in reserve money

Our policy variable, PO which shows the ability of the Central Bank to manipulate its assets is defined to be:

$$\Delta RE = \Delta E + \Delta PO \quad (12)$$

or

$$\Delta PO = -\Delta E + \Delta RE \quad (13)$$

Substitute (11) into (13) to get:

$$\Delta PO = \Delta RE - \Delta(f(X, K, M) + g(y, (\dot{p}/p)^e, i) + G_0) \quad (14)$$

The equation (14) expresses the size of the control of the Central Bank over its asset changes.

Now, if M^{S*} is the desired money supply

$$\frac{M^{S*}}{\hat{r}} = RE^* \quad (15)$$

where \hat{r} = Estimated money multiplier

RE^* is the required reserve money.

To implement the policy, the monetary authority should calculate the required (desired) change in the monetary base:

$$RE^* - RE = \Delta RE^* \quad \text{where } RE^* > RE \quad (16)$$

But we know that some changes would happen autonomously or determined elsewhere in the economy. Then:

$$\Delta RE^* = \Delta E + \Delta PO^* \quad \text{or} \quad (17)$$

$$\Delta PO^* = \Delta RE^* - \Delta E \quad (18)$$

is the desired policy size which could be implemented through the changes in asset holdings of the Central Bank.

Now let us follow the implications of the model for Turkey's case.

B. Steps Toward a Policy Determination

1. A Decision Process

As we stated before, a policy action requires us to take a series of steps.

First, monetary authorities should be able to translate the longer term objectives

of the economy into short term movements. That means, they should estimate what the current situation implies about balance of payments, future prices, employment in the future, etc. Secondly, we need to ask, what should be the changes in current variables necessary to reach the desired future values of the economic aggregates. Later, the analysis of current situation comes into the picture. What are the changes from the previous period and what are the reasons for those changes?

Now the size of the desired changes and autonomous changes are estimated. After subtraction of the anticipated autonomous changes which would depend more or less on their time paths, the required policy to reach the desired change in economic aggregate is ready to be implemented, through the policy-sensitive variables. Let us follow the implication of these steps for our monetary base analysis and control model for Turkey.

2. Monetary Base, Money, Income Relations

To be able to say that control of the reserve money leads to the control of income, it has to be shown that the income and money supply (= money demand) relation is a stable one. Further, a stable (or "definable") relationship between reserve money and money supply should be demonstrated.

Money supply nominal income relationship can be expressed as equations (19) and (20) below. The coefficients of income, (Y) in the equations explain the effects of the unit Y change on money supply (M^S). That is, money demanded for unit income change (with the assumption $M^S = M^d$) is equal to Y. In estimations standard M^S_1 and M^S_2 definitions for Turkey are used.

$$\text{LogM}_1^S/P = -.341 + .4371 \text{ Log } y \quad (19)$$

(-.107) (1.40)

with $R^2 = .131$ and D.W. = .8842 $\rho = .763$

and

$$\text{Log M}_2^S/P = -.321 + .4652 \text{ Log } y \quad (20)$$

(-.088) (1.30)

with $R^2 = .115$ and D.W. = .7167 $\rho = .859$

Equation (19) and (20) implies that for one unit change in real income we should increase money supply (M_1 sense) .4371 times and (M_2 sense) .4652 times. In making comments on these figures, data unavailability, definitions problems for Turkey and the excluded variables (that is, i and \dot{p}/p effects) should be considered.²

After these observations, money supply and monetary base relationship should also be examined. In Table 4, the monetary base-money supply (for M_1 and M_2) relations are shown.

If we define monetary base³ in form of:

$$RE = m (DD + DDg) + u (PTDR) DD + PAR (DD) + DERP (DD) \quad (21)$$

where m = Reserve ratio on demand deposits,

DD = Demand deposits,

²In Aydin, Dr. Izzet, Para Politikasinin Teorik Yonu ve Analiz Modeli (Theoretical Aspects of the Monetary Policy and a Model to Analyze Turkish System), Ankara 1970, pp. 105-106, these elasticities are estimated as for M_1 , 0.9613 and for M_2 , 1.073. Fry, Maxwell J., Finance and Development Planning in Turkey, E. J. Brill (Leiden), 1972, in pp. 92-101, found close relationships between money and income, working with various definitions of money and lags. Considering the recent studies which report the real income elasticity at the neighborhood of .6, our estimates should be taken as statistically significant. The reason for a low Durbin-Watson statistic (even after adjustment for serial correlation) may well be a result of a non-linear or more than one period lagged error term.

³For the derivation of this see: Boorman, John T. and Thomas Havrilesky, Money Supply, Money Demand and Macroeconomic Models, Allyn and Bacon, 1972, pp. 18-30.

Table 4
 Money Multipliers for Turkey
 (1959 - 1974)

<u>Years</u>	<u>For M₁</u>	<u>For M₂</u>
1959	2.09	1.96
1960	2.09	1.92
1961	2.13	1.92
1962	2.11	1.90
1963	2.19	1.94
1964	2.17	1.92
1965	2.23	1.92
1966	2.36	1.99
1967	2.37	1.99
1968	2.43	2.01
1969	2.51	2.07
1970	2.69	2.14
1971	2.52	1.93
1972	2.36	1.76
1973	2.29	1.77
1974	2.22	1.74

Source: Prepared from International Monetary Fund, International Financial Statistics, Turkey Section, various issues.

DDg = Government deposits at commercial banks,

u = Reserve ratio on time deposits,

g = Reserve ratio for government deposits,

PTDR = Preferred Time Deposit Ratio or time deposit/demand deposits,

PAR = Preferred Asset Ratio or currency/demand deposits,

DERP - Desired Excess Reserve Preference Ratio,

and $0 < r, u < 1; 0 < PAR, PTDR, DERP$.

Then for M_1 , we have:

$$M_1^S = \left(\frac{1+PAR}{m(1+g)+u(PTDR)+PAR+DERP} \right) RE \quad (22)$$

and for M_2

$$M_2^S = \left(\frac{1+PAR+u(PTDR)}{m(1+g)+u(PTDR)+PAR+DERP} \right) RE \quad (23)$$

Here the coefficients of RE are the money multipliers.

Table 4 displays more stable relationship for M_2 definition for implicit money multipliers while M_1 shows more fluctuating behavior. Change in any of the determinants of the multipliers (such as legal reserve requirements on demand deposits or time deposits or currency preference ratio change) will affect the value of the multipliers. Also it can be shown⁴ that these variables can be expressed in the form of behavioral equations. Then, we may conclude that the changes observed in money multipliers are the result of some definable relationships and most of them

⁴Boorman, Havrilesky, op. cit., pp. 31-33.

(such as the ratio of legal reserve requirements) are under monetary authorities' control. Note that any change in multiplier will bring a non-discriminatory pressure on the money supply and credit expansion. That is, a general contractionary pressure which may not be desirable.⁵ As a result changes in the values of money multipliers are quite predictable. It follows from what we have said so far, that if we can control the monetary base, through certain parameters we can control the money supply which in turn would lead to the control of nominal income. However, the limitations should be noted; the unstability in money multipliers may imply that either we have insufficient data or the monetarist model is not appropriate, or structural changes may have occurred in Turkey.

But which part of the monetary base is more feasible for policy actions? According to the findings reported below in Table 5 the policies exercised on monetary base "uses" are offset by the changes in income velocity of money supply while changes in the base cause the changes in nominal income. In our estimation, we have found that, both for M^S_1 and M^S_2 definitions, the equations, that is, $Y = v.M^S$; $M^S = r.RE$; $Y = d.RE$, (corrected for autocorrelation) show that variations in income velocity are greater than the variation in the income/reserve money ratio, that is the product of velocity times the money multiplier. Meanwhile, money multipliers are more stable. The results are given in Table 5.

Table 5
Estimated Variances for the Estimated Velocity and Money Multipliers for Turkey

$\frac{Y}{M_1}$	$\frac{Y}{M_2}$	$\frac{M_1}{RE}$	$\frac{M_2}{RE}$	$\frac{Y}{RE}$
.026	.076	.003	.005	.017

Source: Calculated using IMF International Financial Statistics, 1959-1974.

⁵For an analysis of money multipliers for Turkey also see: Fry, op. cit., pp. 83-89.

These results imply that efforts to apply the policies to the "use" of monetary base (such as increases or decreases in legal reserve requirements) cause velocity to fluctuate inversely with the money multiplier which in turn can be considered as changes in the money supply in a direction contrary to that intended by policy. In Table 5, the variance of Y/RE is the variance of the combined effect of the velocity (Y/M^S_1 or Y/M^S_2) and the implicit money multipliers (M^S_1/RE or M^S_2/RE). The variance of Y/RE expresses the squared deviations from the mean value of Y/RE . Variances of velocity, on the other hand, represent deviations from mean of Y/M^S_1 or Y/M^S_2 . When a policy tool related to the money multiplier is employed, it means that the intention is to change M^S_1/RE or M^S_2/RE (depending on the definition). For this policy to be effective, either velocity would have to be constant or would have to change in the same direction as the money multiplier; otherwise, as for example when the authorities attempt to decrease the value of the money multipliers, if velocity increases, then the resulting effect would be to end up with a smaller change in the money supply than was desired. If this were not the case, that is, if velocity were either constant or changing in the same direction as the money multipliers, the variance of the product of these two parameters (that is Y/RE) would fluctuate, at least as much as the product of the individual variations taken separately. Thus, what follows logically is that, if the volatility of Y/RE is smaller than velocity variations, the velocity and money multipliers do not change in the same direction; in other words they interact in the opposite direction, offsetting each others' variations, keeping the product of velocity and the money multiplier relatively constant.

For this reason, we suggest direct monetary base controls, that is, control of "sources" rather than "uses" of reserve money.

If all these observations are true, then the question becomes, given the estimated money multiplier, how can we control the sources of the monetary base. This problem can be considered in a money stock adjustment form. First, we should know the desired money stock, then subtracting this from existing stock, we can get the required change in stock. Since monetary base and money supply relationships are assumed to be defined, we may calculate the required reserve changes.

3. Availability of the Data and Speed of Adjustment

To explain the speed of the adjustment requires the information about how soon the institutions could react and how soon the data would become available.

The "use of reserve money," if we would recall, consists of bank reserves and public currency holdings. Public currency holdings and the currency in the bank reserves, in other words "currency in circulation" data, is available daily; since the currency issuing main institution is the Central Bank, daily computer printouts give the result (and Treasury coin issues should be added to this figure). But the calculation of the bank reserves requires more time, since we do not know the currency in deposit money banks. On the other hand the "sources" of the reserve money data is also available daily. All data are published weekly in the "Official Gazette of Turkey."

Speed of adjustment also depends on how soon the measures could be taken. If the required measure is a matter of a new Law or an amendment of a

Law, this may take at least months if not years or even decades. For this reason, the new Central Bank Law⁶ enacted in 1970 gave the Central Bank broad flexibility to alter the monetary aggregates. Also in recent years, Budget Laws may contain some articles related to the Central Bank operations.

Even if the matter is already allowed under certain legislations, the implementation by Central Bank is not easy. The extent of intervention by the Government Agency, in general, depends on the size of the Central Bank operation. Intervention could be in both directions. However, in recent years, for some operations Central Bank has succeeded in reacting independently. So, timing in the defensive operation of the Central Bank both in the short-run and in the long-run depends on various but different factors and the reaction is uncertain.

The "adjustment period" to be considered depends on the trade-off between the predictability of different length multipliers and whatever the accepted relationship between the money stock and the economy is.⁷ However, the best control period is still debatable and varies from daily to quarterly control.⁸ Too short periods are clearly irrelevant, the proper length depends upon the lags between money and income. In Turkey, since the related data can be obtained only with a considerable lag, the control period may not be less than one quarter.

⁶ Law No. 1211.

⁷ Kalish, L., "A Study of Money Stock Control", Federal Reserve Bank of St. Louis, working paper: 11, 1974, p. 5.

⁸ Meltzer, op. cit., p. 20.

C. Sensitivity of Reserve Money and Its Components to Policies

Now, suppose the monetary authorities estimated the desired change in the money supply, estimated money multipliers and translated ⁹ the desired change of the money supply in the monetary base form. There are certain variables in the reserve money components that grow over time autonomously. Monetary authorities cannot influence them in the short-run or in a monetary adjustment period. Naturally, like all the other variables, they can be affected in the long-run. But our emphasis here is mostly on the short-run. So, the desired change in the base less the autonomous change will give the possible size of change of the desired monetary policy variable.

The model constructed for this work uses the concepts shown in Table 6 in the calculation of reserve money for Turkey. Let us examine the meaning and the coverage of these items in the following sections.

This table is prepared using only Central Bank accounts, Treasury coin issues, and Treasury "International Monetary Fund advances" accounts.¹⁰ It is not a complete reserve money as defined in Chapter 1, since it does not contain all Treasury debt accounts (either short-term or long-term) and Treasury cash situations, but the definition used by IMF is the one used here.

⁹ Here, it should be noted that the money supply may also be affected by changes in the deposit/currency ratio and changes in the liquidity ratio. But these effects are, in general, long-run effects. Furthermore, their estimates for Turkey have been found very small. For this reason we ignore more detailed analysis here. For more on this point see: Fry, *op. cit.*, pp. 79-80, 83-88.

¹⁰ Hereafter, International Monetary Fund will be mentioned as IMF.

Table 6
Reserve Money Sources and Uses (Turkey's Case)

<u>Sources</u>	<u>Uses</u>
Foreign Assets	Bank Reserves
Claims on Government	Public Currency Holdings
Claims on SEE's	
Claims on Deposit Money Banks	
(-) Foreign Liabilities	
(-) Government Deposits at the Central Bank	
(+) Other Items (Balancing Item)	

Source: Prepared, using Central Bank of Turkey Reports and data published by the Turkish Government.

The data used is obtained from IMF publications¹¹ and is shown in Appendix Table 1. This data is, in turn, used in obtaining "annual data" which consists of the averages of the four quarters for "stock" figures and the sum of the quarterly data for "flow" figures (Appendix Table 6).

Both quarterly and annual data are then used to obtain the shares of their respective components (Appendix Tables 2 and 7).

Later, in Appendix Table 3 and 8, we show the absolute one-period changes in variables calculated for quarterly and annual data, respectively. Percentage changes appear in Appendix Tables 4 and 9 for quarterly and annual data respectively.

The breakdown of the one-period changes in terms of changes in components are shown in the Appendix Tables 5 and 10 for quarterly and annual data.

¹¹ IMF, International Financial Statistics, various issues, 1959-1975, Turkey Sections; Washington, D.C.

Finally, in Appendix Table 11, growth rates or time trends of the variables are calculated according to the equation (except foreign assets).

$$X = Ce^{gt} \quad (24)$$

$$\text{Log} X = \text{Log} C + \text{Log} (e^{gt}) \quad (25)$$

$$\text{Log} X = \text{Log} C + gt \quad (26)$$

where X = The variable whose growth rate is to be calculated;

C = a constant which shows the intercept or average growth;

g = growth rate,

t = time.

For foreign reserves, equation (26) has the form:

$$\text{Log} R = \text{Log} C + g_1 t + g_2 t^2 + g_3 t^3 \quad (27)$$

Now, we are ready to analyze the role of reserve money components.

1. Foreign Reserves

By definition, foreign reserves equal foreign assets less foreign liabilities. Under "foreign asset," "convertible" and "non-convertible" foreign reserves and gold holdings are reported. Under "foreign liabilities", the coverage of the figures is not clear. The item appears in IMF statistics under the heading "foreign reserve creditors" and gives the amount of "convertible" foreign exchange credits (apparently only from non-citizens and short-run). On the other hand, another item, called "other accounts" gives a substantial amount of foreign exchange credit figures, which indicates that the real foreign exchange reserve situation is, in fact, different from what is stated. In this case, although reserve money figures would cover the contribution of the foreign sector as the algebraic

sum of foreign assets, foreign liabilities and "a part of other accounts", since we don't know how much "other accounts" arises from the foreign sector, the "foreign sector" contribution to reserve money figures which appears in our work do not represent the foreign sector in the conventional sense. Rather, these figures could be taken as a proxy for the "gold and convertible foreign exchange situation which resulted from non-citizens activities, for short-term analysis purposes." For this reason we have preferred to examine foreign asset behavior only.

The trend equation estimated (for quarterly data) is:

$$\text{Log } R = 4.77 + .060t - .0024t^2 + .000036t^3 + 1.110D_1 \quad (28)$$

(41.8) (3.54) (3.75) (5.19) (7.55)

where $R^2 = .958$ and $D_1 =$ dummy variable for 1970 devaluation differential effect, D.W. = .8177

$R =$ Foreign reserve assets, $t =$ time.

For annual data the result is:

$$\text{Log } R = 4.56 + .356t - .057t^2 + .0030t^3 + .938D_0 \quad (29)$$

(24.79) (3.11) (3.15) (4.02) (3.37)

with $R^2 = .971$ D.W. = 1.81

Then, what follows from this result is that foreign reserve accumulation, due to various reasons, follows an oscillatory path. And devaluations have an impact which can be explained by the change of intercept (or average foreign reserve accumulation rate). Obviously these changes are exogenous to the monetary authorities. However, the monetary authority can change the domestic price of foreign reserve assets and, as we have shown, this may have an effect on average

accumulation. That is, by changing the ratio of foreign currency to domestic currency, the government may have an instantaneous gain or loss (revaluation and devaluation respectively) when foreign assets at the Central Bank are evaluated at the new price.

Besides this, alteration of foreign asset prices will have an impact on the accumulation of reserves. The accumulation behavior would depend on export earnings, capital movements (that is, inflow or outflow) and expenditures on import goods and services. These three variables in turn can be expressed in terms of their respective determinants. For short-run analysis, we consider these variables as exogenously determined to the monetary system. Polak-Argy¹² argue that imports are related to income through the marginal propensity to import, which, in turn, allows them to consider this variable endogenously determined through the money supply (or monetary base changes), and consider reserve accumulation as endogenous to the system.

Our estimations in Appendix Table 12 did not support this point and for the short-run we could not find a stable relationship between imports and income. Also using annual data, one-period lag estimations do not imply a satisfactorily stable relationship among the imports and the variables cited above. The reason for this may well be due to import restrictions which are subject to instantaneous changes.¹³

¹²Polak-Argy, op. cit., p. 3.

¹³Moreover, Polak-Argy (op. cit., p. 6) accept that their model which includes endogenous import equation "should really give worse results for developing countries." And they continue "but this greater variability is due to reasons that are difficult to incorporate in models, e.g. (for imports) greater variability in the use of controls and duties."

In the long-run a certain relationship between imports and income may be defined. But for a system characterized by frequently changing restrictions and incentives (which is more relevant to Turkey), it is better to approach imports and exports as given by the restrictions and incentives package. So that we formulate the short-run behavior by the implicit form:

$$R = f (X, K, M) \quad (30)$$

where R = Foreign exchange reserves,

X = Capital movements,

M = Imports

Having specified the behavioral equations, we should address the question of how the monetary authority (in Turkey's case the Central Bank and in the case larger operations the Central Bank in conjunction with other decision-making Government Agencies) would react to the impact of foreign reserves on reserve money. This problem is the issue of sterilization (neutralization) and desterilization of capital inflows and outflows. At this point note that the major problem in the short-run is to restrain the increase of the money supply.¹⁴ Sterilization (in the case of a devaluation) can be thought of either as restraining the effects of all additional foreign reserve inflows on the domestic money supply, or as limiting the multiple effects of the increment to foreign reserve accumulations on the money supply through controls over bank reserves (partial sterilization). Note that the latter case

¹⁴Although from time to time, it may be required to increase reserve money, there are more ways than needed to do this. There, the problem may be the choice of instrument. But, since the major problem is to "restrain" the increase, emphasis here is given to that point.

allows foreign reserves (although to a smaller extent than other forms of the monetary base) to contribute to the money supply through currency and deposit changes, whereas complete sterilization assumes no increase in the money supply and could be considered as an alternative to the revaluation of the domestic currency.

Since devaluation in general causes increases in domestic prices, an upward pressure on credit expansion (otherwise on nominal interest rates) should be expected. In such cases, the monetary authorities, holding other central bank credit sources fairly constant, as an alternative might permit capital inflow in response to the expansionary pressures. In terms of domestic currency the capital inflow may be two forms: increases in currency in circulation, and/or increases in bank reserves, that is, changes in deposits less required legal reserves. Public currency holdings add themselves to the money supply, whereas the contributions of the changes in bank reserves are magnified by the money multipliers. In this case, what is undesirable is the "multiple" effect of the changes in the bank reserves. A theoretically possible solution could be to set the money multiplier equal to one. This can be implemented by changing the determinants of the money multiplier to give the desired result. Among other possibilities, there is one effective tool. This is to fix the reserve requirement on capital inflows equal to 100% or close to it. But such an approach would have three major drawbacks in Turkey's case:

- a. When the Government imposes such a deposit requirement on the banking system, it has to reimburse the interest paid by the commercial bank system to its depositors, which implies an interest payment on domestic money created by foreign reserve accumulation which would possibly be financed by an increase in

government credit from the central bank.

b. The second drawback is that the income velocity would have to remain fairly constant during this sterilization operation. Otherwise, with upward changes in velocity, the restrained money supply "effect" would be compensated. As we mentioned above, these fluctuations in velocity are likely to happen in Turkey.

c. Third, since the source of deposits cannot be identified (except "convertible lira accounts") at the moment of deposit; a certain time period and calculations would be required to estimate the share of foreign reserve increases in the changes of deposits. Besides this, a delayed action varying reserve requirements could not discriminate by origin of the deposits. But discrimination in terms of the maturity of deposits is certainly possible. In the case of the so-called "convertible lira accounts," which are the foreign reserve deposits denominated in domestic currency, 100% reserve requirements may be applied provided that interest is paid by the central bank. Such a measure would mean the use of the commercial banking system as an intermediary in collecting foreign reserve deposits at the Central Bank. In this case, since money multiplier is equal to one for these deposits, there is once-for-all increase in money supply equal to the amount of the deposits.

Up to this point, we have examined sterilization possibilities through the "use" of the reserve money. There are also some possible measures which can be applied to reserve money sources.

One possibility is to speed up imports which are already queued or to pay back the foreign liabilities with relatively higher terms more quickly.

Another measure which could lead to sterilization is suggested by the World Bank Report:¹⁵ to allow the banks to invest freely abroad and to repatriate investment. The World Bank also contributes another suggestion: to keep the reserves at reasonable level, Central Bank could extend some investment credits (medium-term) to the investment banks in Turkey. Although legally it is easy to decide to adopt these measures, we think, first, the Central Bank should have a good estimate of the future inflow of foreign reserves. Second the investment credits suggestion requires that some additional investment projects be kept ready by the beneficiaries; this does not seem to us very likely to happen. Revaluation of domestic currency which may cause the capital outflow is not considered a suitable measure because of the effects on exportation.

Other policy measures not directly related to the foreign reserve inflow (or any mix of such measures) may be applied. For instance, the foreign exchange considered "excess" may be invested in gold or some asset which pays a positive return in international money markets, and bonds indexed by the value of such gold holdings could be sold in domestic markets with the government paying a minimum nominal interest. Such a measure would require the government to assume financial responsibility for downward price movements of gold, but since gold is a common means of holding wealth in Turkey, there would be a good chance that these gold certificates denominated in domestic currency would be willingly held by the Public.

But we should recognize that all individual sterilization measures have limited power when they are used alone, and in general the situation requires the use of some mix of these measures.

¹⁵World Bank Report, op. cit., p. 52.

In the early 1970's in Turkey, it was not possible to conduct an adequate sterilization, which caused a huge foreign reserve accumulation. Although, for future analytical purposes foreign reserve accumulation may be taken as subject to policy control, for the period of our analysis, accumulation, net of sterilization, is taken as exogenously determined in the monetary adjustment period.

2. Government Liabilities to the Central Bank

Claims on government includes Central Bank government bond holdings, short-term advances to the Treasury, so-called "accounts to be liquidated" and Treasury coin issues.

Government bonds are issued in various forms; some are long-term bonds issued in accordance with some special legislation to finance some government activities such as highway construction or waterworks. Usually, in these cases, the issuing agency is not the Treasury but the beneficiary agency; the Treasury guarantees the interest and repayment, however. Some other forms of short-term government bonds are issued by the Treasury to obtain liquidity. Although these types of bonds are not discountable at the Central Bank when presented by the Treasury, rediscounting through a financial intermediary (usually a commercial bank) was possible¹⁶ until 1970.

The third kind of Government bond is issued to finance the tobacco crop which is one of the main agricultural products of Turkey. The purchase of the crop

¹⁶But, "(there were) some considerable difficulties both in rediscounting them and in cashing them on maturity. The Central Bank has been known in numerous instances simply to say that cash is not available at the present time for such transactions and that the bills must be held for another week or longer" (Fry, op. cit., p. 143).

is completely guaranteed by the Government, The minimum price also is fixed by the Government. Usually the Government-determined price includes a subsidy and requires that the purchasing agency (for instance State Monopolies Directory) be financed. In this case, the purchasing agency issues Government bonds to the Central Bank with a "Treasury guarantee." This bond issue is limited to a certain percentage of the capital and reserves of the purchasing agency. After this limit is exceeded the Central Bank can no longer accept this form of government bond. In practice, since financing requirements are usually greater than the limit, short term Treasury advances are also used for this purpose.

"Short-term advances to the Treasury" is a mechanism financing budget deficits. Each year, the Government can borrow up to 15% of the current fiscal year budget allocations. And there is no need to repay this debt at the end of the year, even though the name suggests the contrary. In practice, since tax collections are generally overestimated and/or cannot be collected on time, this reserve is usually almost completely used up.

The amount under the heading of "accounts to be liquidated" includes the "consolidated" debts of some private firms, some commercial banks, some State Economic Enterprises taken over by the Treasury, and the "consolidated" Treasury short-term advances. After this consolidation in the second quarter of 1961, some further consolidations of smaller magnitude took place. But the importance of the 1961 consolidation is that the annual payments by the Treasury to the Central Bank are continuously deferred by the Budget Laws. Meanwhile the amounts arising from the smaller consolidations are being repaid. As a matter of fact, this "Government

debt" for the last ten years has had a fixed value totaling 5270 million Turkish Lira.

The data and various trends estimated are given in Appendix Tables 1-11. In addition to the calculations using the observed values, another version of the continuous trends was estimated. This was done by undoing the 1961/3 (consolidation date) data and reassigning the quantities to their original sources. Central Bank reports show that the breakdown of the consolidation was in the following form (in 10 million Turkish Lira):

$$\begin{aligned} \text{Consolidated Total} &= \text{Govt. Credit} + \text{SEE's} + \text{Private Co.} \\ 527 &= 228 + 179 + 120 \quad (31) \end{aligned}$$

By adding the relevant amounts to the respective accounts, for the period after 1961/3, we get:

$$GC = G - 299$$

$$SC = S + 179$$

$$BC = B_T + 120$$

where GC = Government credit corrected for consolidation,

G = Government credit from Central Bank,

SC = SEE's credit corrected for consolidation,

S = SEE's credit from Central Bank,

BC = Commercial banking system credit corrected for consolidation,

B_T = Banking system credit from Central Bank.

The new estimates of this form again are given in Appendix Table 11.

Note that the new estimates also contain an important differential effect for the first quarter which includes the ends of fiscal years -- difficult periods for Turkish Governments.

Now again the question is how do policy measures affect this variable? First, we should mention that the transfer of all government deposits to the Central Bank would be a contractionary measure, since the reserves of the banking system (actually reserves of one bank) would be reduced.

The consolidated amount in 1961 is a "frozen" account and each year, re-payment is deferred by Budgets. Later consolidations are repaid.

In 1970, with the new Central Bank Law, the purchase of short-term Treasury bonds by the Central Bank has been effectively restricted. (Recall that the major problem for Turkey is to restrain the growth of money supply rather than the reverse).

Bonds of annex budgets (this item corresponds to the "State Monopolies" which is a Government Agency) have not changed for years, since the credit limit is fixed by law and a credit ceiling has already been reached. But to accept the fact that the "State Monopolies" are not getting Central Bank Credit is to underestimate the real situation. Some channels, perhaps the Treasury, continue to provide new credits, since the average purchase price and quantity have been continuously increasing in recent years.¹⁷

¹⁷ Average tobacco purchase price (relative to previous year) in 1971, 8.3%, 1972, 17.3%, 1973, 24.6%, 1974, 74.9%, increased. (Third Five-Year Development Plan, 1975 Programme, State Planning Organization, Ankara, 1975, p. 143).

The remaining item, which could be subject to policy intervention is the "short-term Treasury account." Although it is called that, it really shows the cumulated account and it therefore is a stock figure. Varying this account can be considered a policy variable. While in the Third Five-Year Development Plan, this item seems to be considered as exogenous,¹⁸ the World Bank report considers this stock figure completely as a policy variable.¹⁹ We think, as we stated, that these changes are manageable (perhaps at a degree lower than 100%). The counter-cyclical policy could be either short-run bond sales by Treasury to the Public (or even to non-Governmental banks), or with good timing and ever-increasing stock figures, long-term bond sales can be resorted to.

We can reasonably formulate the magnitude of a policy impact arising from "Government Liabilities to the Central Bank account" as:

$$PO_g = G - (G_0 + T_{t-1}) \quad (33)$$

where PO_g = Policy variable arising from "claims on government",

G_0 = Government liability accounts other than "Treasury short-term" at Central Bank,

T = Treasury short-term account.

3. State Economic Enterprises Financed by Central Bank

The figures under this heading represent the SEE's financing for their economic activities. The managerial deficits compensated by the Treasury are not

¹⁸ State Planning Organization, The New Strategy, pp. 876-877.

¹⁹ World Bank Report, op. cit., p. 112.

included here; neither is commercial paper discounted by SEE's (arising from their economic activities as in the case of private companies) are not included here either. So that this item shows only some part of inventory financing of major agricultural products by the Government. (The remaining part of agricultural financing by Government is agricultural credit which is included in the claims on deposit-money banks).

Prices of most agricultural products which are financed by the Government are fixed by it each year, just before the purchase and harvest season begins. This implies that the absolute and percentage changes in these figures (see Appendix Tables 3 and 4, Column 5) are determined by the level of prices fixed as well as by weather conditions in the past season. In other words, if weather conditions are good and prices are kept high (usually for political reasons such as in an election year, or right after a devaluation to extend the distribution of export gains to the farmers), the changes in SEE credit are greater and vice versa. The 1970/3 devaluation (1970/3 = forty-fourth observation) was such an instance. Also, increases in this type of credit occur mostly in the third quarter of the year, which illustrates the differential effect of newly determined prices which are out in the fall, or at the end of the summer.

Although big price changes take place from time to time, this part of agricultural sector credits at its peak (excluding the period prior to 1961/2) did not exceed about 15% of total reserve money. (Fifth column of Appendix Table 2). Sometimes, however, a sharp increase in this form of credit, in spite of its small share, contributes largely in the year to year variations of total reserve money (such

as from 1963/3 to 1963/4; 1965/2 to 1965/3; 1967/2 to 1967/3; 1971/2 to 1971/3; 1974/2 to 1974/3. In these quarters much of the total changes in the reserve money came from this type of SEE's credits (see Appendix Table 5). However, in the 1972/2-1972/3, 1973/4-1974/1 changes, the situation was slightly different. Although absolute changes were relatively large in size, since other forms of Central Bank credits were competing, these large changes did not lead to a big change in the share of this type of credit in total reserve money.

In sum, this part of agricultural credit varies with weather conditions, government policies and prices.

What can be said about policy? Changes in total SEE inventory financing in fact are the products of the changes in volume purchased (which in turn depends on a series of variables which can be summarized as weather conditions) and the price. So that changes in either variable affect the amount of credit. For this reason, the same amount of credit can be the product of the different set of price and weather conditions. Prices in general are inflexible downward. To give an idea for recent years Table 7 was prepared.

However, the changes can be estimated approximately. Theoretically, the total amount is inventory financing, therefore it follows that after inventories are liquidated, the credit amount should be equal to zero. But this never happens. Part of this credit is already "frozen", as it contains a subsidy component. This can be calculated as the credit amount less the existing inventories in new year (or season). Under the assumption that there are no inventories left, the total

Table 7
 Important Agricultural Products Support-Price Changes
 (as percentage)

<u>Product</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>
1. Wheat	16.5	0.0	21.2	75.0
2. Cotton	19.6	10.6	59.3	34.5
3. Hazelnut	13.3	0.0	19.1	39.2
4. Seedless raisin	4.3	0.0	139.7	42.9
5. Sunflower	11.1	10.0	13.6	50.0
6. Rice	0.0	11.1	44.0	25.0
7. Sugar beets	0.0	0.0	50.0	33.3
8. Tea	14.3	0.0	12.5	38.9
9. Tobacco	8.3	17.3	24.6	74.9

Source: Third Five-Year Development Plan, 1975 Programme,
 State Planning Organization, Ankara, 1975, p. 143.

outstanding credit equals the "frozen" part. If so, the change (that is, the difference between the estimated inventories at the new price and the total credit amount) is completely under Government control and can be considered as a policy variable.

So:

$$PO_s = \Delta S \quad (34)$$

where PO_s = the size of the policy variable arising from SEE's financing

4. Claims on Deposit Money Banks

Under this heading, IMF figures give the total amount of the advances to the banks against foreign reserves or gold, credits against rediscounted private sector commercial paper and the capitalized debt of bank liquidation fund deficits. Also, a part of agricultural credits extended against the required reserves deposited at the Central Bank are included in this category.

Credits to the Agricultural Sales and Credit Cooperatives, since these institutions are considered a part of the private sector, are covered in the total private sector figures. These credits to Agricultural Sales and Credit Cooperatives (in the form of commercial paper) have substantial weights in the total claims on deposit money banks.

Considering the fact that the prices of agricultural products are heavily regulated by the Government and the small resemblance these cooperatives bear to private enterprises, one can say that this form of presenting data on credits to the private sector (through the deposit money banks) is misleading.

Except for the amounts previous to the 1962/2 consolidation, credits in general had the tendency to increase over time (See Appendix Tables 1-5, sixth

columns). However, from time to time, small decreases (perhaps seasonal) could be observed. In most cases, these decreases were offset by compensated increases in the next quarters. But during the two major recessions in Turkey (1964-1965) and 1970/4-1971) that was not the case. Meanwhile it should be noted that, in Turkey, usually the banking system does not go to the Central Bank for credit unless the loan sought is eligible for preferential terms. Reluctance to have recourse to Central Bank rediscounts can be explained because higher profit margins are usually attainable by internal financing.

Under these circumstances, the banking sector credits from the Central Bank, on average compose only 15-20% of the total reserve money (sixth column in Appendix Table 2). Note that during the periods in which the market price of the foreign currency has diverged from its official value, that is the periods prior to a devaluation (the length of the periods depending on the government's persistence) credit demands (although costly) increased their share of total reserve money (as in 1967-1970/2) perhaps to finance import demands and speculation.

After 1970/3 devaluation, credit demand (and supply) decreased sharply under the effect of Government credit controls and/or because of the "abundance" of foreign reserves (the foreign exchange necessary to cover import contracts was provided on demand) up to 1972/3. Later, sharp increases were observed. The reason for this is that, with the optimistic expectations with respect to the balance of payments, "convertible lira accounts" (which are deposits in foreign exchange) were allowed to be used as a source of credit; so that this foreign exchange credit in Turkish Lira added to claims on deposit money banks. Also note that the increases

in banking sector credit coincided with increases in the interest rate paid on time deposits. As these were increasing in cost, banks tended to seek more credits from the Central Bank. The third reason is that new measures were taken in the form of the provision of cheap Central Bank credit for export promotion. Of course, acceleration of inflation after 1970, also contributed to these developments.

The trend estimates of quarterly and annual data are given in Appendix Table 11. Quarterly data estimates showing autocorrelation were corrected. But note that in the corrected estimates, the differential effect of D1 disappears. The test values of the yearly estimates are normal.

Again the policy implications should be examined. In our estimations, part of the Central Bank credit to the commercial banking system is assumed to be directed toward the agricultural sector (in actual calculation this part is assumed to be .30 of the total). Same is true for changes in this credit. Then, we can treat the changes in this part like SEE's credit changes. Therefore, we may formulate the implicit form of the demand equation of this form of credit as:

$$B_T = g(y, (\dot{p}/p)^e, i) \quad (35)$$

where B_T = Total claims on deposit money banks,

y = Real income; $(\dot{p}/p)^e$ = Expectations about future price changes;

i = Properly defined nominal interest rate.

In other words, credit demand from the Central Bank is a function of income, (y), expectations about future prices $(\dot{p}/p)^e$, and interest rates (i).¹⁸

¹⁸ Here, one of the difficulties is the definition and proper measurement of i . Indeed, State Planning Organization (The New Strategy, p. 876) seems to accept that it "should have a value greater than zero, but not known,"; on the other hand,
(Footnote 18 continued at bottom of next page)

These variables in turn can be expressed in terms of appropriate proxies. Note that our analysis deals with the short run, consequently the more quickly available data is the better for policy determination. For price change expectations, current price changes may be used as proxies. Since in Turkey income or production data are essentially available annually, another proxy (such as excise tax records)¹⁹ would be used for this variable for short run policy purposes.

Since we assume that part of these credits (say, d) is going to the agricultural sector and this part can be considered under government control, then it follows that:

18 (Continued)

World Bank Report (op. cit., p. 51) says that "role of interest rate in restraining the rapid growth in money supply is indirect, but its allocative role is important." Further, Dorrance (op. cit., p. 278) accepts that "the desires of the community to borrow are likely to be almost insatiable at any reasonable level of interest rates." Also Aydin (op. cit., p. 160) gives the elasticity of money supply as $-.1241$. But the test values of the estimates (such as $D.W. = 1.07$) makes the estimate questionable. In fact, the channeling of credits to certain areas through the "interest change rebates" is proven to be effective in the past. We do believe that a properly defined interest rate increase reduces the demand (and supply) of money; If it has a value different from zero, it may be used as a policy variable.

¹⁹ Most developing countries levy taxes on production and imports in the form of excise taxes. This form of tax generates a relatively small number of tax declarations. Since in general these taxpayers are the relatively large firms of the country, they have good accounting systems. Tax corruption may be small. And government usually has a reliable record on these tax collections.

Furthermore, since major credit users and important industrial good producers are usually the same, it follows that if any relationship between claims on banking sector credits from Central Bank and excise tax collections can be postulated, a periodic and reliable source of data would be obtained.

$$\Delta d (B_T) = PO_B \quad (36)$$

and

$$(1-d) B_T = B = (1-d) (g(y, (\dot{p}/p)^e, i)) \quad (37)$$

where B_T = Total claims on commercial banking sector,

B = Total claims on commercial banking sector less agricultural credit,

PO_B = Size of policy related to this variable.

In other words, we state that part of this variable can be considered endogenous (equation 37), while equation (36) shows "policy controllable" component.

5. Other Items

The remaining assets and liabilities excluding reserve money uses and foreign liabilities in Table 6 are summed up in this variable. So, it contains capital accounts as well as unclassified assets such as buildings, etc. and unclassified liabilities such as provisions and convertible lira account liabilities. Since each of these items changes its definition over time, there is no clear-cut trend movement in "other items."

Although we can't really say more, lacking a more accurate breakdown of this account, our guess is that the convertible lira accounts have played a major role in determining the behavior of this account, especially in recent years. The values and changes of this variable are shown in Appendix Tables 1-10.

Note that when this item has a positive net value it is adding to the monetary base; when it has a net negative value, it reduces the monetary base. Although we do not know its composition, as we stated, since it is a net value we accept the

proposition that all changes are adding to our "policy" variable, assuming the risk of overestimating the "policy" variable for this item. So:

$$PO_0 = \Delta O \quad (38)$$

where PO_0 = The size of policy arising from this variable.

So far, we have explained how the Central Bank and other decision-maker Agencies could react to changes in monetary base sources. Now we would like to explore the possibilities for policy determination through the "use" side of the monetary base.

6. Public Currency Holdings

This item shows the total currency in circulation (including coin issues by the Treasury) minus Treasury and banking system (including Central Bank) currency holdings. In other words, these figures are "effectively" circulating money.

In general, it is steadily increasing. Results of the estimates show that there is a strong upward tendency during the third quarters in which crop purchases take place.

Although in Turkey the Central Bank cannot directly change public currency holdings, the monetary authority (which consists of the Central Bank and other monetary decision-maker Agencies) can effectively do so by selling and purchasing bonds. This point is also mentioned in the World Bank Report.²⁰ But although it is correct, such measures require marketing efforts as we have said before.

²⁰ World Bank Report, op. cit., p. 51.

7. Bank Reserves

This item, as we mentioned above, shows bank reserves including their currency holdings. In quarterly estimates, we have significant decreases in the third quarters of the year in which agricultural crop purchases by private sector take place.

The quarterly, yearly, and the equations corrected for serial correlation are given in Appendix Table II. Quarterly and corrected for serial correlation yearly equations have the expected signs and test values.

The variable, D7, indicates that in the post-devaluation period (1970) bank reserves did not increase immediately (as in the case of currency). We may argue two reasons for this: first, tight money after the devaluation; second, lagging approximately one year after the devaluation price increases started to accelerate having a nominal increase effect on the bank reserves as well as currency holdings.

One of the effective measures of monetary policy is to change the legal reserve requirements to restrain the rate of growth of money and reduce its potential growth. This would cause an effect on the money multiplier in an opposite direction (if requirements are increased, multipliers would decrease, or vice versa) without changing Central Bank assets. But in Turkey, effective application of this measure is difficult for, at least, two reasons:

1. There are heavy pressures from different groups against an increase in reserve requirements.
2. The banks rather than rediscounting their commercial paper at the Central Bank, prefer to get advances against them. For this purpose, they deposit

their paper at the Central Bank. But, unless they use these advances, the value of this paper cannot be seen in the accounts. So, this is similar to a hidden cash reserve for the banks. When the legal requirements are increased part of the required reserves can be paid by entering this paper into the accounts.²¹

The extent of the first difficulty is suggested by the World Bank:²²

(The increase in the reserve requirements) is likely to be less resented by the banking system if part of the sterilized reserves earn a reasonable interest which would bring them close to being an obligatory purchase of low-yield bonds.

The second defect could be overcome by keeping the reserve requirement increases higher than those required by policy.

A third difficulty may be added to these. The reserve requirement changes usually are effective in the next quarter. This may delay obtaining a fast result.

This completes the reserve money components analysis from the standpoint of their use as policy variables in controlling the monetary base. Our policy variable is the sum of the individual policy variables which are, the policy variable arising from government liabilities to the Central Bank (PO_G), the policy variable arising from the SEE's liabilities to the Central Bank (PO_S), the policy variable arising from commercial banking credits from the Central Bank (PO_B), and the policy variable arising from "other items" (PO_O). To show their relative importance Table 8 was prepared.

As it can be observed from the table, the policy variable arising from Government liabilities is the largest component of the complete policy variable.

²¹See: Akguc, Oztin, op. cit., p. 59.

²²World Bank Report, op. cit., p. 51.

Table 8
The Magnitude of the Individual Policy Variables Relative to the Total
Changes in the Reserve Money, 1961-74
(as percentage) *

Year	Policy Variables of the Model			
	Govt. Liab.	Banking Sys. Liabilities	SEE's Liab.	Other Items
1961	-2103	-93	-376	-39
1962	579	-24	- 58	34
1963	163	19	68	-107
1964	225	6	14	36
1965	407	1	- .3	- 3
1966	230	9	17	- 7
1967	327	24	22	-18
1968	240	12	9	12
1969	993	24	- 4	-38
1970	-14	18	- 1	-24
1971	497	- 6	25	-74
1972	85	- 3	13	-30
1973	30	17	- 4	-78
1974	65	17	34	-24

* If one would add the sum of the policy variables to the exogenously determined variables, then the result would be equal to 100.

Source: International Monetary Fund, International Financial Statistics, Turkey Section, various issues.

At its peak in 1969, this variable changed as much as 933% of the total reserve money changes. In 1961, because of consolidation, the Treasury credit from Central Bank, namely the "policy variable" arising from the "claims on government" component of the reserve money, had a reducing effect on reserve money, since accumulated Treasury credit was transferred to the "other government liabilities" account. In the same year, outstanding SEE loans and some of banking sector liabilities to the Central Bank were also consolidated.

The "other items" component in general is relatively smaller in magnitude than the government policy variable, but it is still important. Note that when it has a negative sign, it "adds" to reserve money. The remaining two policy variables, banking system liabilities and SEE credits have moderate shares in the total changes, even though their impacts in reserve money changes fluctuate widely.

The summary explanation of the use of this variable is presented in the next chapter.

CHAPTER IV
POLICY RECOMMENDATIONS

Up to this point, we have shown how to calculate the policy variable, PO . In this chapter we will discuss the use of the variable.

Throughout we have assumed that the monetary authority has an absolute control over PO . But this may not be the case. With further investigation, it may be shown that the monetary authority's control over PO is in fact αPO where $\alpha \leq 1$. If this is the case, that means the effective policy size is αPO , rather than PO .

The relationships between desired magnitude of policy (PO^*) and available size of policy (PO) may be of three types:

1. $PO^* < PO$,
2. $PO^* > PO$,
3. $PO^* = PO$.

Leaving aside the third possibility, which has a small probability, let us examine the other two:

1. $PO^* < PO$

If the desired policy changes are smaller than what is attainable to the monetary authority through PO , there are several choices, as we mentioned in the previous chapter. If the components of PO can be ordered in terms of certain extraneous priorities (e.g., part of Treasury short-term advances were to be used, or a smaller subsidy to agriculture may still be desirable), then, these priorities can be incorporated in the determination of policy. The use of PO would, in any case, alter the Central Bank-Treasury portfolio.

2. $PO < PO^*$

If the magnitude of the desired policy effect is bigger than what is under control through PO , then the difference $(PO^* - PO)$ would have to be attained through other measures, since the limit to possible asset changes is assumed to be expressed in PO . In this case, the measures to be implemented would include changes in the value of money multipliers (such as changes in reserve requirements). Note that when indiscriminately applied, it restrains all forms of banking sector credits. This may not be desirable. Then, there is a possibility to use this tool discriminately.¹ Since changing the size of the money multipliers requires more precise information and estimation than is normally available, the probability of error is greater than is likely through direct monetary base control. Also it may take more time. Our suggestion is not to use this tool too frequently in Turkey's case. In spite of its effectiveness, it would be desirable to set the amount to be implemented through this variable at its minimum, that is equal to $(PO^* - PO)$.

As we have explained before, Central Bank-Treasury asset changes for a policy purpose may be implemented various ways. In selecting the tools a priority ordering can be prepared. For instance some sort of deficit financing expenditures may still be desirable or measures such as revaluation may not be desirable, perhaps because of possible destabilizing effects on the economy, etc.

Open market or similar operations like the transfer of Government funds to the Central Bank, although desirable, may have a limited applicability under a

¹In 1976, the application in form of reduced reserve requirements for the deposits to be used for medium term credits has been successful in Turkey.

developing economy's conditions. The "excess liquidity" observed by Government could be demanded by the private sector. For a government which prefers not to use direct credit restrictions or rediscount rate increases, it may be the case that the competition between the Government and the private sector for "excess" funds may result in the government having to offer higher nominal interest rates on borrowings. In such periods, the government should first seriously consider reductions in its own borrowing from the Central Bank as an alternative policy.

If the pressures originate from foreign reserve accumulation, and sterilization policies are limited, then this should be taken as an opportunity to speed up repayment of foreign loans. Foreign reserve accumulation increases, among other things, import demand (maybe with a lag). Since most import goods in developing countries are taxed (usually ad valorem) then increased import tax proceeds may be used in paying back these foreign debts with relatively higher terms. This would have an effect similar to sterilization. Sterilization or the similar resulting policies like routing new reserve funds to investments as much as possible may be applied.

With these words we have completed the presentation of our analysis, considering Turkey's case. As in all models, we have abstracted from many real world complications, yet the model strives to highlight certain essential relationships which recommend its useful applicability.

CONCLUSION

A monetary base analysis and control model has been the focus of this report.

In the first chapter, the monetary base approach to the control of money is presented and the links between monetary base, money supply and money income are shown. Further, the monetary policy problems of the developing countries are reviewed.

The second chapter describes the institutional framework for Turkey. Here, as background information, the Central Bank, the Treasury and the State Economic Enterprises are examined from a monetary policy viewpoint. Also the stability of prices, the credit system, interest rates, money and security markets and foreign sector developments in recent decades are summarized.

In the third chapter, we have constituted a model which highlights the essentials of monetary base control. To justify monetary base sources control first we have examined the money income-money supply relationship; then, the relationship between the money supply and the monetary base is demonstrated. As a result, in Turkey's case, we have found that efforts toward changes in the money multipliers, which can be attempted, among other ways, through changing legal reserve requirements, would be offset by changes in the income velocity of money. Then, given the relative stability of the product of multipliers times velocity, the "direct" control of reserve money sources is suggested, and given the exogenously determined components of reserve money sources, the limits on the range of deliberate Central Bank-Treasury asset changes, through exchange rate, rediscount

rate, open market interventions, etc., are estimated.

Foreign reserve accumulation (noting that endogeneity of imports as in the Polak-Argy model is not proven in our estimates on Turkey) and banking sector credits obtained from the Central Bank (which represent private sector demand from Central Bank) are taken as exogenous to the monetary authorities. But the balance of payment surpluses arising from the reevaluation of foreign assets after changes in the exchange rate are assumed to be under monetary authority's control. It is also argued that devaluations far below the equilibrium value of the domestic currency (under-valuation) result in potential inflationary pressures since they cannot be properly sterilized and/or absorbed by the economy, so that this instrument requires care in its use.

The recommended use of the policy variable defined is explained in the last chapter. There the ways in which Central Bank-Treasury asset changes can be effected are described and found to include limited open market operations, manipulation of government accounts, direct or indirect (fixing the rediscount rate) regulation of Central Bank credit and changes in the foreign exchange rate.

The problems of Turkey are similar to those of other developing countries in many aspects. There are similar tendencies for many variables, although each country has different characteristics, economic and social structures. It follows that remedies can be broadly similar although applications will differ from country to country.

The outlined policies do not address themselves to the solution of all problems; however, the necessity for designing different policies fitting the special

conditions of each country and the need for other policies complementary to monetary policies is apparent. Our suggested solutions should be considered as guidelines.

Appendix Table I

The Values of the Reserve Money and Its Components Used in This Study (Quarterly Data)
(In 10 Million Turkish Lira)

Period	Reserve Money	Sources of Reserve Money						Uses of Reserve Money	
		Foreign Reserves	Govt. Liab. to Cen. Bk.	SEEs Cred. to Cen. Bk.	Banking Sector Liab. to Cen. Bk.	Foreign Liabilities	Other Items (Net)	Bank Reserves	Currency in circula.
1959.4	442	74	110	222	249	- 95	-118	101	341
1960.1	458	73	135	221	240	- 99	-112	103	355
1960.2	462	73	131	224	262	- 99	-129	102	360
1960.3	490	218	121	225	258	-249	- 83	96	394
1960.4	513	227	161	190	283	-218	-130	130	383
1961.1	514	206	182	182	264	-183	-137	114	400
1961.2	492	201	512	18	76	-186	-129	93	399
1961.3	526	208	499	26	106	-186	-127	100	426
1961.4	554	213	517	20	89	-160	-125	140	414
1962.1	567	211	520	27	75	-137	-129	126	441
1962.2	541	204	515	15	83	-175	-101	110	431
1962.3	589	207	519	43	95	-183	- 92	122	467
1962.4	601	196	544	36	110	-162	-123	148	453
1963.1	620	195	570	40	99	-150	-134	148	472
1963.2	597	194	578	54	121	-183	-167	138	459
1963.3	621	192	585	67	152	-198	-177	143	478
1963.4	663	206	592	100	121	-201	-155	170	493
1964.1	679	177	610	78	124	-176	-134	171	508
1964.2	671	179	622	60	123	-174	-139	161	510
1964.3	749	161	655	81	168	-187	-129	169	580
1964.4	810	205	622	103	163	-174	-109	241	569

(Continued)

Appendix Table I (Continued)
 The Values of the Reserve Money and Its Components Used in This Study (Quarterly Data)
 (In 10 Million Turkish Lira)

Period	Reserve Money	Sources of Reserve Money						Uses of Reserve Money	
		Foreign Reserves	Govt. Liab. to Cen. Bk.	SEEs Cred. to Cen. Bk.	Banking Sector Liab. to Cen. Bk.	Foreign Liabilities	Other Items (Net)	Bank Reserves	Currency in Circula.
1965.1	808	176	681	88	140	-148	-129	242	566
1965.2	828	178	712	59	142	-132	-131	232	596
1965.3	872	182	724	92	157	-138	-145	249	623
1965.4	904	193	730	81	160	-136	-124	295	609
1966.1	941	193	771	74	140	-111	-126	269	672
1966.2	902	181	763	84	168	-147	-147	264	638
1966.3	1043	195	767	136	212	-164	-103	298	745
1966.4	1084	193	797	124	259	-196	- 93	368	716
1967.1	1058	178	806	127	261	-145	-169	330	728
1967.2	1059	230	788	91	309	-138	-221	338	721
1967.3	1163	176	808	172	318	-165	-146	366	797
1967.4	1278	198	849	162	379	-200	-110	407	871
1968.1	1207	180	880	146	351	-162	-188	407	800
1968.2	1250	188	882	146	344	-174	-136	441	809
1968.3	1323	194	918	164	376	-176	-153	482	841
1968.4	1385	220	919	150	444	-225	-123	578	807
1969.1	1363	255	993	130	435	-232	-218	522	841
1969.2	1382	275	993	136	466	-266	-222	535	847
1969.3	1488	308	1003	146	549	-321	-197	575	913
1969.4	1572	342	1053	168	577	-360	-208	685	887

(Continued)

Appendix Table I (Continued)
The Values of the Reserve Money and Its Components Used in This Study (Quarterly Data)
(In 10 Million Turkish Lira)

Period	Reserve Money	Sources of Reserve Money						Uses of Reserve Money	
		Foreign Reserves	Govt. Liab. to Cen. Bk.	SEEs Cred. to Cen. Bk.	Banking Sector Liab. to Cen. Bk.	Foreign Liabilities	Other Items (Net)	Bank Reserves	Currency in Circula.
1970.1	1510	335	1136	110	575	-316	-330	612	898
1970.2	1486	300	1138	111	626	-331	-358	568	918
1970.3	1732	766	1133	163	663	-764	-229	670	1062
1970.4	1834	864	1135	183	631	-848	-131	733	1101
1971.1	1930	881	1109	191	550	- 54	-747	814	1116
1971.2	2077	853	1242	226	493	- 46	-691	907	1170
1971.3	2364	1034	1276	386	414	- 56	-690	1011	1353
1971.4	2620	1289	1237	383	497	- 77	-709	1228	1392
1972.1	2690	1542	1475	384	301	- 90	-922	1219	1400
1972.2	2694	1438	1454	355	336	- 17	-872	1278	1416
1972.3	3176	1862	1491	458	342	- 20	-957	1488	1688
1972.4	3590	2211	1475	418	570	- 27	-1057	1992	1598
1973.1	3692	2678	1467	395	570	- 56	-1362	1977	1715
1973.2	3725	2761	1462	326	891	- 57	-1658	1963	1762
1973.3	4179	3187	1509	371	1010	- 72	-1826	2113	2066
1973.4	4405	3170	1597	355	1317	- 37	-1997	2341	2064
1974.1	4789	3374	1715	473	1333	- 51	-2055	2596	2193
1974.2	4955	3124	1715	503	1545	- 62	-1870	2637	2317
1974.3	5449	3155	1874	780	1487	- 76	-1771	2628	2821
1974.4	5714	2660	2005	1364	2238	- 71	-2482	3037	2677

Source: International Monetary Fund, International Financial Statistics, Turkey Section, various issues.

Appendix Table 2

The Shares of the Reserve Money Components in the Total Reserve Money (Quarterly Data)
(as percentage)

Period	Reserve Money	Sources of Reserve Money						Uses of Reserve Money	
		Foreign Res. Assets Share	Govt. Liab. Share	SEEs Liab. Share	Commerc. Bank, Sec. Share	Foreign Liab. Share	Other Items Share	Bank Res. Share	Share of currency in circula.
1960.1	100	16	29	48	52	22	24	22	78
1960.2	100	16	28	48	57	21	28	22	78
1960.3	100	44	25	46	53	51	17	20	80
1960.4	100	44	31	37	55	42	25	25	75
1961.1	100	40	35	35	51	36	27	22	78
1961.2	100	41	104	4	15	38	26	19	81
1961.3	100	40	95	5	20	35	24	19	81
1961.4	100	38	93	4	16	29	23	25	75
1962.1	100	37	92	5	13	24	23	22	78
1962.2	100	38	95	3	15	32	19	20	80
1962.3	100	35	88	7	16	31	16	21	79
1962.4	100	33	91	6	18	27	20	25	75
1963.1	100	31	92	6	16	24	22	24	76
1963.2	100	32	97	9	20	31	28	23	77
1963.3	100	31	94	11	24	32	29	23	77
1963.4	100	31	89	15	18	30	23	26	74
1964.1	100	26	90	11	18	26	20	25	75
1964.2	100	27	93	10	18	26	21	24	76
1964.3	100	21	87	11	22	25	17	23	77
1964.4	100	25	77	13	20	21	13	30	70

(Continued)

Appendix Table 2 (Continued)
 The Shares of the Reserve Money Components in the Total Reserve Money (Quarterly Data)
 (as percentage)

Period	Reserve Money	Sources of Reserve Money						Uses of Reserve Money	
		Foreign Res. Assets Share	Govt. Liab. Share	SEEs Liab. Share	Commerc. Bank, Sec. Share	Foreign Liab. Share	Other Items Share	Bank Res. Share	Share of currency in circula.
1965.1	100	22	84	11	17	18	16	30	70
1965.2	100	21	86	7	17	16	16	28	72
1965.3	100	21	83	11	18	16	17	29	71
1965.4	100	21	81	9	18	15	14	33	67
1966.1	100	20	82	8	15	12	13	29	71
1966.2	100	20	85	9	19	16	16	29	71
1966.3	100	19	74	13	20	16	10	29	71
1966.4	100	18	74	11	24	18	9	34	66
1967.1	100	17	76	12	25	14	16	31	69
1967.2	100	22	74	9	29	13	21	32	68
1967.3	100	15	69	15	27	14	13	31	69
1967.4	100	15	66	13	30	16	9	32	68
1968.1	100	15	73	12	29	13	16	34	66
1968.2	100	15	71	12	28	14	11	35	65
1968.3	100	15	69	12	28	13	12	36	64
1968.4	100	16	66	11	32	16	9	42	58
1969.1	100	19	73	10	32	17	16	38	62
1969.2	100	20	72	10	34	19	16	39	61
1969.3	100	21	67	10	37	22	13	39	61
1969.4	100	22	67	11	37	23	13	44	56

(Continued)

Appendix Table 2 (Continued)
The Shares of the Reserve Money Components in the Total Reserve Money (Quarterly Data)
(as percentage)

Period	Reserve Money	Sources of Reserve Money						Uses of Reserve Money	
		Foreign Res. Assets Share	Govt. Liab. Share	SEEs Liab. Share	Commerc. Bank. Sec. Share	Foreign Liab. Share	Other Items Share	Bank Res. Share	Share of currency in circula.
1970.1	100	22	75	7	38	21	22	41	59
1970.2	100	20	77	7	42	22	24	38	62
1970.3	100	44	65	9	38	44	13	39	61
1970.4	100	47	62	10	34	46	7	40	60
1971.1	100	46	57	10	28	3	39	42	58
1971.2	100	41	60	11	24	2	33	44	56
1971.3	100	44	54	16	18	2	29	43	57
1971.4	100	49	47	15	19	3	27	47	53
1972.1	100	57	55	14	11	3	34	48	52
1972.2	100	53	54	13	12	1	32	47	53
1972.3	100	59	47	14	11	1	30	47	53
1972.4	100	62	41	12	16	1	29	55	45
1973.1	100	73	40	11	15	2	37	54	46
1973.2	100	74	39	9	24	2	45	53	47
1973.3	100	76	36	9	24	2	44	51	49
1973.4	100	72	36	8	30	1	45	53	47
1974.1	100	70	36	10	28	1	43	54	46
1974.2	100	63	35	10	31	1	38	53	47
1974.3	100	58	34	14	27	1	32	48	52
1974.4	100	47	35	24	39	1	43	53	47

Note: Totals may not be equal to 100% because of rounding.

Source: International Monetary Fund, International Financial Statistics, Turkey Section, various issues.

Appendix Table 3
The Absolute One-Period Changes in Reserve Money and Its Components (Quarterly Data)
(In 10 Million TL)

Period	Reserve Money	Sources of Reserve Money						Uses of Reserve Money	
		Foreign Reserves	Govt. Liabilities	SEEs Liab. to Cen. Bk.	Banking Sector Liab. to Cen. Bk.	Foreign Liabilities	Other Items (Net)	Bank Reserves	Currency in Circula
1960.1	16	- 1	25	- 1	- 9	4	- 6	2	14
1960.2	4	0	- 4	3	22	0	17	- 1	5
1960.3	28	145	-10	1	- 4	150	-46	- 6	34
1960.4	23	9	40	-35	25	-31	47	34	-11
1961.1	1	-21	21	- 8	-19	-35	7	-16	17
1961.2	-22	- 5	330	-164	-188	3	- 8	-21	- 1
1961.3	34	7	-13	8	30	0	- 2	7	27
1961.4	28	5	18	- 6	-17	-26	- 2	40	-12
1962.1	13	- 2	3	7	-14	-23	4	-14	27
1962.2	-26	- 7	- 5	-12	8	38	-28	-16	-10
1962.3	48	3	4	28	12	8	- 9	12	36
1962.4	12	-11	25	- 7	15	-21	31	26	-14
1963.1	19	- 1	26	4	-11	-12	11	0	19
1963.2	-23	- 1	8	14	22	33	33	-10	-13
1963.3	24	- 2	7	13	31	15	10	5	19
1963.4	42	14	7	33	-31	3	-22	27	15
1964.1	16	-29	18	-22	3	-25	-21	1	15
1964.2	-8	2	12	-18	- 1	- 2	5	-10	2
1964.3	78	-18	33	21	45	13	-10	8	70
1964.4	61	44	-33	22	- 5	-13	-20	72	-11

(Continued)

Appendix Table 3 (Continued)
 The Absolute One-Period Changes in Reserve Money and Its Components (Quarterly Data)
 (In 10 Million TL)

Period	Reserve Money	Sources of Reserve Money						Uses of Reserve Money	
		Foreign Reserves	Govt. Liabilities	SEEs Liab. to Cen. Bk.	Banking Sector Liab. to Cen. Bk.	Foreign Liabilities	Other Items (Net)	Bank Reserves	Currency in Circula.
1965.1	- 2	-29	59	-15	-23	-26	20	1	- 3
1965.2	20	2	31	-29	2	-16	2	-10	30
1965.3	44	4	12	33	15	6	14	17	27
1965.4	32	11	6	-11	3	- 2	-21	46	-14
1966.1	37	0	41	- 7	-20	-25	2	-26	63
1966.2	-39	-12	- 8	10	28	36	21	- 5	-34
1966.3	141	14	4	52	44	17	-44	34	107
1966.4	41	- 2	30	-12	47	32	-10	70	-29
1967.1	-26	-15	9	3	2	-51	76	-38	12
1967.2	1	52	-18	-36	48	- 7	52	8	- 7
1967.3	104	-54	20	81	9	27	-75	28	76
1967.4	115	22	41	-10	61	35	-36	41	74
1968.1	-71	-18	31	-16	-28	-38	78	0	-71
1968.2	43	8	2	0	- 7	12	-52	34	9
1968.3	73	6	36	18	32	2	17	41	32
1968.4	62	26	1	-14	68	49	-30	96	-34
1969.1	-22	35	74	-20	- 9	7	95	-56	34
1969.2	19	20	0	6	31	34	4	13	6
1969.3	106	33	10	10	83	55	-25	40	66
1969.4	84	34	50	22	28	39	11	110	-26

(Continued)

Appendix Table 3 (Continued)
The Absolute One-Period Changes in Reserve Money and Its Components (Quarterly Data)
(in 10 Million TL)

Period	Reserve Money	Sources of Reserve Money						Uses of Reserve Money	
		Foreign Reserves	Govt. Liabilities	SEEs Liab. to Cen. Bk.	Banking Sector Liab. to Cen. Bk.	Foreign Liabilities	Other Items (Net)	Bank Reserves	Currency in Circula
1970.1	-62	- 7	83	-58	- 2	-44	122	-73	11
1970.2	-24	-35	2	1	51	15	28	-44	20
1970.3	246	466	- 5	52	37	433	-129	102	144
1970.4	102	98	2	20	-32	84	-98	63	39
1971.1	96	17	-26	8	-81	-794	616	81	15
1971.2	147	-28	133	35	-57	- 8	-56	93	54
1971.3	287	181	34	160	-59	10	- 1	104	183
1971.4	256	255	-39	- 3	83	21	19	217	39
1972.1	70	253	238	1	-196	13	213	62	8
1972.2	4	-104	-21	-29	35	-73	-50	-12	16
1972.3	482	424	37	103	6	3	85	210	272
1972.4	414	349	-16	-40	228	7	100	504	-90
1973.1	102	467	- 8	-23	0	29	305	-15	117
1973.2	33	83	- 5	-69	321	1	296	-14	47
1973.3	454	426	47	45	119	15	168	150	304
1973.4	226	-17	88	-16	307	-35	171	228	- 2
1974.1	384	204	118	118	16	14	58	255	129
1974.2	166	-250	0	30	212	11	-185	42	124
1974.3	494	31	159	277	-58	14	-99	-10	504
1974.4	265	-495	131	584	751	- 5	711	409	-144

Source: International Monetary Fund, International Financial Statistics, Turkey Section, various issues.

Appendix Table 4
The Percentage Change of Reserve Money and Its Components From Previous Period (Quarterly Data)
(as percentage)

Period	Reserve Money	Sources of Reserve Money						Uses of Reserve Money	
		Foreign Reserves	Govt. Liab. to Cen. Bk.	SEEs Cred. to Cen. Bk.	Banking Sector Liab. to Cen. Bk.	Foreign Liabilities	Other Items (Net)	Bank Reserves	Currency in Circula.
1960.1	4	- 1	23	0	- 4	- 4	5	2	4
1960.2	1	0	- 3	1	9	0	-15	- 1	1
1960.3	6	199	- 8	0	- 2	-151	36	- 6	9
1960.4	5	4	33	-16	10	12	-57	35	- 3
1961.1	0	- 9	13	- 4	- 7	16	- 5	-12	4
1961.2	- 4	- 2	181	-90	-71	- 2	5	-18	0
1961.3	7	3	- 3	44	39	0	2	8	7
1961.4	5	2	4	-23	-16	14	2	40	- 3
1962.1	2	- 1	1	35	-16	14	- 3	-10	7
1962.2	- 5	- 3	- 1	-44	11	-28	22	-13	- 2
1962.3	9	1	1	187	14	- 5	9	11	8
1962.4	2	- 5	5	16	16	11	-34	21	- 3
1963.1	3	- 1	5	11	-10	7	- 9	0	4
1963.2	- 4	- 1	1	35	22	-22	-25	- 7	- 3
1963.3	4	- 1	1	24	26	- 8	- 6	4	4
1963.4	7	7	1	49	-20	- 2	12	19	3
1964.1	2	-14	3	-22	2	12	14	1	3
1964.2	- 1	1	2	-23	- 1	1	- 4	- 6	0
1964.3	12	-10	5	35	37	- 7	7	5	14
1964.4	8	27	- 5	27	- 3	7	16	43	- 2

(Continued)

Appendix Table 4 (Continued)
 The Percentage Change of Reserve Money and Its Components From Previous Period (Quarterly Data)
 (as percentage)

Period	Reserve Money	Sources of Reserve Money						Uses of Reserve Money	
		Foreign Reserves	Govt. Liab. to Cen. Bk.	SEEs Cred. to Cen. Bk.	Banking Sector Liab. to Cen. Bk.	Foreign Liabilities	Other Items (Net)	Bank Reserves	Currency in Circula
1965.1	0	-14	9	-15	-14	15	-18	0	- 1
1965.2	2	1	5	-33	1	11	- 2	- 5	5
1965.3	5	2	2	56	11	- 5	-11	7	5
1965.4	4	6	1	-12	2	1	14	18	- 2
1966.1	4	0	6	- 9	-12	18	- 2	- 9	10
1966.2	- 4	- 6	- 1	14	20	-32	-17	- 2	- 5
1966.3	16	8	1	62	26	-12	30	13	17
1966.4	4	- 1	4	- 9	22	-20	10	23	- 4
1967.1	- 2	- 8	1	2	1	26	-82	-10	2
1967.2	0	29	- 2	-28	18	5	-31	2	- 1
1967.3	10	-23	3	89	3	-20	34	8	11
1967.4	10	12	5	- 6	19	-21	25	11	9
1968.1	- 6	- 9	4	-10	- 7	19	-71	0	- 8
1968.2	4	4	0	0	- 2	- 7	28	8	1
1968.3	6	3	4	12	9	- 1	-12	9	4
1968.4	5	13	0	- 9	18	-28	20	20	- 4
1969.1	- 2	16	8	13	- 2	- 3	-77	-10	4
1969.2	1	8	0	5	7	-15	- 2	2	1
1969.3	8	12	1	7	18	-21	11	7	8
1969.4	6	11	5	15	5	-12	- 6	19	- 3

(Continued)

Appendix Table 4 (Continued)
The Percentage Change of Reserve Money and Its Components From Previous Period (Quarterly Data)
(as percentage)

Period	Reserve Money	Sources of Reserve Money						Uses of Reserve Money	
		Foreign Reserves	Govt. Liab. to Cen. Bk.	SEEs Cred. to Cen. Bk.	Banking Sector Liab. to Cen. Bk.	Foreign Liabilities	Other Items (Net)	Bank Reserves	Currency in Circula.
1970.1	- 4	- 2	8	-35	0	12	-59	-11	1
1970.2	- 2	-10	0	1	9	- 5	- 8	- 7	2
1970.3	17	155	0	47	6	-131	36	18	16
1970.4	6	13	0	12	- 5	-11	43	9	4
1971.1	6	2	- 2	4	-13	94	-470	11	1
1971.2	8	- 3	12	18	-10	15	7	11	5
1971.3	14	21	3	71	-16	-22	0	11	16
1971.4	11	25	- 3	- 1	20	-37	- 3	21	3
1972.1	3	20	19	0	-39	-17	-30	5	1
1972.2	0	- 7	- 1	- 8	12	81	5	- 1	1
1972.3	18	29	3	29	2	-18	-10	16	19
1972.4	13	19	- 1	- 9	67	-35	-10	34	- 5
1973.1	3	21	- 1	- 6	0	-107	-29	- 1	7
1973.2	1	3	0	-17	56	- 2	-22	- 1	3
1973.3	12	15	3	14	13	-26	-10	7	17
1973.4	5	0	6	- 4	30	49	- 9	11	0
1974.1	9	6	7	33	1	-38	- 3	11	6
1974.2	3	- 7	0	6	16	-22	9	2	6
1974.3	10	1	9	55	- 4	-23	5	0	22
1974.4	5	-16	7	75	51	7	-40	16	- 5

Source: International Monetary Fund, International Financial Statistics, Turkey Section, various issues.

Appendix Table 5
The Breakdown of the Total Change of Reserve Money From Previous Period (Quarterly Data)
(as percentage)

Period	Reserve Money	Sources of Reserve Money						Uses of Reserve Money	
		Foreign Reserves	Govt. Liab. to Cen. Bk.	SEEs Cred. to Cen. Bk.	Banking Sector Liab. to Cen. Bk.	Foreign Liabilities	Other Items (Net)	Bank Reserves	Currency in Circula.
1960.1	100	- 6	156	- 6	- 56	25	- 37	12	87
1960.2	100	0	-100	75	550	0	425	- 25	125
1960.3	100	518	-36	4	-14	536	-164	- 21	121
1960.4	100	39	174	-152	108	135	204	148	-48
1961.1	100	-2100	2100	-800	-1900	-3500	700	-1600	1700
1961.2	100	23	-1500	745	854	-14	36	95	5
1961.3	100	21	-38	24	88	0	- 6	21	79
1961.4	100	18	64	-21	-61	-93	- 7	143	-43
1962.1	100	-15	23	54	-108	-177	31	-108	208
1962.2	100	27	19	46	-31	-146	108	62	38
1962.3	100	6	8	58	25	17	-19	25	75
1962.4	100	-92	208	-58	125	-175	258	217	-117
1963.1	100	- 5	137	21	-58	-63	58	0	100
1963.2	100	4	-35	-61	-96	-143	-143	43	57
1963.3	100	- 8	29	54	129	62	42	21	79
1963.4	100	33	17	79	-74	7	- 52	64	36
1964.1	100	-181	112	-137	19	-156	-131	6	94
1964.2	100	-25	-150	225	12	25	- 62	125	-25
1964.3	100	-23	42	27	58	17	- 13	10	90
1964.4	100	72	54	36	- 8	-21	- 33	118	-18

(Continued)

Appendix Table 5 (Continued)
 The Breakdown of the Total Change of Reserve Money From Previous Period (Quarterly Data)
 (as percentage)

Period	Reserve Money	Sources of Reserve Money						Uses of Reserve Money	
		Foreign Reserves	Govt. Liab. to Cen. Bk.	SEEs Cred. to Cen. Bk.	Banking Sector Liab. to Cen. Bk.	Foreign Liabilities	Other Items (Net)	Bank Reserves	Currency in Circula
1965.1	100	1450	-2950	750	1150	1300	-1000	-50	150
1965.2	100	10	155	-145	10	-80	10	-50	150
1965.3	100	9	27	75	34	14	32	39	61
1965.4	100	34	19	-34	9	-6	-66	144	-44
1966.1	100	0	111	-19	-54	-68	5	-70	170
1966.2	100	31	21	-26	-72	-92	-54	13	87
1966.3	100	10	3	37	31	12	-31	24	76
1966.4	100	-5	73	-29	115	78	-24	171	-71
1967.1	100	58	-35	-12	-8	196	-292	147	-46
1967.2	100	5200	-1800	-3600	4800	-700	5200	800	-700
1967.3	100	-52	19	79	9	26	-72	27	73
1967.4	100	19	36	-9	53	30	-31	36	64
1968.1	100	25	-44	23	39	54	-110	0	100
1968.2	100	19	5	0	-16	28	-121	79	21
1968.3	100	8	49	25	44	3	23	56	44
1968.4	100	42	2	-23	110	79	-48	155	-55
1969.1	100	-159	-336	91	44	-32	-432	255	-155
1969.2	100	105	0	32	163	179	21	69	32
1969.3	100	31	9	9	78	52	-24	38	62
1969.4	100	40	60	26	33	46	13	131	-31

(Continued)

Appendix Table 5 (Continued)
The Breakdown of the Total Change of Reserve Money From Previous Period (Quarterly Data)
(as percentage)

Period	Reserve Money	Sources of Reserve Money						Uses of Reserve Money	
		Foreign Reserves	Govt. Liab. to Cen. Bk.	SEEs Cred. to Cen. Bk.	Banking Sector Liab. to Cen. Bk.	Foreign Liabilities	Other Items (Net)	Bank Reserves	Currency in Circula.
1970.1	100	11	-134	94	3	71	-197	118	-18
1970.2	100	146	- 8	- 4	-212	-62	-117	183	-83
1970.3	100	189	- 2	21	15	176	- 52	41	59
1970.4	100	96	2	20	-31	82	- 96	62	38
1971.1	100	18	-27	8	-84	-827	642	84	16
1971.2	100	-19	90	24	-39	- 5	- 38	63	37
1971.3	100	63	12	56	-28	3	0	36	64
1971.4	100	100	-15	- 1	32	8	7	85	15
1972.1	100	361	340	1	-280	19	304	89	11
1972.2	100	-2600	-525	-725	875	-1825	-1250	-300	400
1972.3	100	88	8	21	1	1	18	44	56
1972.4	100	84	- 4	-10	55	2	24	122	-22
1973.1	100	458	- 8	-23	0	28	299	-15	115
1973.2	100	252	-15	-209	973	3	897	-42	142
1973.3	100	94	10	10	26	3	37	33	67
1973.4	100	- 8	39	- 7	136	-15	76	101	- 1
1974.1	100	53	31	31	4	4	15	66	34
1974.2	100	-151	0	18	128	7	-111	25	75
1974.3	100	6	32	56	-12	3	-20	- 2	102
1974.4	100	-187	49	220	283	- 2	268	154	-54

Source: International Monetary Fund, International Financial Statistics, Turkey Section, various issues.

Appendix Table 6
The Values of the Reserve Money and Its Components Used in This Study (Annual Data)
(in 10 Million TL)

Period	Reserve Money	Sources of Reserve Money						Uses of Reserve Money	
		Foreign Reserves	Govt. Liab. to Cen. Bk.	SEEs Cred. to Cen. Bk.	Banking Sector Liab. to Cen. Bk.	Foreign Liabilities	Other Items (Net)	Bank Reserves	Currency in circula.
1960	480	147	137	215	260	166	113	107	373
1961	521	207	427	61	133	178	129	111	409
1962	574	204	524	30	90	164	111	126	448
1963	625	196	581	65	123	175	165	149	475
1964	727	180	627	80	144	177	128	185	541
1965	853	182	711	80	149	138	132	254	598
1966	992	190	774	104	194	129	142	299	692
1967	1139	195	820	138	316	162	168	360	779
1968	1291	195	899	151	378	184	149	477	814
1969	1451	295	1010	145	506	294	211	579	872
1970	1640	566	1135	141	623	568	257	645	994
1971	2247	1014	1216	296	488	58	709	990	1257
1972	3337	1763	1473	403	387	38	952	1512	1525
1973	4000	2949	1508	361	947	55	1710	2098	1901
1974	5226	3078	1827	780	1650	65	2044	2724	2502

Source: International Monetary Fund, International Financial Statistics, Turkey Section, various issues.

Appendix Table 7

The Shares of the Reserve Money Components in the Total Reserve Money (Annual Data)
(as percentage)

Period	Reserve Money	Sources of Reserve Money						Uses of Reserve Money	
		Foreign Reserves	Govt. Liab. to Cen. Bk.	SEEs Cred. to Cen. Bk.	Banking Sector Liab. to Cen. Bk.	Foreign Liabilities	Other Items (Net)	Bank Reserves	Currency in circula.
1960	100	31	29	45	54	35	24	22	78
1961	100	40	82	12	26	34	25	22	79
1962	100	36	91	5	16	29	19	22	78
1963	100	31	93	10	20	28	27	24	76
1964	100	25	86	11	20	24	18	26	74
1965	100	21	83	9	18	16	16	30	70
1966	100	19	78	11	20	13	14	30	70
1967	100	17	72	12	28	14	15	32	68
1968	100	15	70	12	29	14	12	37	63
1969	100	20	70	10	35	20	15	40	60
1970	100	35	69	9	38	35	16	39	61
1971	100	45	54	13	22	3	32	44	56
1972	100	58	49	13	13	1	31	50	50
1973	100	74	38	9	24	1	43	52	48
1974	100	59	35	15	32	1	39	52	48

Source: International Monetary Fund, International Financial Statistics, Turkey Section, various issues.

Appendix Table 8
The Absolute One-Period Changes in Reserve Money and Its Components (Annual Data)
(In 10 Million TL)

Period	Reserve Money	Sources of Reserve Money						Uses of Reserve Money	
		Foreign Reserves	Govt. Liabilities	SEEs Liab. to Cen. Bk.	Banking Sector Liab. to Cen. Bk.	Foreign Liabilities	Other Items (Net)	Bank Reserves	Currency in circula.
1960	39	74	27	- 7	12	71	- 4	7	32
1961	41	59	290	-153	-127	12	16	4	37
1962	53	- 3	97	-31	-43	-14	-18	14	38
1963	51	- 8	57	35	32	11	54	23	27
1964	102	-16	46	15	21	2	-37	36	66
1965	126	2	84	0	5	-39	4	69	57
1966	139	8	63	24	45	- 9	10	45	94
1967	147	5	46	33	122	32	26	60	86
1968	152	0	80	13	62	22	-19	117	35
1969	160	99	111	- 6	128	110	61	102	58
1970	189	271	125	- 3	117	274	47	67	123
1971	607	448	80	155	-135	-510	451	344	263
1972	790	749	258	107	-101	-20	243	522	268
1973	763	1186	35	-42	560	17	759	586	376
1974	1226	129	318	418	704	10	334	626	600

Source: International Monetary Fund, International Financial Statistics, Turkey Section, various issues.

Appendix Table 9
The Percentage Change of Reserve Money and Its Components From Previous Period (Annual Data)
(as percentage)

Period	Reserve Money	Sources of Reserve Money						Uses of Reserve Money	
		Foreign Reserves	Govt. Liab. to Cen. Bk.	SEEs Cred. to Cen. Bk.	Banking Sector Liab. to Cen. Bk.	Foreign Liabilities	Other Items (Net)	Bank Reserves	Currency in circula.
1960	9	100	25	- 3	5	-74	4	7	9
1961	8	40	212	-71	-49	- 8	-14	4	10
1962	10	- 1	23	-51	-32	8	14	13	9
1963	9	- 4	11	116	36	- 7	-49	18	6
1964	16	- 8	8	23	17	- 1	23	24	14
1965	17	1	13	- 1	4	22	- 3	37	10
1966	16	5	9	31	30	6	- 8	18	16
1967	15	3	6	32	62	-25	-19	20	12
1968	13	0	10	10	19	-14	11	32	4
1969	12	51	12	- 4	34	-60	-41	21	7
1970	13	92	12	- 2	23	-93	-22	11	14
1971	37	79	7	109	-22	90	-175	53	26
1972	35	74	21	36	-21	34	34	53	21
1973	32	67	2	-10	145	-44	-80	39	25
1974	31	4	21	116	74	-17	-20	30	32

Source: International Monetary Fund, International Financial Statistics, Turkey Section, various issues.

Appendix Table 10
The Breakdown of the Total Change of Reserve Money From Previous Period (Annual Data)
(as percentage)

Period	Reserve Money	Sources of Reserve Money						Uses of Reserve Money	
		Foreign Reserves	Govt. Liab. to Cen. Bk.	SEEs Cred. to Cen. Bk.	Banking Sector Liab. to Cen. Bk.	Foreign Liabilities	Other Items (Net)	Bank Reserves	Currency in circula.
1960	100	190	70	-18	30	184	-12	17	82
1961	100	145	713	-377	-312	31	39	10	90
1962	100	- 5	183	-59	-81	-27	-34	28	72
1963	100	-15	112	69	64	22	107	46	54
1964	100	-16	45	15	21	2	-37	35	65
1965	100	1	67	0	4	-31	3	55	45
1966	100	6	45	18	32	- 6	7	32	68
1967	100	3	31	23	83	22	18	41	59
1968	100	0	52	9	41	15	-13	77	23
1969	100	62	69	- 4	80	69	38	64	36
1970	100	143	66	- 2	62	145	25	35	65
1971	100	74	13	25	-22	-84	74	57	43
1972	100	95	33	14	-13	- 3	31	66	34
1973	100	123	4	- 4	58	2	78	61	39
1974	100	11	26	34	57	1	27	51	49

Source: International Monetary Fund, International Financial Statistics, Turkey Section, various issues.

Appendix Table 11

Estimated Equations for the Time Paths of the Variables of the Model

Dummy variables take the value 1 for the following specified periods and zero otherwise.

D_1 = For the period after 1970/3.

D_2 = For the years after 1971.

D_3 = For the period before 1961/3.

D_4 = For the first quarters of the year.

D_5 = For the period after 1974/3.

D_6 = For the third quarters, after 1961/2.

D_7 = For all quarters after 1971/2.

D_8 = For the third quarters of the years.

Appendix Table 11
Estimated Equations for the Time Paths of the Variables of the Model

Dependent Variable	Regressors										R ²	DW	<i>p</i>	Data Used Q=Quarterly Y=Annual	
	Constant	Time	Dummies												
			1	2	3	4	5	6	7	8					
Log(G)	6.01 (257.10)	.024 (26.88)	.040 (1.33)		-1.14 (35.05)							.992	1.10		Q
Log(G)	5.91 (209.82)	.102 (23.30)			-1.15 (27.65)							.997	2.46		Y
Log(GC)	5.05 (208.99)	.040 (43.95)	-.618 (2.02)		-.238 (7.10)	.040 (2.20)						.993	1.21		Q
Log(GC)	4.81 (78.34)	.172 (24.73)										.977	1.12		Y
Log(S)	3.04 (32.17)	.055 (20.98)			2.16 (14.31)		.875 (2.80)					.900	.912		Q
Log(S)	2.97 (17.78)	.056 (12.32)			2.22 (9.23)		.642 (2.46)					.790	2.21	.560	Q
Log(S)	3.37 (20.35)	.180 (9.60)			1.92 (8.06)		.583 (1.98)					.924	2.58		Y
Log(SC)	5.16 (102.71)	.016 (9.18)	.227 (3.64)		.138 (2.00)		.929 (7.08)	.080 (2.05)				.923	.818		Q

(Continued)

Appendix Table 11 (Continued)
 Estimated Equations for the Time Paths of the Variables of the Model

Dependent Variable	Regressors										R ²	DW	ρ	Data Used Q=Quarterly Y=Annual	
	Constant	Time	Dummies												
			1	2	3	4	5	6	7	8					
Log(SC)	4.96 (29.14)	.025 (5.22)	0.78 (.820)		-.078 (.794)			.568 (5.99)	.073 (3.85)			.670	1.98	.835	Q
Log(SC)	5.30 (80.04)	.052 (4.68)	.194 (1.78)					.586 (4.30)				.937	1.73		Y
Log(B)	3.83 (38.74)	.060 (16.31)	-.404 (3.19)		1.56 (3.19)							.908	.521		Q
Log(B)	3.82 (12.35)	.058 (6.78)	-.060 (.347)		1.28 (6.96)							.650	2.01	.833	Q
Log(B)	4.10 (22.96)	.191 (10.11)			1.34 (5.08)							.888	1.62		Y
Log(BC)	4.83 (55.66)	.040 (12.40)	-.188 (1.71)		.617 (5.07)							.873	.363		Q
Log(BC)	4.34 (8.13)	.052 (4.30)	-.016 (.12)		.307 (2.28)							.329	2.05	.919	Q
Log(BC)	4.95 (33.76)	.137 (8.84)			.518 (2.38)							.872	1.42		Y

(Continued)

Appendix Table 11 (Continued)
 Estimated Equations for the Time Paths of the Variables of the Model

Dependent Variable	Regressors										R ²	DW	ρ	Data Used Q=Quarterly Y=Annual		
	Constant	Time	Dummies													
			1	2	3	4	5	6	7	8						
Log(CU)	5.79 (197.41)	.026 (23.09)	.221 (4.96)							.051 (1.75)			.972	.256		Q
Log(CU)	5.13 (14.37)	.043 (6.36)	.046 (1.03)							.058 (7.16)			.644	2.48	.951	Q
Log(CU)	5.78 (159.13)	.104 (20.39)		.311 (5.14)							.311 (5.14)		.988	1.90		Y
Log(BR)	4.26 (113.27)	.054 (42.50)			.283 (5.38)						.378 (8.09)	-.073 (2.49)	.991	1.28		Q
Log(BR)	4.19 (78.92)	.216 (31.32)			.393 (4.76)						.401 (5.91)		.996	2.90		Y
Log(BR)	4.19 (147.21)	.215 (57.48)			.338 (7.43)						.425 (11.12)		.999	2.46	-.599	Y
Log(RE)	5.93 (203.60)	.035 (35.49)			.134 (3.25)						.375 (10.31)	.039 (1.73)	.989	.644		Q
Log(RE)	5.34 (15.94)	.051 (7.80)			.070 (1.44)						.082 (1.74)	.022 (2.66)	.624	2.54	.946	Q
Log(RE)	5.94 (125.79)	.137 (21.50)								.418 (6.05)			.990	.198		Y

Source: Prepared from International Monetary Fund, International Financial Statistics, Turkey Section, various issues.

Appendix Table 12

Estimated Relationships Between Imports (Dependent Variables) Nominal Income and Money

Indep. Var.	Data Unit	Coefficients		Var. of Coefficients		R ²	(if corrected for autocorr.)	D.W.
		Constraint	Indep. Var.	Constraint	Indep. Var.			
Y	\$	- 223	-.055	1653	.57-05	.974		1.09
Y	\$	- 219	-.054	4491	.10-04	.956	.442	1.77
Y	TL	- 4670	1.22	.13+07	.47-02	.958		.737
Y	TL	- 355	1.73	.20+09	.14-01	.940	.961	1.33
Y _{t-1}	\$	- 474	-.073	4749	.27-04	.934		.710
Y _{t-1}	\$	- 29.2	-.081	6759	.27-04	.949	.438	1.62
Y _{t-1}	TL	- 5568	1.61	.35+07	.20-01	.899		.885
Y _{t-1}	TL	-13223	2.11	.1724+08	.52-01	.868	.636	1.55
M ^S ₁	\$	- 241	-.241	2266	.15-03	.964		.521
M ^S ₁	\$	- 137	-.264	17219	.41-03	.927	.761	1.69
M ^S ₁	TL	- 4043	5.32	.24+07	.1721	.921		.885
M ^S ₁	TL	-26645	8.16	.261+09	1.21	.809	.931	1.65

(Continued)

Appendix Table 12 (Continued)

Estimated Relationships Between Imports (Dependent Variables) Nominal Income and Money

Indep. Var.	Data Unit	Coefficients		Var. of Coefficients		R ²	(if corrected for autocorr.)	D.W.
		Constraint	Indep. Var.	Constraint	Indep. Var.			
M ^S ₂	\$	- 284	-.184	2144	.92-04	.963		.519
M ^S ₂	\$	- 104	-.210	28241	.30-03	.917	.820	.820
M ^S ₂	TL	- 3034	4.01	.2529	.109	.913		.899
M ^S ₂	TL	-30898	6.52	.371+09	.883	.787	.939	1.32
RE	\$	- 291	-.426	1066	.24-03	.981		.926
RE	\$	- 270	-.434	3684	.51-03	.965	.527	1.90
RE	TL	- 2995	9.35	.1569+07	.363	.945		1.12
RE	TL	- 8483	11.90	.29+08	1.81	.857	.796	1.45

Source: Prepared from International Monetary Fund, International Financial Statistics, Turkey Section, various issues.

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