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The Foreign Exchange Gap, Growth and Industrial Strategy in Turkey: 1973-1983

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WORLD BANK

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THE FOREIGN EXCHANGE GAP, GROWTH AND INDUSTRIAL STRATEGY IN TURKEY: 1973-1983

This study is an examination of the interaction between trade, trade policy and growth in the Turkish economy. The analysis relies to a great extent on a multi-sector general equilibrium growth model of the economy. The model focuses on trade and industry and attempts to capture the basic mechanisms that link economic performance and structure to trade policy in the medium run. The time period covered is 1973 to 1983 with first an evaluation of the past five years (1973-1977) and then an analysis of future prospects and alternatives (1978-1983). The study was undertaken during the first half of 1978, by the authors, who work in the World Bank's Economics of Industry Division.

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This study has been prepared in the Economics of Industry Division of the Development Economics Department during the Spring and Summer of 1978. It concentrates on an analysis of the foreign-exchange gap and the interrelationships between trade, growth and industrialization in Turkey. The analysis is largely, but not exclusively, based on results obtained by using a multi-sector general equilibrium growth model of the economy covering the period from 1973 to 1983. All experiments were completed in July 1978 and the forward looking projections reflect the data and estimates as they were available at that time.

We have benefited from close collaboration with the regional economists and would like to thank Ram Chopra, David Berk, Shakil Faruqi and Adrian Wood for their help and advice. We have worked particularly closely with Adrian Wood and many of his ideas are reflected in the formulation of the model and discussion of the experiments. Vinod Dubey, Attila Karaosmanoglu, Don Keesing and Larry Westphal made important suggestions which have helped a great deal in writing the first draft. Jaime de Melo gave us extensive comments and much in this study reflects ideas developed with him over the last two years of joint work. Finally, we would like to thank Hollis Chenery for his encouragement and constant interest.

We have had the expert research assistance of Murat Köprülü throughout this study and thank him for his help. We are also indebted to Jeff Lewis who did the "sources of growth" computation and prepared the figures in Part 5. Margot Clark typed the whole manuscript and Rob Kish typed the first two drafts. We thank them for their patience.

Remaining errors and weaknesses are of course ours alone and the views and policy conclusions expressed in this study are those of the authors alone and should not be attributed to the World Bank, to its affiliated organizations or to any individual acting in their behalf.

The Foreign Exchange Gap, Growth and Industrial Strategy in Turkey: 1973-1983

1. Introduction

The purpose of this study is to analyze Turkish industrialization and growth in the 1970's and to evaluate prospects for the 1980's using a multi-sector general equilibrium growth model of the economy. The very serious foreign exchange crisis that emerged in 1977 has again emphasized the importance of trade and trade policies as major determinants of Turkey's overall economic performance. It therefore seems appropriate that the major focus of the discussion be on the interaction between foreign trade and growth and the analysis of the foreign exchange constraint.

Turkey's growth rate has been impressive in the past, averaging 6.5 percent over three decades (1947-1977). This relatively high growth rate was achieved without the availability of particularly valuable resources such as oil, with only a moderate amount of foreign aid and within the framework of basically democratic political institutions. Finally, while income is quite unequally distributed (with a very large rural-urban gap and a Gini-coefficient above 0.500), basic needs are reasonably well met and problems of malnutrition, basic health care, basic education and shelter are less acute than in many countries with equal or even higher per capita incomes.[1/]

The initial conditions from which Turkey started after World War I were not favorable. For example, both in terms of physical infrastructure and human resources, Egypt was significantly ahead of Turkey at

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1/ For an evaluation of Basic Needs in Turkey, see Karaosmanoğlu and Durdağ (1977). For an analysis of the distribution of income, see Dervis and Robinson (1977).

the beginning of the century.[1] Particularly in terms of human resources, all the Southern European countries such as Bulgaria, Greece, Serbia, Croatia, Spain and Portugal were far ahead of Turkey before and after World War I. Furthermore, the rate of population growth in Turkey remained betweeen 2.5 and 3.0 percent throughout the century and, while on a declining trend, it is still more than double that in the rest of Southern Europe. With a per capita income of about $1000 in 1977, Turkey remains poorer than most countries in the semi-industrial category.

Growth, while rapid on average, has not proceeded at a steady pace. The foundations of Turkish industrialization were laid in the decade before World War II and, in spite of the world depression, Turkey achieved substantial growth in the 1930's with important investments in infra-structure and the creation of State Economic Enterprises that successfully led to the beginnings of industrial growth. The war and the diversion of resources and change of priorities it created in spite of Turkey's neutrality were probably the major causes of the complete economic standstill that followed in the 1940's.[2]

Since 1950, which marks the beginning of regular national accounting as well as an important political turning point, Turkey seems to have gone through three rather similar cycles. Each starts with a period of quite rapid industrial growth and ends with a major foreign-exchange

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1/ See C. Issawi (1978).

2/ See Bulutay and others (1975) for estimates of national income in the 1930's and 1940's. See also Herschlag (1968) and Land (1970).

crisis, a large devaluation and a transitory slowdown in industrial growth.[1/]

In Figure 1, two-year moving averages of industrial growth rates have been plotted against time. The three cycles are quite apparent from the graph. Each downswing is associated with an acute foreign-exchange crisis and a major effective devaluation, close to 100% in 1958, about 50% in 1970 and again about 50% in the period from September 1977 to March 1978.[2/]

While a clear cyclical pattern emerges from Figure 1, one has to be careful in interpreting the cycles in too mechanistic a fashion. Common factors and aspects exist but one crisis has not been a simple repetition of its predecessor. Thus, while the 1958-1960 crisis followed a period of almost hyperinflation and was followed by a period of remarkable price stability, exactly the opposite is true of the 1970 crisis. It followed a period of relative price stability but was followed by a period of substantial inflation. The impact on export performance has also varied. The 1958 de facto devaluation was not followed by a major upward surge of exports. Between 1957/58 and 1961/62, exports increased by only 23% in value. In contrast export revenue increased by 153% between 1969/1970 and 1973/1974.

There was reason for much optimism in the early 1970's. The foreign-exchange constraint that had plagued the Turkish economy throughout

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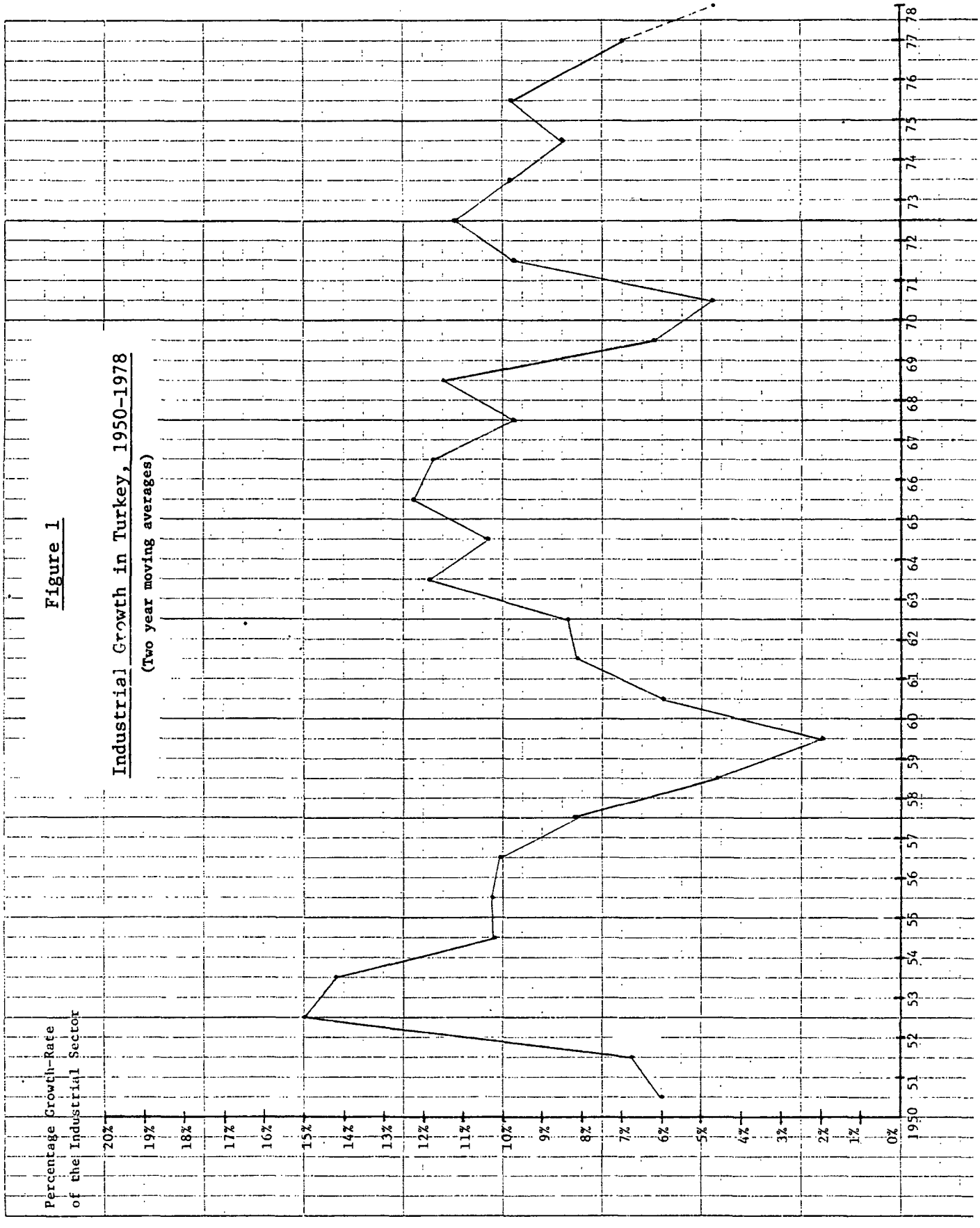
1/ Economy-wide growth has not always followed the movements of industrial growth because of the extreme volatility of agricultural growth, heavily dependent on weather conditions.

2/ See Krueger (1974) for the computation of changes in effective exchange rates in 1958 and 1970. Note that by industrial we are here referring to the non-agricultural sectors including services.

Figure 1

Industrial Growth in Turkey, 1950-1978

(Two year moving averages)



the 1950's and 1960's had all of a sudden disappeared. For the first time ever in post-war history, the current account deficit declined to zero in 1972 and turned into a 484 million dollar surplus in 1973. Foreign exchange reserves reached 2 billion dollars at the end of 1973, a figure equal to annual imports of merchandise. The major factor responsible for this substantial accumulation of reserves was the sudden and massive inflow of workers' remittances from Western Europe: while only 141 million dollars in 1969, remittances were 471 million dollars in 1971 and reached a peak of 1426 million dollars in 1974. Tourism revenues and manufactured exports also increased. Total export revenues increased by 15% in 1971, 31% in 1972 and 49% in 1973. Manufactured exports grew at an annual rate of 40% in the same period. Value-added in industry grew at 10.6% in the 1970-73 period. Performance in agriculture was mixed, with a 10% decline in 1973 but a 13% growth-rate in 1971. While the weather is still a major determinant of agricultural output, increased use of fertilizer and mechanization proceeded at a very rapid pace in the first half of the seventies and the average growth rate of agricultural output between 1970 and 1975 was 4.5%.

The situation seemed to point to an increase in the possible trend growth rate of the Turkish economy from about 6.5 percent to about 8.0 percent. In fact, between 1970 and 1976, GDP grew at an annual average rate of 7.7 percent. It was even on an accelerating trend after 1973, seemingly in spite of the oil crisis and the world depression that followed. There was general agreement in Turkey that the Fourth Five Year Plan due to start in 1978 should aim at an annual growth rate of at least 8.0 percent.

This kind of growth rate is perceived to be a necessary minimum for the absorption of underemployment and for a significant narrowing of the absolute income gap that separates Turkey from other Southern European countries, an objective planners hope to achieve by the end of this century.

With the full emergence of the current foreign exchange crisis, these goals are seriously called into question. The cumulative current account deficit since 1974 has reached 8 billion dollars, with the 1977 deficit alone about 3 billion dollars. While the current foreign-exchange crisis is similar in many ways to the 1958 crisis, it is probably deeper, with a much greater percentage resource gap. The debt-service ratio has climbed from 11.4 percent of exports and workers' remittances in 1976 to 15.6 percent in 1977 and it will be above 20% for the coming years. Payments for imports have been delayed on a wide scale, foreign exchange reserves equal only one month's worth of imports, industry is lacking crucial imported inputs as well as energy and it appears that growth has come to a halt in the latter half of 1977.

Predictions and projections for the future vary widely. In the short-run, that is to say in 1978 and 1979, it seems clear that only a very substantial net new inflow of borrowed funds can allow increased capacity use and prevent fixed investment from actually declining. Can a 5 to 6 percent annual growth rate be achieved in 1978-1979? How much new external finance would appear necessary for the achievement of such a target? What are Turkey's growth prospects in the longer-run? Can an 8

percent growth rate be achieved over the Fourth Five Year Plan now covering 1979 to 1983? What kind of policy package complemented by what amount of foreign resources could be expected to allow the realization of an 8 percent growth target? What are the implications for the growth of private consumption and public consumption? What are the implications for employment and sectoral structure? Is the exchange-rate of 25 TL to the dollar arrived at after the March 1978 devaluation a realistic one that should be preserved in real terms or are further devaluations needed?

These are the basic questions we want to address in the following sections emphasizing and analyzing the impact of policy. But before attempting to provide projections for the future and evaluating possible alternative policy packages, it is necessary to analyze the nature of the crisis that emerged in 1977. How did Turkey move from a 484 million current account surplus to a 3.2 billion dollar deficit in 4 years? Is the crisis one that is largely due to factors endogenous to Turkey's development policies or can it be explained by exogenous shocks coming from the world economy? Are present problems the necessary outcome of Turkey's inward-looking import-substituting development strategy or would the crisis never have occurred had it not been for the oil price increase and increased disbursements for military hardware due to the American embargo? Without at least finding tentative answers to these questions and assigning approximate weights to the various factors that led to the 1977 collapse, one cannot really appraise future prospects and policy alternatives. Part 3 will therefore attempt to provide a quantitative analysis of the 1977 crisis

with special emphasis on the role of the oil price increase. Part 4 will turn to the future and offer an analysis of the impact of alternative policy packages on overall growth and economy-wide performance in the Fourth Five Year Plan period. Part 5 will turn to a microeconomic analysis and will focus on the pattern of sectoral growth and the role of import substitution and export expansion. Both the macroeconomic analysis in Part 4 and the microeconomic analysis in Part 5 will rely to a large extent, although not exclusively, on a computable general equilibrium model of the Turkish economy that allows conditional policy experiments to be conducted and with which we attempt to quantify the general equilibrium mechanisms that link trade, growth and employment to policy variables such as the exchange rate, tariffs, import rationing, export subsidies, taxes and government expenditure patterns. Part 2 below provides a detailed description of the most important features of the model. A complete statement of the model equations is available in Appendix A.

2. Distinctive Features of the TGT Model

2.1 Introduction: General Equilibrium Modelling

This section describes the most important features of the general equilibrium growth model of the Turkish economy on which much of the discussion will be based. While of an economy-wide nature, it concentrates on the industrial sector and on issues of trade and industrialization. We shall call it the TGT model (Turkey, Growth and Trade).

The model is in the tradition of the non-linear computable general equilibrium (CGE) models that have been built over the past few years for development planning purposes.[1/] The original inspiration for this class of models can be found in Chenery and Uzawa (1958) and Leif Johansen's 1960 study of the Norwegian economy, but computational difficulties prevented, at that time, the full implementation of these ideas. Since then, computational difficulties have greatly diminished and it has become possible to implement very large and highly non-linear models. Progress, in this field as in others, is not costless. The data requirements of large models characterized by price endogenous feedback mechanisms are larger than those of simpler linear models and often the specification is ahead of the data. The availability of Social Accounting Matrices of the sort recently built by Stone, Pyatt and others

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1/ See for instance Dervis (1975), Adelman and Robinson (1978), Taylor (1978), De Melo (1978) and Ahluwalia, Lysy and Pyatt (1977). See also Chenery and Raduchel (1971) who, with a 4-sector illustrative model, stressed the importance of modelling price-sensitive direct substitution mechanisms. For an approach based on linearization rather than explicit solution see Celasun (1975).

is therefore a development from which CGE modelling can greatly benefit.[1/] A second area of concern is the difficulty of keeping track of the various causal chains implicit in a complex non-linear model. Nevertheless, while still in their first phase of implementation, the recent models that endogenize prices and incorporate direct substitution constitute a notable advance in the field of development planning because they make possible an explicit analysis of policy packages that work through the price mechanism. They should therefore, when properly used, allow a much richer dialogue among economic theorists, model builders and policy makers. It is in this dialogue that one should see their most useful function.

The model of Turkey builds on recent work we have done and aspects of it can already be found in De Melo and Dervis (1977), Robinson and De Melo (1976) and Dervis (1977 a & b). But, particularly in the treatment of trade policy, the specification of adjustment to a fixed exchange rate, the treatment of exports and the incorporation of macro-accounts, the present model provides several new features.

In the next subsection, we describe a number of the distinctive features of the model. The full set of model equations, both static and dynamic, is given in an appendix. We do not discuss the solution

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1/ See Pyatt and Thorbecke (1976), Stone (1970), and United Nations (1975). An aggregate social accouting matrix for the model is presented in Section 2.6 below.

algorithm but note only that we are able to solve the rather large non-linear general equilibrium system quite economically.[1/]

2.2 Import Demands and Relative Prices

Empirically, one of the most unrealistic assumptions of trade theory is the treatment of foreign and domestic goods of the same sectoral classification as identical. The assumption is essentially harmless when it is used to obtain the many important qualitative results and theorems of trade theory. But when it is incorporated into applied planning or model-building exercises, it leads to extremely unrealistic and misleading results. Under such a homogeneity assumption, the domestic prices of tradables are fully tied to the price of imports and the structure of production and consumption in a given country will be extremely sensitive to slight relative-price variations between foreign and domestic goods, leading to overestimation of the effects of exchange-rate policies as well as a tendency to specialize in the production of a few commodities.

An elegant formulation that allows one to keep aggregative commodity categories across countries, but introduces product differentiation by countries of origin into the structure of demand for commodities in any given country, was proposed and implemented in a partial equilibrium

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1/ Our solution strategy follows the basic approach described in Adelman and Robinson (1978). We have, however, developed a new algorithm for solving this type of model that seems more robust and easier to apply than previous algorithms.

framework by Armington in 1969.[1/] The crucial assumption is that "marginal rates of substitution between any two products of the same kind (i.e., commodity category) must be independent of the quantities of the products of all other kinds."

Within the framework of a single country model, the basic idea is to define a "composite" commodity that is a C.E.S. aggregation of commodities produced abroad or imports, M_i, and commodities produced and consumed at home, D_i. The aggregation takes the familiar C.E.S. form:

$$Q_i = \gamma_i[\delta_i M_i^{-\rho_i} + (1 - \delta_i)D_i^{-\rho_i}]^{-1/\rho_i} \qquad i=1, \ldots, n \qquad (1)$$

where γ_i, δ_i and ρ_i are the parameters of the C.E.S. function in sector i, with $\frac{1}{1+\rho_i} = \sigma_i$ defining the elasticity of substitution. M_i and D_i are like inputs "producing" the aggregate output. Their ratio to each other is sensitive to relative prices and the degree of sensitivity varies with the elasticity of substitution. Consumers and producers are assumed to minimize the cost of obtaining the "composite" goods by choosing the cost-minimizing ratio of imports to domestically produced goods. After solving

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1/ See Armington (1969) for a more complete discussion of the assumption underlying the treatment of product differentiation. Robinson and De Melo (1976) used the idea in a single country CGE model formulation and De Melo, Dervis and Robinson (1977) formulated a global trade model using the same approach. The approach has also been used in a somewhat different spirit by Pyatt (1978) and in a still different form by Petri (1976). See De Melo and Robinson (1978) for a partial equilibrium analysis of the price relations implicit in Armington's formulation.

the first order conditions, the import demand functions are given by:

$$M_i = \left(\frac{\delta_i}{1-\delta_i}\right)^{\sigma_i} \left(\frac{PD_i}{PM_i}\right)^{\sigma_i} D_i$$

where PD_i = domestic good price and

PM_i = imported good price

Government policy directly affects the domestic price of imported commodities. Adopting the small country assumption, assume fixed world prices Π_i^m. Denoting ad valorem tariffs by tm_i and the exchange rate by ER, the domestic price of imports is given by:

$$PM_i = \Pi_i^m(1 + tm_i)ER \qquad i=1, \ldots, n$$

Since government policy determines tm_i and, depending on the exchange-rate regime, ER, then PM_i is fixed. The prices of domestically produced commodities (PD_i) on the other hand, are free to vary so as to equate the supply of domestically produced goods to the demand, which is also sensitive to the PM_i/PD_i ratio. Note that in the models following the assumptions of pure trade theory, there is no distinction between the foreign and the domestic components with a given sectoral aggregation and hence $PM_i=PD_i=\Pi_i(1+tm_i)ER$. This leads to the complete determination of all prices of tradable commodities by the world price and tariff equations alone, with demand and supply conditions playing no role whatsoever in the determination of relative prices of tradable commodities. The model becomes one in which quantities passively adjust to predetermined

relative prices. This of course greatly exaggerates the actual control trade policy has over domestic relative prices. In the C.E.S. formulation adopted here, not only the prices of non-tradable commodities but also the prices of domestically produced tradables are free to vary and cannot be tightly controlled through tariff policy, although they will of course be influenced by changes in the prices of imported commodities caused by tariff changes or exchange-rate adjustment. But the degree of autonomy of the domestic price system will be much greater and the links leading from exchange-rate and tariff policy to domestic prices are weaker and more complex than in standard trade theory. Only if the elasticities of substitution are very large will the model behave like the pure models of trade theory.

2.3 Fixed Exchange Rates and Quantitative Restrictions

While for some purposes a flexible exchange rate is a desirable model specification, it is often necessary to specify a fixed exchange rate and allow only discrete, government-determined adjustments to it. This certainly reflects the realities of the Turkish situation.

Model builders have usually dealt with a fixed exchange rate by dropping the foreign exchange balance equation (i.e., the foreign-exchange constraint) from the model while retaining the mechanism determining imports. The balance-of-payments deficit becomes endogenous and whatever additional foreign borrowing is necessary is assumed to be forthcoming. If much too high, the borrowing requirement may then be interpreted as a signal suggesting the unfeasibility of the proposed growth path.

Such a treatment of adjustment to a fixed exchange rate has many undesirable features. It may yield empirically quite unrealistic paths and also it is very difficult to evaluate the merits of alternative policy packages when net foreign capital flows are not held constant across experiments. To give an example, suppose one wants to compare the effects of raising income taxes to the effects of raising tariffs in order to achieve a given increase in government revenue. With a fixed exchange rate, these two policy changes will generate substantially different net capital inflows and it will therefore be very difficult to separate the direct effects of the tax policy changes alone from the effects of induced changes in capital flows.

In the Turkey model we have taken a different route. Total imports (valued in dollars) are set equal to total foreign exchange earnings composed of export earnings, factor income from abroad and net foreign capital flows. Capital flows are exogenously given to the model and will therefore remain constant across experiments. Given that total imports are thus determined by total exports and that world import prices are fixed, it can no longer be true that imports are also equal to "desired" imports as determined by the customs clearance price (c.i.f. + tariff) and the cost-minimization procedure outlined above. Something has to give, and there are essentially two alternatives:

Case a. There is a market for import licenses and/or imports can be resold. The domestic user price of imports is then bid up over and above

the customs clearance price until actual imports equal desired imports. Import users are thus on their demand curves and the premium separating the market price from the customs clearance price accrues to the recipients of import licenses. The burden of adjustment thus falls on the premia which will endogenously move so as to equate desired imports to what is made possible by available foreign exchange earnings. The user cost of imports will now be:

$$PMP_i = PM_i + PR_i \Pi_i^m ER$$

where PR_i denotes the premium in sector i. It is PMP_i/PD_i not PM_i/PD_i that will determine the import ratio and enter the import demand functions. If quotas are fixed sector by sector, each individual PR_i will have to move so as to equate sectoral import demands to the quotas. When total imports are restricted by available foreign exchange earnings, with the sectoral structure not rigidly fixed by quotas, the average level of import premia will adjust so as to clear the balance of payments. In that case, the model behaves as if the exchange rate were flexible but on the import side only: a systematic bias remains against exports.

Case b. For many producer goods, the sale of licenses or the resale of the goods themselves may not be possible. A domestic producer may receive a license to import specific machinery necessary for the expansion of his production facility and such a license will not be transferable. Although the scarcity value of the imported machinery may be much higher, in this case the user will only pay the c.i.f. + tariff price. Import

users will be "off" their demand curves in the sense that at prevailing user prices the desired sectoral import ratios are higher than the actual realized ratios. No explicit import premia appear in the model, but they are implicit in the profits made by producers. A certain part of these profits must be viewed as rents generated by import restrictions and the fixed exchange rate.

The user cost of imports now remains what it was before the introduction of quantitative restrictions, namely

$$PM_i = \Pi_i^m(1 + tm_i)ER$$

and desired imports will therefore be:

$$MD_i = \left(\frac{\delta_i}{1-\delta_i}\right)^{\sigma_i} \left(\frac{PD_i}{PM_i}\right)^{\sigma_i} D_i$$

But the sum in world prices of desired imports may exceed total foreign exchange earnings available to be spent on imports. Letting RM denote the ratio of actual imports to total desired imports we have:

$$RM = TIM/\Sigma_i \Pi_i^m MD_i$$

where TIM is total foreign exchange available for imports.

A simple allocation rule to determine actual imports in proportion to desired imports is to multiply desired imports by RM in each sector:

$$M_i = RM \cdot MD_i$$

In the case of a general foreign exchange shortage, the burden of adjustment is now on RM which will endogenously move so as to satisfy the foreign exchange constraint.

The quantity adjustment mechanism outlined above, although clearly a stylized and simplified story, closely resembles what actually took place in Turkey during the last few years. Import rationing has been very important and the assumption that foreign exchange is being rationed roughly in proportion to the levels of "desired" imports is an acceptable representation of reality.[1/] The remaining question is whether, in Turkey, the ultimate users of imported commodities pay the customs clearance price or a higher price incorporating an importer's premium.

It is difficult to give a clear-cut answer: the situation has varied over time and varies across sectors. A first point to keep in mind is that finished consumer goods constitute an insignificant proportion of Turkish imports, less than 5% on average in the 1970's. Secondly, while in the early 1960's probably more than half of import licenses were granted to "importers," this proportion has been dramatically reduced in the 1970's.[2/] For quota list items, the share of importers has steadily declined and was already down to 23% in 1970 (see Krueger, page 151), with the remainder going directly to "industrialists."

1/ This has also been true during previous foreign exchange shortages. See for instance the discussion in Krueger (1974), pages 144-171.

2/ "Importers" are intermediaries and are not the final users of the imported goods.

Furthermore, the importance of user-specific quotas and also licenses tied to use, even for items on the liberalized imports list, greatly increased during the 1970's. Almost all capital-goods imports and a great deal of intermediate-goods imports took place linked to user-specific "encouragement certificates" that grant the user various tax rebates and import duty waivers. It is also illegal for industrialists to resell their imports.

Thus it may seem that Turkey fits Case b more closely than Case a and that it is the direct users of producer goods that reap most of the rents implicit in the restrictive import regime. This conclusion is probably substantially correct although it should not be overstated: illegal or semi-legal means of resale exist and for certain intermediate goods very important trader's premia are being realized.

We have therefore chosen Case b as the basic specification in the model, leaving Case a and possible mixtures as variants to be explored. It is worth stressing that this way of modelling a fixed-exchange-rate regime that allows capital flows to remain fixed across experiments constitutes an important improvement over usual practice.

2.4 Price-Level Normalization, Inflation and the Exchange Rate

As a general equilibrium model, the present model only determines relative prices. The absolute price level must be determined separately by an additional normalization equation. A wide variety of price normalization equations have been used in planning models. Johansen, in his

1960 study, fixed the wage of labor and thus expressed all prices in terms of wages. One could alternatively fix the price of any one commodity and express all prices in terms of this numeraire.

For a model to be used as a tool of analysis and policy formulation, it seems best to use a price normalization that provides a "no inflation" benchmark against which all price changes are relative price changes. The equation used here will be of the form:

$$\sum_i P_i \Omega_i = \overline{PL}$$

where the Ω_i are weights defining the index $\overline{PL}$ that one wants to hold constant. We shall use base year value-added weights. The normalization equation provides a numeraire and interacts with the real structure of the model only in the sense that a numeraire does. But it could be used to become a link between the CGE model and a separate macro-monetary model that would determine the value of the price index.

Note that it is composite commodity prices that enter the determination of the price index. Given that the value of the composite commodity in each sector must equal the sum of the value of imports and the value of domestically produced goods, the prices of the composite commodities are given by:

$$P_i = [PD_i + PM_i \cdot M_i/D_i]/f_i[M_i/D_i, 1]$$

where M_i/D_i is the ratio of imports to domestic goods.

In the absence of rationing, when cost-minimizing behavior is

unconstrained, the equation for the price of the composite commodities simplifies to the cost function that corresponds to the C.E.S. aggregation function:

$$P_i = \frac{1}{\gamma_i}[\delta_i^{\sigma_i} PM_i^{1-\sigma_i} + (1 - \delta_i)^{\sigma_i} PD_i^{1-\sigma_i}]^{1/1-\sigma_i}$$

Since $PM_i = \Pi_i^m(1 + tm_i^*)ER$, a devaluation will lead to a general increase in the price of imported commodities. For the price-level defined in terms of the P_i's to remain constant, a devaluation must be matched by a decline in at least some of the domestic good prices. The downward pressure on a given PD_i will vary directly with $(1-\delta_i)$, the initial domestic share parameter and inversely with the substitution elasticity σ_i in the aggregation function. But the response of the domestic price system to a devaluation will also depend on the various demand and supply elasticities embodied in the demand system and the production and factor market equations. Some domestic prices may in fact go up after a devaluation. The story is further complicated when rationing is constraining the sectoral import ratios.

What needs to be emphasized at this point is that by normalizing around the overall price level, we are simply implying that the determination of the price level is exogenous to the model. If an overall rate of inflation of 10% is given to a model, an exchange rate adjustment will not automatically affect this rate. The fact that there must be certain specific monetary mechanisms at work that lead to the 10 percent inflation is undeniable but they are not explicitly modelled and are assumed to be separable from the rest of the model. It is of course

perfectly possible to estimate the effect of exchange-rate changes or other variables on the price-level and then to incorporate these estimates into the projections of price-level changes that the general equilibrium model takes as given. We have not so far, however, attempted to endogenize the price-level explicitly. It is projected separately and while it affects the model, the feedback from the model to the projections is kept informal.

2.5. Production and Supply

Production technology is given by two-level C.E.S. production functions in which "capital" is a fixed proportions aggregate[1/] and labor is itself a C.E.S. aggregate of different sub-categories. Intermediate goods are required according to fixed input-output coefficients. Sectoral capital stocks are fixed in each period and can only be changed by depreciation or investment. Short-run sectoral supply curves are thus always upward sloping. The short-run supply elasticities will vary directly with the substitution elasticities specified in the production functions and will also depend on the way labor markets have been modelled.

Given the use of neoclassical production functions and the assumption of some substitutability between domestic and imported intermediate inputs, supply will never be rigidly constrained by an upper

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1/ Note that while no substitution is allowed between "machines" and "buildings," there is substitution between "foreign" and "domestic" machines as discussed above in the section on imports.

bound on capacity. Provided prices are bid up high enough, a supply response will always be forthcoming.[1/] While reasonable for medium-term and long-term analysis, this treatment of supply does not make it possible to capture the more short-term effects of specific shortages of inputs and will tend to overestimate the ability of supply to adjust within one or two year periods. Given the sudden and severe nature of the crisis that Turkey is going through, it is necessary to modify the treatment of supply outlined above for those experiments focusing on the anatomy of a foreign-exchange crisis. There is strong evidence in Turkey that the recent severe rationing of intermediate imports has forced many sectors to reduce significantly their degree of capacity utilization.

Since the model is to be used to explore the impact of import rationing on the economy, it seems important to capture its impact on capacity utilization. The way this is done is to assume that the productivity parameter in the production function depends on the overall severity of import rationing and on the degree of dependence of a given sector on imported intermediate goods. The function is given by:

$$U_i = (RM)^{\alpha m_i}$$

where U_i is the utilization rate in sector i,

RM is the ratio of total desired to available imports discussed above,

m_i is the ratio of imported intermediates to total intermediate

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1/ Of course, for CES production functions, if the elasticity of substitution is greater than one, the isoquants intersect the axes and there will exist an extreme wage-rental ratio that will set an upper bound on supply.

inputs in sector i, and

α is a fixed parameter greater than zero.

Note that U_i is applied to the productivity parameter and hence affects both labor and capital. Also, since $0<RM\leq 1$, $\alpha>0$, and $m_i \geq 0$, then $0<U_i \leq 1$.

Agricultural labor is treated as separate and immobile within any period, with endogenous rural-urban migration taking place between periods. Within the urban industrial sector we distinguish between modern-sector, largely unionized "organized" wage labor and traditional "unorganized" labor (small scale enterprise employees, family workers, self-employed). But rather than explicitly differentiating firms by size or type, the two kinds of labor are treated as imperfect substitutes entering the same sectoral production functions. The real wage of organized labor is exogenously fixed and only parametrically varied. The real wage of unorganized labor has been considered, unless otherwise indicated, as fully flexible. The unorganized sector thus absorbs any surplus urban labor. Under these conditions no open unemployment will normally appear in the model. The "surplus" labor problem will be reflected in low wages of traditional labor and consequent urban poverty rather than in an open unemployment rate that still does not have much meaning in the Turkish context.[1/]

1/ Official census figures report as unemployed only an insignificantly small proportion of the labor force. On the other hand estimates of urban underemployment or labor surplus for the mid-1970's varied between 12% and 15% of the urban labor force. (See S.P.O., Annual Programs)

2.6. The Treatment of Exports

Under the small-country assumption, a country's export prices, Π_i^e, are fixed in the world market independently of the quantities exported. With a constant exchange-rate and subsidy system, the per unit revenue of domestic exports would be given by:

$$PE_i = \Pi_i^e(1 + te_i)\ ER$$

With $PE_i > PD_i$ and the assumption of no supply constraints specifically affecting exports, no domestic sales would take place and whatever is produced domestically would be exported. In fact, given the C.E.S. aggregation function that regulates the share of domestically produced output in total use of any commodity, D_i can never fall to zero and we could therefore never have $PE_i > PD_i$. The constraints implied by the model on the export side could thus be summarized as follows:

$$PE_i \leq PD_i \quad \text{and} \quad E_i = 0 \text{ whenever } PE_i < PD_i$$

While faithful to the small-country assumption, this treatment of exports is quite inconsistent with the "view of the world" implicit in the specification of product differentiation and imperfect substitution on the import side. Once one adopts Armington's assumption that products are differentiated by country of origin, one cannot assume that a world price exists for the exports originating from an individual country. Rather, the world price of a certain category of products, Π_i^e, is an aggregate reflecting the C.E.S. aggregation of the various components distinguished by

country of origin while the world price facing the buyers of our country's specific product can be written as follows:

$$PWE_i = PE_i/[ER(1 + te_i)] \qquad i=1, \ldots, n$$

with $PE_i = PD_i$ whenever $E_i > 0$.

Contrary to the small-country case, the chain of causality is thus reversed, with domestic prices determining export prices rather than the opposite. The quantity of exports demanded will now be a function of the total level of world demand for the aggregate commodity in question and the ratio of our country's export price to the aggregate world price reflecting all other countries' production costs, trade policies and export prices. We get:

$$E_i = \overline{EB}_i \left(\frac{\Pi_i^e}{PWE_i}\right)^{\eta_i} \qquad i=1, \ldots, n$$

where $\overline{EB}_i$ captures the effect of aggregate world demand and the country's initial share in it, and η_i is the price elasticity of demand for exports.

The supply of exports is equal to total domestic production net of domestic use and will therefore normally rise with increases in PD_i. Exports are determined by the interaction of domestic supply and foreign demand with the foreign demand elasticities and domestic supply elasticities jointly determining the sensitivity of exports to changes in the structure of relative prices.

For agriculture, mining and textiles, we have actually retained the small-country assumption by specifying that the world price of Turkish exports is exogenous for these sectors. Wheat, ginned cotton and minerals dominate exports from these sectors and it is reasonable to assume that

Turkey is a price taker on world markets for these commodities. Furthermore, rather than insisting on equality between PD_i and PE_i, we allow deviations and the share of domestic production going to exports is assumed to be a symmetric logistic function (with lower asymptote of zero) of the ratio of PD_i to PE_i.

When analyzing trade policy, the most important effect of having largely abandoned the small-country assumption on the export side, is, of course, the now endogenous nature of the terms-of-trade. A devaluation will worsen the terms of trade and, apart from its more indirect effects, will lead to a terms-of-trade induced reduction in real income. Note however that the small country assumption has only been dropped on the export side: import supply remains completely elastic at given world prices, a quite realistic assumption.

2.7. Macroeconomic Aspects and the Flow-of-Funds

The TGT model is a trade and growth model of primarily micro-economic nature. However, all computable general equilibrium models, by their very nature, must provide a complete specification of the circular flow in the economy. Table 1 presents a social accounting matrix (SAM) which summarizes the aggregate flow-of-funds in the system and which captures the important linkages in the model economy.[1/] It presents a summary picture of the model whose equations are presented in Appendix A.

1/ For a discussion of the conventions of social accounting, see Pyatt and Thorbecke (1976).

The SAM distinguishes between "activities" and "commodities." In the model, "activities" are identical to "sectors" in an input-output table and produce domestic goods. These goods are either exported or combined with imports to produce composite "commodities" (as discussed above). The "activities" purchase inputs (intermediate goods, labor and capital) and also pay indirect taxes. Factor income is distributed to two of the "institutions": labor households and enterprises. Enterprise income is in turn either retained, distributed to "capitalist" households, or paid to the government in direct taxes.

Columns 1 and 2 of the SAM summarize the factor and product markets in the model economy. Row and column 10 summarize international trade. The rest of the matrix summarizes the distribution of income and its allocation. The capital account, in particular, summarizes the determination of aggregate saving and investment and involves a number of macroeconomic issues that must be discussed in some detail.

The model is essentially savings driven, with the savings propensities of the different institutions determining the pace of capital accumulation. Table 2 presents the capital accounts in more detail, distinguishing among different types of financial flows. The two kinds of households have been aggregated and a new institution, the "financial system," has been included to collect savings and distribute them to enterprises to purchase investment goods. The financial system has no independent existence in the model economy -- it is merely a conduit and does not appear explicitly in the model equations.

Table 2.1

Aggregated Social Accounting Matrix

	Expenditures / Receipts	1 Activities	2 Commodities	3 Factors: Labor	4 Factors: Capital	5 Institutions: Lbr. Hshld.	6 Institutions: Cpt. Hshld.	7 Institutions: Enterprises	8 Institutions: Govt.	9 Capital Account	10 Rest of the World
1	Activities		Domestic commodity supplies								Exports
2	Commodities	Intermediate inputs				Consumption	Consumption		Consumption	Investment	
	Factors:										
3	Labor	Wages									
4	Capital	Capital rentals									
	Institutions:										
5	Labor hshlds.			Labor income					Transfers		Worker's remittances
6	Capitalist households							Distributed income	Transfers		Short-term capital inflow
7	Enterprises				Capital income						
8	Government	Indirect taxes	Tariffs			Direct taxes	Direct taxes	Direct taxes		Seignorage	Long-term capital inflow
9	Capital account					Saving	Saving	Retained earnings	Saving		Reserve accumulation
10	Rest of the world		Imports								
	Total Expenditures	Total costs	Commodity supplies	Factor income	Factor income	Hshld. income	Hshld income	Enterprise income	Govt. Expenditure	Total investment	Imports

Table 2.2

Capital Accounts

Expenditures / Receipts	Households	Enterprises	Government	Financial System	Rest of Economy
Households			Seignorage transfer		Disposable income a/
Enterprises				Total investment	Retained earnings b/
Government	Seignorage				Net govt. revenue c/
Financial system	Voluntary saving	Retained earnings	Government investment		Reserve accumulation
Rest of economy	Private consumption	Total investment	Government consumption	Reserve accumulation	

Notes:

a/ Labor income + distributed profits + government transfers + workers' remittances + short-term foreign capital inflow - direct taxes

b/ Undistributed capital income (net of indirect taxes)

c/ Direct taxes + indirect taxes + long-term foreign capital inflow - transfers

Households receive their disposable income and are assumed first to set some of it aside as "idle balances" or "forced saving." This forced saving is assumed to arise from money creation by the government which thus receives the proceeds as "seignorage." Households are then assumed to apply fixed "voluntary" savings rates to their remaining income, to deposit the saving in the financial system, and to spend the rest on consumption goods.

The government is treated as a distinct entity. Line 8 of Table 1 gives its revenue sources and column 8 its expenditure categories. The government sector receives all taxes (direct and indirect), long-term foreign capital inflow and a share of the seignorage arising from new money creation. Tax income is determined by applying fixed rates to the appropriate magnitudes. Long-term foreign capital inflow is set exogenously. Seignorage income may be determined endogenously and depends on how government consumption and savings behavior is specified.

The specification of government expenditure behavior represents the crucial point where various different types of "closure" rules are imposed on the model economy. We have included different alternatives that can be used, with different implications for the macroeconomic behavior of the model. The first alternative is very simple. Government simply divides its income between saving and consumption by applying a fixed saving rate, just as do labor and capitalist households.

There are a number of possible variants on the first alternative. Instead of specifying a government savings rate, one can specify the level

of real or nominal government savings exogenously. In this case, government consumption is determined residually as government income minus savings. Another pair of variants would be instead to specify the real or nominal level of government consumption exogenously and to determine government investment residually. In all these variants, new money creation -- seignorage -- is either zero or specified exogenously.

The second alternative is to specify the level of government investment and consumption spending exogenously. Again, there are possible variants depending on whether government spending is specified in either real or nominal terms. The problems with this alternative is that some other element in the flow of funds must now adjust endogenously in order to balance the accounts. There are a number of different ways to achieve the necessary balance. For example, one might simply adjust all tax rates, or some subset of them, so that government revenue equalled the exogenously specified expenditure. In the Turkey model, a different approach is taken that incorporates a very simple monetary story and allows the possibility of incorporating the rate of inflation endogenously into the model.

The assumption made is that the government simply creates the new money necessary to finance its target expenditures. The proceeds from the creation of new money -- seignorage -- are assumed to be shared between government and capitalists in fixed proportions. This view of how seignorage is shared is very simplistic and really conceals a host of issues in monetary theory. In this model, one might assume that some Schumpeterian process is going on such that the economy will validate the expenditure decisions of

government and capitalists and that this process is summarized by the simple division of the seignorage between government and capitalists.

For the flow of funds to balance, the nominal value of forced savings by households must exactly equal the nominal value of seignorage given to capitalist households and to government. Furthermore, under the second alternative, the value of seignorage accruing to the government is determined endogenously so that government resources exactly equal expenditures (whose value was set exogenously). The idle balances held by households are forced savings that they are required to hold. In a more complete model in which the rate of inflation depends, in turn, on new money creation, these forced savings can be seen as reflecting the incidence of inflationary finance on the different institutions in the economy. The division of the holding of idle balances between the two kinds of households is by fixed proportions or, in a different variant, in proportion to their shares in aggregate disposable income.

The seignorage account can be seen as a kind of transfer mechanism whereby funds are transferred from some institutions to other institutions. It is a reasonable fable to identify the transfer with a simple monetary mechanism, but one must be careful not to read too much into the fable. It is certainly not anything approaching an adequate behavioral specification. For example, there is no consideration of the portfolio situation of the different institutions, nor are there any explicit paper assets being introduced. Indeed, we do not even choose to keep track of the stock of idle balances accumulated dynamically by the different institutions since they have no effect whatsoever on behavior in the model. Instead, the specification

should be seen as perhaps the simplest possible way to introduce the important fact that in Turkey government deficits are largely financed by money creation into the model without adding institutions such as banks or financial intermediaries and without having to build an elaborate model of the financial sector.

It is important to emphasize that while a flow-of-funds specification has been added to the microeconomic core of the model and while we attempt to capture the effects of money creation on government resources and aggregate investment, we have not attempted so far to endogenize the inflation rate. The price level as such will simply be projected separately although this projection can be linked to the variables appearing in the model.

In both Tables 1 and 2, it is convenient to distinguish "enterprises" and to treat their accounts separately since corporations are behaviorally distinct and important entities. In the model, however, they do not have any separate behavioral rules and serve only as a conduit linking the factor and activity accounts with the household and government accounts. In the equations presented in the appendix, the enterprise accounts are aggregated with those of "capitalist households" into a single conglomerate institution. Thus, for example, the savings of "capitalist households" include retained earnings of enterprises.

2. 8. Dynamic Linkages

The overall dynamic model is partitioned into a static within-period general equilibrium model and a separate between-period model which provides the necessary intertemporal linkages. In general, the role of

the intertemporal model is to update all the exogenous variables entering the static model which will then be solved for the next period. In turn, when various variables are updated for the following period, the intertemporal model will take past solutions of the static model as given.

Most of the variables to be updated are projected using simple time trends, growth rates, exogenous projections, or accounting. The variables relating to the sectoral allocation of investment and to rural-urban labor supplies are behaviorally more interesting and important since they determine the basic structure of the supply of factors in the next period.

Theoretically, probably the most satisfying way to model the sectoral allocation of investment would be to specify both the supply of and demand for investable funds. Unfortunately, given the data, it would be impossible to implement a complete model of the loanable funds market in Turkey. Instead, we have chosen a much simpler approach in which we assume that there is a "normal" or historical set of sectoral allocation shares which are modified over time as a function of the relative profitability of different sectors. The normal shares are given by the last period's sectoral shares in the aggregate capital stock.[1/]

The simple investment model has been formulated in a lagged version as part of the intertemporal model. However, once we give up the

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1/ This approach to determining investment allocation is identical to that used by De Melo and Dervis (1977) except that they defined "normal" investment shares as equalling sectoral shares in total profits rather than in total capital stock. Using capital stock shares fits the Turkish historical data much better.

notion of an intertemporally efficient investment allocation procedure -- some kind of intertemporal tâtonnement process -- we could in fact incorporate the determination of investment in the within-period model. Simply use current instead of past profit rates and include the equation in the within-period model. On the assumption that there are no serious oscillations in the underlying technological and taste parameters, not much should change. Experiments with the model indicate that it makes little difference empirically which approach is used.

The rural-urban migration model treats migration as being a function of the differential between the rural and urban wages. Migrants are assumed to be attracted by the average urban wage compared to the rural wage. Total rural and urban labor are assumed to have exogenously specified natural rates of growth. The migration equations are given by:

$$MIG_t = \varepsilon\left[\frac{W^e}{W_1} - 1\right]L_t^A$$

$$W^e = \sum_i (W_2 L_{2i} + W_3 L_{3i})/L^U$$

where W_1 is the rural wage,

L^A is agricultural labor,

L^U is urban labor,

W_2 is the wage of organized urban labor (L_{2i}),

W_3 is the wage of unorganized urban labor (L_{3i}), and

ε is the migration response parameter.

The average wage W^e can be interpreted as the expected wage a new migrant would receive if his probability of employment in the organized and unorganized labor markets were equal to their shares in the total urban labor force. It is also consistent with the way Harris and Todaro (1970) define the expected urban wage since we assume that any excess supply of labor to the organized market (where the wage is fixed) is simply absorbed into the unorganized market. There are, of course, a number of alternative ways to define the probabilities of entering the organized or unorganized markets, but this approach is both reasonable in the Turkish context and empirically implementable. 1/

This concludes the description of the distinctive features of the TGT model. A full statement of the equations is available in Appendix A. The model has been applied to analyze the actual developments in the Turkish economy and to provide policy conditional projections for the medium-term future. Part 3 below turns to a model-based discussion of the makings of the 1977 crisis. Parts 4 and 5 go on to evaluate future prospects and analyze the impact of alternative policy packages.

1/ See Mundlak (1976) for an empirical analysis.

3. The Origins of a Crisis: An Analysis of the Turkish Economy from 1973 to 1977

3.1 Introduction

The 1977 crisis, like its predecessors in 1958 and 1970, appears primarily as a foreign exchange crisis. By the end of 1977 Turkey, with an import bill of 5.8 billion dollars, had only 1.7 billion dollars of exports. Workers' remittances provided another billion dollars, leaving a huge 3 billion dollar gap to be financed. The gap, which had been of similar size in 1976, was financed by massive short-term external borrowing and a complete running down of foreign exchange reserves. By the end of 1977, the situation had become one of acute crisis, with foreign lenders declining to make further loans, commercial arrears close to 2 billion dollars, and the economy unable to continue to grow without imports that could no longer be financed.

After the crisis had reached these alarming proportions, a new government under Prime Minister Ecevit was formed in January 1978. The Ecevit government has embarked on a new program of readjustment and stabilization that will have a large impact on Turkey's economic performance in the next few years. The beginning of the Fourth Five Year Plan has been delayed a year, until 1979, when it is hoped that the worst part of the crisis will have been overcome.

In this section we will analyze the determinants of the 1977 crisis and its immediate impact. Part 4 will turn to prospects for the future, focusing on the Fourth Five Year Plan period from 1979 to 1983.

3.2 Summary of Recent Events and Policy Reactions

The period from 1970 to 1977 marks the third cycle in Turkey's post-war path of industrialization (see Figure 1, page 4). We shall briefly describe events in this period that started with the 1970 devaluation and led to the present crisis.

The latter half of the 1960's was characterized by severe foreign exchange shortages and consequently increasingly severe import rationing. While growth performance particularly in the industrial sector was impressive, exports virtually stagnated. Between 1960/61 and 1969/70, exports increased at an annual rate of only 5.9 percent in current dollar value which reflects near stagnation in real terms. Over the same period imports could only grow by 6.7 percent in current dollar value or about 3 percent in real terms compared to an average annual growth of real GDP above 6 percent and an annual industrial growth rate of about 10 percent.

While foreign exchange shortages were chronic and net incentives had drifted more and more against exports, the situation in 1970 was far less serious than it had been in 1958. The main reason was probably a still small but significant flow of workers' remittances, averaging about 100 million dollars a year since 1965, which compensated for about 40% of the trade deficit. Import substitution was also proceeding relatively successfully, particularly in transport equipment and machinery, and the foreign exchange situation was not really deteriorating rapidly. The timing of the devaluation that occurred in August of 1970 must be explained

as much by political as by purely economic factors. To quote Anne Krueger, "the fact that a foreign exchange shortage had continued for so long meant that it could continue longer."[1/]

It is quite possible that it was the dismal performance of exports in general and of manufactured exports in particular that constituted the single most important factor leading to the 1970 devaluation. At the State Planning Organization in particular, the failure of any manufactured exports to materialize was perceived as a serious bottleneck to further growth and as an indication that Turkey's industrial development was lacking an important dimension. In fact, when the decision to devalue was made in 1970, it was accompanied by a significant increase in the average value of subsidies to manufactured exports, a fact indicating that the need to start exporting manufactured products was strongly felt by policy makers. The 1970 policy adjustment was a substantial one, increasing the effective exchange rate for imports by about 50%, for traditional agricultural exports by 28% (tobacco, hazelnuts, dried fruits, raw cotton) and for manufactured exports by 57%.[2/]

The devaluation was followed by three years of extremely rapid increase in foreign exchange receipts which made possible not only an unprecedented increase in imports but also an even more dramatic accumulation of foreign exchange reserves.

1/ See Krueger (1974), page 312.

2/ See Krueger (1974).

Exports, in sharp contrast to what had happened after 1958, responded vigorously to the 1970 exchange rate adjustment. Their total value increased from 537 million dollars in 1969 to 588 million in 1970, 677 in 1971, 885 in 1972 and 1317 million dollars in 1973. This represents an annual average growth of 25 percent. Turkish exports had been close to 300 million dollars in 1950 and 1951. Thus in the two decades from 1950 to 1969, total export value failed to double, increasing by only 80% over 19 years, a growth of only 3 percent per annum. In contrast the near tripling of exports earnings between 1969 and 1973 constituted an unprecedented achievement.

The overwhelming source of export expansion in the early 1970's was in the food processing and textile sectors. Exports of processed food products increased from 200 million dollars in 1969 to 390 million dollars in 1973. Exports of textiles including ginned cotton increased from 127 to 391 in the same period. But what is equally significant is that from a base close to zero, significant exports appeared in the following categories of manufactured products: clothing, footwear, inorganic chemicals, cement, glass and glassware and metal products.

Thus the 1970-73 period can be taken as an indication that the potential for export expansion in a wide range of manufactured products exists in Turkey provided the structure of incentives is conducive to such an expansion and provided foreign market conditions are appropriate. Unfortunately neither the structure of incentives nor foreign market conditions remained conducive to export expansion for more than a few years.

In addition to increased exports, Turkey aquired foreign exchange from workers' remittances which increased from 141 million dollars in 1969 to 273 in 1970, 471 in 1971, 740 in 1972, and 1183 in 1973. This represents an annual average growth rate of 70 percent. By 1973, the flow of remittances was financing half of imports. The increase of remittances was only partly a reaction to devaluation. Between 1969 and 1973, the number of workers abroad itself grew at an average annual rate of about 35 percent. On the rough assumption that remittances are proportional to total income earned abroad and noting that nominal income per worker measured in dollars grew at an annual rate of at least 10 percent one would estimate a 50 percent annual growth rate. To this was added the redirection into official channels that no doubt followed the devaluation as well as some repatriation of accumulated savings that constituted a direct response to the exchange rate adjustment. The great surge in remittances was iramatic and largely unexpected.1/

Inflation was moderate in the 1960's, accelerating somewhat towards the end of the decade, but averaging only about 5 percent per annum from 1960 to 1970. The situation changed sharply after 1970. The wholesale price index rose by 16 percent in 1971, 18 percent in 1972 and 20.5 percent in 1973, making for an average inflation rate of 18.2 percent per year in the 1970-1973 period. During the same period worldwide inflation, expressed in dollars, also increased substantially but did not average more than

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1/ The Third Five Year Plan prepared in 1972 underestimated remittances in 1973 and 1974, projecting them at one third of their actual value.

10 percent per year.[1/] Relative incentives had thus significantly drifted against exports by 1973 and the price deflated exchange rate had been revalued by about 30 percent.[2/]

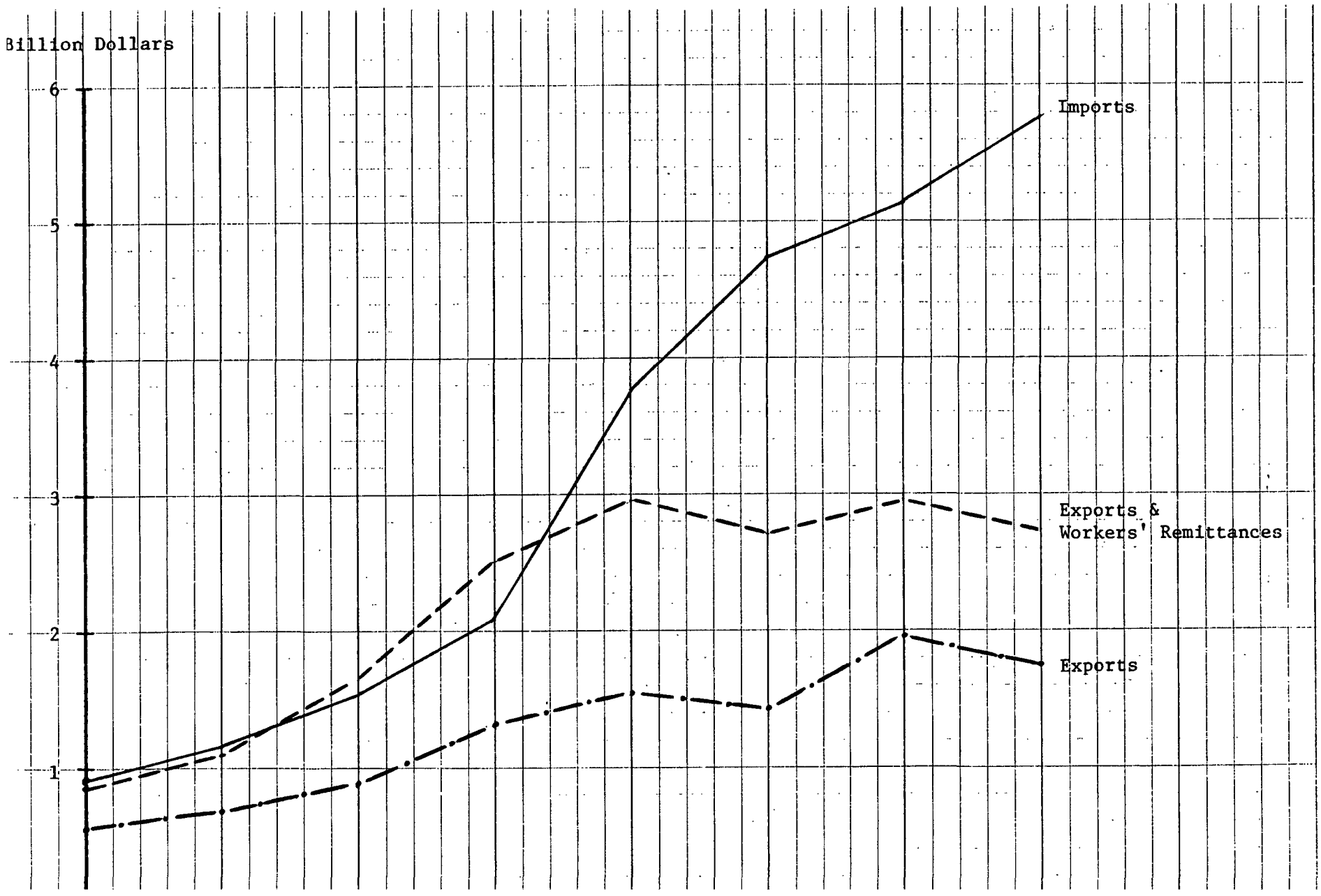
Between 1973 and 1976, the annual spread between Turkey's domestic inflation rate and worldwide inflation remained between 8 and 10 percentage points. Turkey did start a series of minor exchange rate adjustments in this period, devaluing the Turkish Lira against the dollar by an average of 5 percentage points a year, which did not fully compensate for the inflation differential. The upward drift in the price-deflated exchange rate thus continued, slowly but steadily, and by the end of 1976 the real exchange rate was therefore again close to what it had been before the 1970 devaluation.

Since 1974, export revenues have grown only very slowly and erratically, officially recorded workers' remittances have declined by about 40%, while imports almost tripled between 1973 and 1977. Figure 2 illustrates these divergent trends.

1/ See "Historical Rates of Change in US$ GDP Deflators: 1961-1975," World Bank, Economic Analysis and Projections Department, February 1978.

2/ The Turkish Lira was actually formally revalued by 6 percent against the dollar between 1970 and 1973.

Figure 2: Exports, Imports and Workers' Remittances: 1970-1977



As can be observed from Figure 2, exports and imports were growing at about the same rate between 1970 and 1973 while workers' remittances grew somewhat more rapidly with the sum of exports and remittances actually overtaking the value of imports in 1972 and producing a sizeable current account surplus in 1973. Imports jumped from 2.1 billion dollars in 1973 to 3.8 billion in 1974, growing by 80% in one year. The foreign exchange gap created by this sharp increase in imports in 1974 was still however moderate, consisting of 819 million dollars or about 2.8 percent of GDP. It is in 1975 that the danger of a major foreign exchange crisis became apparent. In that year, both exports and remittances declined while imports continued to grow rapidly, increasing by 25% over 1974. The foreign exchange gap (imports - exports - remittances) reached 2 billion dollars or about 5.4 percent of GDP.

It is thus quite clear that the crisis was already apparent in 1975 and that the level and growth rate of imports experienced in 1974 and 1975 were inconsistent with the amount of export earnings and remittances that materialized. The situation did not improve in 1976 or 1977. On the contrary, in 1977 the foreign exchange gap reached 3 billion dollars which at the March 1978 exchange rate of 25 TL to the dollar constituted about 9 percent of GDP.

The gap was temporarily closed by massive international borrowing and the running down of the substantial foreign exchange reserves that had accumulated in 1972 and 1973. But by the end of 1977, there were no more

reserves to be run down and Turkey's borrowing capacity had reached its limits. The situation was no longer tenable and a major readjustment had become inevitable.

While the upward drift in the price deflated exchange rate and the anti-export biased shift in incentives resulting from Turkey's high inflation rate constitute one major element explaining the foreign exchange crisis, there have been other important developments. A significant part of the 1974 upward jump in imports that is apparent in Figure 2 can be attributed to the oil price increase. Turkey imported about 70 percent of its oil needs during the 1974-1977 period and there is no doubt that the oil price rise has had a major adverse impact on the balance of payments and the economy. In fact the Turkish government tried to insulate the domestic economy from the effects of the oil price increase by setting up a special fund to subsidize the price of gasoline in the domestic market. While this probably helped keep up real wages and profits domestically, at least for an interim period, it probably heightened the impact of the oil crisis on the balance of payments since it weakened any possible substitution effect against oil-intensive activities. By 1977, oil imports were almost equal in value to total merchandise exports! But how important has the oil price increase really been in explaining the present crisis? Has it been the major cause of the great widening in the foreign exchange gap?

Another development in the middle 1970's that has been suggested as one of the contributing causes of the current crisis is the major invest-

ment program undertaken by the government. The aggregate investment rate (as a proportion of GDP) increased steadily during the period, from about 18 percent to 24 percent. Since investment is relatively import-intensive, this increase has led to additional strain on the balance of payments.

It is important to attempt to explore the relative importance of the different shocks that the Turkish economy has undergone in recent years in order to understand the nature of the present crisis and to evaluate future policy choices. We have used the TGT model to explore quantitatively the relative impact of the different factors by means of a number of counter-factual or "as-if" experiments. These experiments are described below. We first consider the impact of events on the equilibrium exchange rate and then discuss their impact on the general performance of the economy.

3.3 Exchange Rate Drift and Structural Imbalances: Decomposing the Change in the Equilibrium Exchange Rate

The major question to be explored in this section is what would have happened if Turkey had pursued a flexible exchange rate policy during the 1973-77 period. Would the "equilibrium" or "shadow" exchange rate have had to depreciate at only a rate equal to the difference in inflation rates between Turkey and its trading partners? How did the oil price rise affect the equilibrium exchange rate? How different would economic performance have been?

Instead of assuming that import rationing is the mechanism by which the balance of payments is equilibrated, one can run the TGT model with a flexible rather than fixed exchange rate. The exchange rate ad-

justs in each year so that total demand for foreign exchange equals the total supply. However, the "equilibrium" exchange rate determined by equating the annual demand and supply flows of foreign exchange will be sensitive to the exogenous flows of foreign capital and reserve accumulation. For example, in 1976 and 1977, Turkey borrowed massive amounts of foreign exchange which are given in the basic run but which in no way reflect some "normal" or "equilibrium" amount of borrowing. The result in the basic run is that there is little import rationing until 1977. Running the model with a flexible exchange rate but assuming the same massive borrowing as in the basic run yields a market-clearing exchange rate in 1977 about 6-7 percent higher than the fixed rate of 18.2 in the rationing-constrained basic run.

To compute an "equilibrium" exchange rate, one thus has to assume an amount of borrowing and a level of reserves that can be sustained over time. It is not obvious what such a "normal" or "sustainable" level of reserves and borrowing would have been, but one can make certain rough assumptions. Regarding the stock of reserves, it is reasonable to assume that it should equal about 30% of annual imports.[1/] At the end of 1972, Turkey's foreign exchange reserves stood at 1.2 billion dollars compared to an import bill in 1972 of 1.6 billion dollars. The stock of reserves was already too high. But another 700 million were allowed

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1/ In 1973 this ratio has been 35% for Greece, 31% for Yugoslavia, 69% for Spain, 61% for Germany, 23% for India and 50% for Mexico. Source: IMF International Financial Statistics.

to accumulate during 1973 leading, at the end of 1973, to one of the highest reserves-to-imports ratios in the world. Thereafter, starting in 1974, Turkey started running down its reserves, arriving in 1977 at a reserves-to-imports ratio below 10%.

For the equilibrium exchange rate experiments, we assume that instead of first accumulating and then decumulating reserves, Turkey keeps its 1972 stock of 1.2 billion until the end of 1975. By that time, the reserve-to-imports ratio reaches 30% and, to preserve that ratio, reserves have to be slowly accumulated from 1976 onwards.

With respect to borrowing, it is more difficult to define a normal level. In Turkey's case, it is possible to argue that until 1975, the total amount of debt and the levels of annual borrowing were too low rather than too large given Turkey's size and total foreign exchange earnings. But the situation was reversed quite dramatically in 1976 and 1977, with massive borrowing leading to a debt/GDP ratio close to 40% by the spring of 1978. Taking the 1973-1977 period as a whole, Turkey borrowed at levels that could not be sustained over time given the trend increase in exports and the flow of workers' remittances. To compute an "equilibrium" exchange rate, we therefore assume that a "normal" level of borrowing would have implied a total cumulative net flow of 3.5 billion dollars instead of the 5.5 billion that were actually realized. Starting from 500 million dollars in 1973, the net foreign capital inflow is assumed to grow at 17% annually (about 7.0 percent in constant dollars)

reaching 940 million dollars in 1977 and summing to a total cumulative flow of 3.5 billion dollars. Table 3.1 compares capital inflow and reserve decumulation in the basic run, which reflects the actual events over the 1973-1977 period, with the figures assumed for the experiments.

Table 3.1

Flexible Exchange Rate Experiments:
Reserve Decumulation and Net Capital Inflow

	1973	1974	1975	1976	1977	Cumulative
Basic Run						
Reserve decumulation	-716	433	222	262	550	1,251
Net capital inflow	222	129	1,011	1,740	2,385	5,493
Sum	-488	562	1,733	2,002	2,935	6,744
All Experiments						
Reserve decumulation	0	0	0	-200	-250	-450
Net capital inflow	500	585	685	800	940	3,510
Sum	500	585	685	600	690	3,060

Units: million dollars

Once the path of what is considered to be an equilibrium level of reserves and foreign borrowing is specified, it is possible to use the flexible exchange rate version of the TGT model to explore the values that the market-clearing or "equilibrium" exchange rate would have taken if it had been allowed to move to equilibrate the supply of and demand for

foreign exchange. We are not here referring to a shadow rate in the sense of a free trade exchange rate, but to the rate that would have been an equilibrium rate given Turkey's structure of tariffs and in the absence of quantity rationing.

In the basic run, which is used as a reference point for comparisons, the exchange rate is fixed at the official parity levels in each year, as are also the levels of capital inflow, remittances, and reserve decumulation. The intent of the basic run is to approximate as closely as possible the actual path the economy followed in the 1973-77 period. All the flexible-exchange-rate experiments were conducted with the assumptions about normal levels of foreign borrowing and reserve decumulation discussed above. In the first experiment (A-1), there are no other changes. It thus provides a reference path of equilibrium exchange rates given the shocks that the economy actually underwent, but assuming a flexible exchange-rate policy and more normal capital and reserve behavior. The equilibrium exchange rates in each year from the experiment are compared with the actual rates in Table 3.2.

Table 3.2

Experiment A-1: Equilibrium Exchange Rates, 1973-77

	Experiment A-1: equilibrium rates	Basic run: official parity
1973	10.4	14.0
1974	14.7	13.5
1975	17.8	14.5
1976	20.3	16.0
1977	28.2	18.2

According to the TGT model the equilibrium exchange rate was 10.4 in 1973, substantially lower than the official parity of 14 TL to the dollar. Thus, in terms of flow-equilibrium conditions, Turkey seems to have had a significantly undervalued exchange rate in 1973. While this may, at first, seem surprising, one should remember that Turkey accumulated 1.5 billion dollars of reserves between 1971 and 1973. The reserves to imports ratio rose to above 100%, far in excess of what can be considered normal or required. Furthermore, net borrowing in that period was minimal. The explanation for this dramatic reversal of the chronic foreign exchange shortage that had characterized the post-war period is primarily to be found in the massive increase of workers' remittances. To this must be added the very good export performance in the early 1970's.

However, the situation did not last. Starting in 1974, the downward trend in the equilibrium value of the Turkish Lira is very steep and the degree of overvaluation steadily increased. Note that the single biggest percentage change occurred between 1973 and 1974, reflecting the impact of the oil price increase. By 1977, the TGT model results indicated that the Turkish Lira was overvalued by more than 50%.

In experiments A-2 through A-5, we progressively add the major causal factors discussed above in order to explore their separate contributions to the decline of the equilibrium exchange rate. Table 3.3 gives a summary description of the experiments and the equilibrium exchange rate in 1977. Experiment A-2 is the same as A-1 except that the domestic inflation rate is set equal to the world inflation rate throughout the

period. This experiment thus isolates the effect of differential inflation rates in explaining the depreciation of the equilibrium exchange rate. The third experiment (A-3) is the same as A-2 except that there is no special rise in the world price of oil. These experiments are designed to isolate the most important factors affecting the equilibrium exchange rate discussed in the previous section.

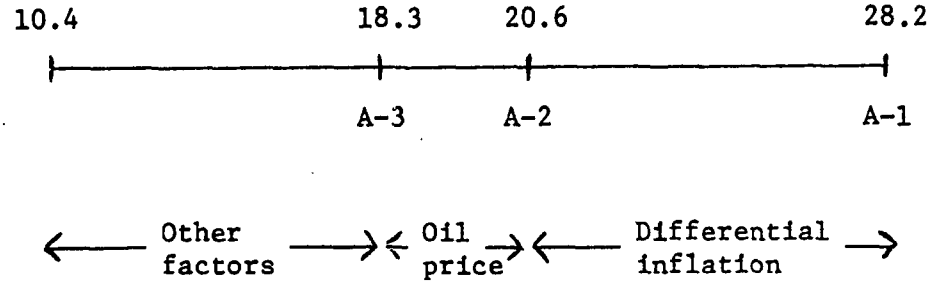
Two additional experiments were run to explore the role of other factors. Experiment A-4 is the same as A-3 except that the investment rate is held roughly constant throughout the period at about the 1973 level of 18 percent of GDP. Experiment A-5 is the same as A-4 except that remittances continue to grow instead of stagnating after 1974. Their growth rate is assumed equal in real terms to the economy-wide growth rate.

Table 3.3

Flexible Exchange Rate Experiments:
Summary Description and 1977 Equilibrium Exchange Rate

Exchange rate: 1977	Experiment	Description
18.2	Basic Run	Fixed exchange rate, historical run
28.2	A-1	Basic run + flexible exchange rate + moderate borrowing
20.6	A-2	A-1 + moderate inflation
18.3	A-3	A-2 + no oil price increase
17.3	A-4	A-3 + no investment rate increase
14.0	A-5	A-4 + higher remittances

The experiments described above enable us to decompose the change in the equilibrium exchange rate that occurred between 1973 and 1977. The diagram below plots the equilibrium exchange rates in 1977 for experiments A-1, A-2, and A-3 along a line whose origin is the equilibrium rate in 1973. The change in exchange rate between adjacent points is attributable to the single effect which is different between the corresponding experiments.



Reading from right to left, the devaluation due to:

differential inflation = 28.2/20.6 = 1.369

oil price rise = 20.6/18.3 = 1.126

other factors = 18.3/10.4 = 1.760

Or, to express the relationship another way, the equilibrium exchange rate in 1977 is given by the expression:

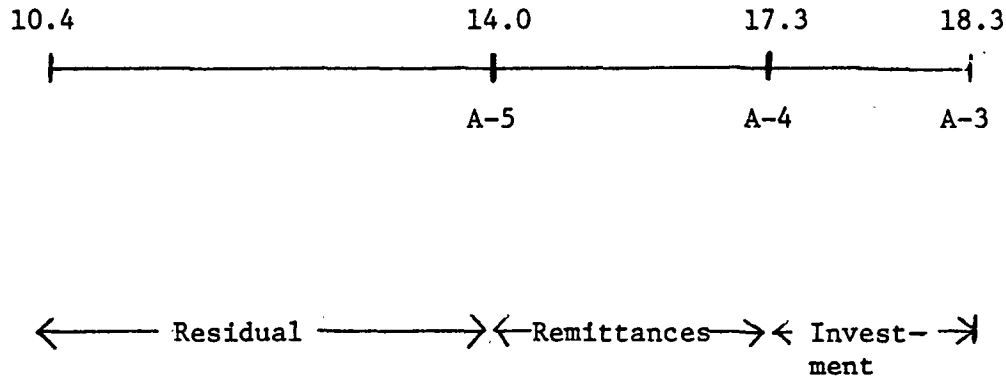
$$ER_{1977} = (1.369) \cdot (1.126) \cdot (1.760) = 2.712 \cdot ER_{1973}$$

The percent change in the exchange rate is given by taking the logarithm of both sides of this expression and subtracting the log of ER_{1973} from both sides. The shares of the logarithms of the three terms in parentheses as a percent of the logarithm of their product (log of 2.712) provides a decomposition of their relative shares of the total change in the equilibrium exchange rate. Thus, the shares of the three effects in the total change in the equilibrium exchange rate are:

differential inflation	32%
oil price rise	12%
other factors	56%
total	100%

This decomposition indicates that differential inflation was more important than the oil price rise in determining the change in the underlying value of the equilibrium exchange rate. The oil price rise in itself led to a 20 percent depreciation of the equilibrium rate while differential inflation caused more than a 50 percent decline. The residual in this decomposition is the change in the equilibrium exchange rate due to all causes other than the oil price increase and the differential inflation rate. It includes some of the indirect effects of the oil crisis such as changes in world market demand for Turkish exports, particularly textiles as well as lower workers remittances, both in part, but not wholly, due to the deflationary impact of the oil crisis.

Experiments A-4 and A-5 can be used to explore further the "other factors" that seem to be significant in the 1973-77 period. The 1977 equilibrium exchange rates for experiments A-3, A-4, and A-5 are plotted below:



The shares of these effects in the change in the exchange rate due to "other factors", and in the total change, can be calculated exactly as was done above. The results give the relative contribution of the different effects to:

	"other factors" devaluation	total devaluation
increased investment rate	10%	5%
remittance deceleration	37	21
residual factors	53	29
sum	100%	56%

In experiment A-4, the investment rate is kept at roughly its 1973 value throughout the period. The reduced levels of capital-goods imports leads to some lessening of pressure on the balance of payments, but this only accounts for 10 percent of the "other factors", or 5 percent of the total 1973-77 change in the equilibrium exchange rate. It has half

required devaluation to differential inflation very seriously underestimate the degree of adjustment that is really required. The oil price increase alone would have required a significant exchange rate adjustment. A continuous upward trend in Turkey's investment rate and changes in sectoral structure would also in themselves require some adjustment. Finally, the role of workers' remittances is very important. If everything in the economy, including exports and imports, were growing with GDP at around 8% annually but workers' remittances remained stationary, it is clear that the foreign exchange gap would steadily grow. Thus, unless remittances can continue to grow at a rate close to that of other variables in the economy, exports must grow more rapidly than imports to preserve equilibrium. In turn, either the real exchange rate or other policy variables will have to change continuously to generate this more rapid growth of exports. This is a simple fact brought out clearly by the experiments described above. Unfortunately, it has not been stressed sufficiently in the policy discussions about Turkey. We do not necessarily want to imply that remittances should be expected to remain stationary in the future. But given their initially very high level, close to total exports, their failure to grow in the 1973-1977 period should have been compensated by growth of exports significantly in excess of the growth of imports. The opposite occurred, leading to the present crisis.

Concluding this section, it is worth emphasizing once more that looking at differential inflation rates is not an adequate way to evaluate the degree of overvaluation reached by a currency. In Turkey the oil price increase, the increase in the investment rate and the behavior of

remittances were together much more important factors leading to the dramatic foreign exchange gap causing the 1977 crisis. Finally, note that an exchange rate policy aimed at continuous annual flow equilibrium may not necessarily be the best policy to follow at all times. This section should not be interpreted as advocating such a policy as always optimal. But better knowledge of what is the equilibrium rate and a better understanding of the factors that cause its change over time would seem to be prerequisite for adequate planning and policy formulation. The steep downward trend in the equilibrium value of the Turkish Lira has been seriously underestimated by those using informal methods, a deficiency which affects policy formulation and discussions about the future.

3.4 Growth, Trade and Structure: 1973-77

The experiments described in the last section can also be used to explore the impact of the various effects they embody on the growth and structure of the Turkish economy as well as on the equilibrium exchange rate and the balance of payments. In this section, we use the experiments to explore the impact of the oil price rise, the investment boom, and the foreign-exchange constraint on the economy.

In evaluating the impact of the individual effects introduced in each experiment, there are two different kinds of comparisons to be made. First, the results from each experiment can be compared with those from the basic run which is designed to replicate as closely as possible the actual path the Turkish economy followed during the period. Second, the incremental impact of a given factor can be determined by comparing the results with those from the adjacent experiment which differs by only the

Table 3.4

Flexible Exchange Rate Experiments:
1973 Values and Ratios to Basic Run

1973: Values	Basic run	All experiments
Export/import ratio (%)[a/]	62.3	36.6
Investment/GDP ratio (%)[b/]	17.6	18.1
Exchange rate (TL/$)	14.0	10.4
Balance of merchandise trade[c/]	0.8	1.7
Capital inflow + reserve decumulation[c/]	- 0.5	0.5
GDP[d/]	301.3	304.1
1973: Ratios to basic run values (%)		
Export/import ratio	100	59
Investment/GDP ratio	100	103
Exchange rate	100	75
Balance of merchandise trade	100	213
GDP	100	101

[a/] Merchandise exports/merchandise imports.

[b/] Gross fixed capital formation/GDP

[c/] Units are billion dollars

[d/] Units are billions of 1973 Turkish lira.

Tables 3.5 and 3.6 provide the basic macroeconomic results of the experiments. Comparing the basic run with experiment A-1 (which differs only in assuming more moderate borrowing and a flexible exchange rate), it is interesting to compare the trade flows. Cumulative exports are about a billion dollars higher over the period while cumulative imports are almost 2 billion dollars less. The rate of growth of exports in the basic run is 7.8 percent a year, slightly less than that of GDP. In experiment A-1, the rate of growth of exports is much higher, 26 percent a year, although starting from a much lower base year value. Starting from the basic run value of exports in 1973, the rate of growth in experiment A-1 is 17.4 percent a year. While high, such rates are comparable to those for other countries and to recent Turkish experience. As noted above, Turkey achieved a rate of growth of exports of 25 percent a year in the 1969-1973 period.

Comparing experiment A-1 with the basic run indicates clearly how dependent Turkish growth was on the massive inflow of foreign borrowing during the period. The 1973-77 growth rate in experiment A-1 is 6.7 percent, compared to an actual rate in the basic run of 8.0 percent. Aggregate consumption grows by only 3.4 percent a year, compared with 7.6 percent in the basic run. In 1977, aggregate consumption is 20.9 percent lower than the basic-run value.

Experiments A-2 through A-5 can be used to explore the impact of various changes on the economy. In experiment A-2, the rate of inflation was assumed to be lower (11.7 percent a year compared to 21.0 percent in experiment A-1). This experiment had virtually no effect on

Table 3.5

Flexible Exchange Rate Experiments: 1973-77 Data

		Basic Run	A-1	A-2	A-3	A-4	A-5
1973-77:	Cumulative flows (billions $) Foreign capital inflow	5.5	3.5	3.5	3.5	3.5	3.5
	Reserve decumulation	1.2	-.4	-.4	-.4	-.4	-.4
	Sum	6.7	3.1	3.1	3.1	3.1	3.1
	Workers' remittances	5.9	6.4	6.4	6.4	6.4	8.5
	Petroleum imports	4.7	4.4	4.3	2.2	2.2	2.3
	Machinery & transport equipment imports	8.0	7.3	7.3	8.0	7.8	8.3
	Total merchandise exports	7.9	8.8	8.8	8.1	7.9	7.3
	Total merchandise imports	20.8	19.0	19.0	18.3	18.1	19.3
	Balance of merchandise trade	12.9	10.2	10.2	10.2	10.2	12.0
1973-77:	Growth rates (%) GDP	8.0	6.7	6.7	7.7	7.4	7.9
	Consumption	7.6	3.4	3.4	5.4	6.0	7.3
	Investment	14.5	6.7	6.8	8.8	5.4	7.3
	Domestic inflation	21.0	21.0	11.7	11.7	11.7	11.7
	Exchange rate	6.8	28.3	18.7	15.2	13.5	7.8

Notes: All experiments assume moderate borrowing (see text) and a flexible exchange rate.
The experiments are:
A-1: Basic run except for moderate borrowing and flexible exchange rate.
A-2: Same as A-1 but includes moderate inflation.
A-3: Same as A-2 but includes no oil price increase.
A-4: Same as A-3 but includes no increase in investment rate.
A-5: Same as A-4 but includes higher remittances.

Table 3.6

Flexible Exchange Rate Experiments: 1977 Values and Ratios

		Basic Run	A-1	A-2	A-3	A-4	A-5
1977:	Values						
	Export/import ratio (%)	37.8	52.5	52.0	50.0	48.5	36.1
	Investment/GDP ratio (%)	23.7	23.5	23.4	22.2	18.7	18.5
	Price index (1973 = 100)	214.1	214.1	155.4	155.4	155.4	155.4
	Exchange rate (TL/$)	18.2	28.2	20.6	18.3	17.3	14.0
	Balance of merchandise trade a/	4.0	2.2	2.2	2.2	2.2	3.2
	Capital stock index (1973 = 100)	120.8	119.4	119.3	120.9	119.8	120.5
	GDP b/	410.0	394.1	393.5	409.7	405.2	412.1
1977:	Ratios to basic run value (%)						
	Price index	100	100	73	73	73	73
	Exchange rate	100	155	113	101	95	77
	Balance of merchandise trade	100	55	55	55	55	80
	Capital stock	100	99	99	100	99	100
	Consumption	100	90	90	97	100	105
	Investment	100	84	84	90	80	86
	GDP	100	96	96	100	99	101
1977:	Ratios to adjacent experiment (%) c/						
	Price index	-	100	73	100	100	100
	Exchange rate	-	155	73	89	95	81
	Balance of merchandise trade	-	55	100	100	100	145
	Capital stock	-	99	100	101	99	101
	Consumption	-	90	100	108	102	105
	Investment	-	84	100	108	88	107
	GDP	-	96	100	104	99	102

a/ Units are billion dollars
b/ Units are billions of 1973 Turkish Lira
c/ Column for A-1 is ratio of A-1 values to basic run, column for A-2 is ratio of A-2 values to A-1 values, and so forth.

any of the real variables in the economy since, with a flexible exchange rate, there was no change in relative prices. This experiment emphasizes the fact that the TGT model does not behave like a standard macro-economic model. Its equations are almost homogenous of degree zero in all prices (including the exchange rate). As described in section 2 above, the model is designed to be linked with a separate macroeconomic model through variables such as the aggregate price level, but they have been treated as exogenous variables in the TGT model. Note, however, in the fixed-exchange-rate experiments described in the next section, the real variables in the model are sensitive to the aggregate price level since changing the price level changes relative prices.

Experiment A-3 indicates the importance of the oil price rise to the economy. Eliminating the price rise leads to a 1 percentage point increase in the growth of GDP (from 6.7 to 7.7 percent a year). The effect on the cumulative dollar value of oil imports is also quite dramatic -- they fall by 2.1 billion dollars over the period. The total volume of trade also falls -- both exports and imports are 0.7 billion dollars less -- indicating that oil is a necessity for which it is difficult to substitute and impossible to expand domestic production cheaply. When the price rose dramatically in the 1974-75 period, it was therefore necessary either to expand exports or to borrow in a massive way in order to pay for it.

The government sought to soften the impact of the oil price rise by lowering the tariff on imported oil and by subsidizing the domestic price of gasoline. These policy responses are reflected in the basic

run and are hence included in experiments A-1 and A-2. To see their impact, we ran a separate experiment (not reported here) in which the oil price rise was kept but in which the policy response was removed. The major impact of the experiment is on the structure of the economy. The infrastructure sector, which includes transportation, grows much more slowly when the economy is forced to adjust fully to the higher price of imported oil. Considering the political significance of the infrastructure sector, it is not surprising that the government attempted to maintain the domestic price of petroleum products by subsidies. The major cost of the policy was felt in increased strain on the balance of payments which, in the basic run, is reflected in increased import rationing in the last few years.

The experiment in which the oil price increase is removed is a relatively pure experiment in that it does not include any other concomitant effects that would likely have occurred. For example, without the oil crisis, there probably would have been higher levels of workers' remittances and also a better world economic situation. Even without these additional effects, experiment A-2 indicates that the oil price increase cost Turkey over two billion dollars in foreign exchange during the period. The response of policy makers was to delay the necessary adjustment and to borrow in order to sustain growth. However, one cannot blame the current foreign-exchange crisis on the rise in the price of oil alone. As the discussion in the previous section indicates, the oil price rise was not the major cause of the imbalance in

Turkey's equilibrium exchange rate. Removing the oil crisis does not change the basic adverse trends in the real exchange rate, exports, imports and remittances. Given the size of these trends, it appears that the lack of an oil price rise would have delayed a major foreign-exchange crisis by up to two years, but no longer.

Experiment A-4 shows the impact on the economy of keeping the rate of investment roughly constant during the period. Instead of rising from 18 percent of GDP in 1973 to 24 percent in 1977, the rate was kept around 18-19 percent throughout the period. The cumulative effect on the total capital stock over such a short time period is quite small, but the effect on the structure of production is significant. Aggregate consumption in 1977 is 4 percent higher and investment 12 percent lower than in the adjacent experiment. The rate of growth of consumption over the period is a full percentage point higher while that of investment is 3.4 percentage points lower. Thus the strain of the investment boom is not felt so much on the balance of payments -- where, as discussed in the previous section, its impact was relatively slight -- but rather on aggregate consumption. As the foreign exchange crisis unfolded, the continued steady increase in the investment rate resulted in a squeeze on aggregate consumption and increased strain in the economy.

In the last experiment (A-5), remittances are assumed to grow at the same rate as foreign capital inflow (17 percent a year), and are thus assumed to be analogous to foreign capital. Over the period, the cumulative difference amounts to 2.1 billion dollars. Comparing the

results to those from the adjacent experiment (A-4), the differences are really quite dramatic. GDP grows at 0.5 percentage points more a year, consumption by 1.4 percentage points, and investment by 1.9 percentage points. In 1977, consumption is 6 percent higher and GDP 2 percent higher than in experiment A-4.

From this experiment, it is interesting to note how dependent on foreign trade is Turkish economic performance. Two billion dollars represents about 10 percent of total cumulated foreign exchange receipts during the period (in experiment A-4), or about 5 percent of 1977 GDP. Yet it makes a half percentage point difference in the rate of growth of GDP over the entire period! The reason for this dependence is that Turkey is importing intermediate and capital goods which cannot be cheaply produced domestically and for which it is difficult to substitute. While Turkey has a relatively low ratio of imports to GDP given its size and per capita income, the goods it does import are important to the economy and cannot be easily squeezed.

Indeed, an important lesson from this last experiment is that trade dependence should not be measured by the ratio of imports to GDP. One must consider what goods are being imported and their elasticity of substitution in use with corresponding domestic goods. As will be seen in the forward-running experiments discussed in the next section, import substitution that is not selective but tries to proceed on all fronts is expensive, and adjusting to foreign exchange shortages by severe import rationing inflicts serious costs on the economy.

3.5 Conclusion

There are a number of lessons to be drawn from the analysis of the 1973-1977 period. Given the variety and magnitude of shocks that Turkey has undergone, and the speed with which they developed, it is understandable why Turkish policy makers and other observers were caught by surprise. The oil price rise, the world-wide recession, and the swing in remittances all contributed to confusing the picture. As the analysis in section 3.3 indicates, under these circumstances it is impossible to estimate the required devaluation from an examination of differential inflation rates. Indeed, when so much is going on, it would seem that any partial-equilibrium analysis is very likely to be misleading and that a general-equilibrium framework such as the TGT model is preferable.

The oil price rise and the swing in remittances both were very important and can be considered as the proximate causes of the foreign exchange crisis that hit at the end of the period. Adding together the cumulative increase in net foreign-exchange inflow from experiments A-3 and A-5 yields over 4 billion dollars in additional foreign exchange from lower oil prices and increased remittances. However, the basic underlying trends in the real exchange rate, exports and imports were still adverse and would have led eventually to a crisis. Indeed, one might argue that while the oil price increase hastened the crisis by one or two years, the completely unexpected increase in remittances in the 1970-1973 period postponed it by two to four years. The fact that the oil price rise coincided with the leveling off of remittances caused the

denouement to occur extremely rapidly, but it would have occured in any case.

A major goal of post-war Turkish economic policy has been to promote industrialization in general, and import substitution in particular. Turkish policy has strongly favored import substitution both through direct protection and through import rationing and exchange rate policy. The result has been severe discrimination against exports and a rather autarkic development strategy. The fact that Turkey has had a relatively low level of trade for a country of its size and per capita income may appear consistent with a desire to be independent of other countries. However, an important conclusion from our experiments is that the policy regime that Turkey has followed may in fact have increased the country's dependence on foreign resources. Discrimination against exports reduces the ability of the economy to acquire foreign exchange and the resulting restriction on all but essential imports reduces the ability of the economy to adapt if necessary. The kind of exchange-rate policy followed inevitably leads to a foreign-exchange crisis. As has happened twice in the past, such a crisis cannot help but cause serious dislocation to the economy.

Turkey has been able, in the past, to overcome these crises relatively rapidly. Growth did resume and even accelerated after the 1958-1960 and 1970 crisis episodes. In both cases, the reasons for the rapid improvement are clear. After 1960, government policy and economic management greatly improved, economy-wide planning was introduced and the public sector was reorganized. Turkey also received a substantial amount

of foreign aid. The 1970 crisis was not followed by a similar period of reform and reorganization although an early attempt was made. But an exogenous factor, workers remittances, transformed the early 1970's into a period of foreign exchange abundance, permitting a great increase in imports and creating a false sense of security.

The present situation seems closer to 1960 than it is to 1970. No great exogenous flow of foreign exchange seems likely to appear. It is economic policy and internal reform that must pull Turkey out of the crisis. Very important strategy decisions have to be made and priorities determined. It is to a general-equilibrium analysis of these issues that we turn in the next sections.

4. Prospects for the Future: An Economy-Wide Perspective for 1978-1983

4.1 Introduction

This section turns to an analysis of future prospects concentrating on the 1979-1983 period which spans Turkey's Fourth Five Year Development Plan (FFYP). We will first attempt to provide an economy wide perspective focusing on the interaction between trade policy, trade performance and overall economic growth. The macroeconomic perspective provided in this section is of course based on developments in the 19 individual sectors distinguished in the TGT model. Section 5 will turn to a microeconomic analysis and a discussion of the sectoral growth and trade prospects that underlie the alternative economy-wide scenarios described below.

All projections generated by the TGT model are conditional projections based on assuming specific policy packages. Government policy has a determining influence on the characteristics of the projected growth paths and it is therefore not possible to take any one projected path as the "predicted" path unless one is willing to predict that the policy assumptions underlying that particular path are in fact the policies that will be followed. It is very important always to keep in mind the conditional nature of the projected paths.

4.2 Constant Price Deflated Exchange Rate Policy

The analysis presented in Part 3 suggests that the degree of overvaluation of the Turkish Lira has been much greater in the 1975-1977

period than generally perceived or than one would estimate by simply comparing differential inflation rates. The March 1978 devaluation which brought the parity of the dollar to 25TL, substantial though it was, did not really alter the situation in real terms. Between mid-1977 and mid-1978, the nominal exchange rate was devalued by over 40% against the dollar. But in the same period Turkish price indices went up at rates between 40% and 50%. Taking account of the depreciation of the dollar against some major currencies, world inflation or the rate of change of a dollar denominated price index was about 15%. So differential inflation in Turkey was at least 25%, probably closer to 30%. Between 1977 and 1978 Turkey did not, therefore, devalue by more than about 10% in real terms.

Until the middle of 1977, the great widening of the underlying foreign exchange gap that had been underway since 1975, did not have a dramatic impact on the Turkish economy because of massive short-term borrowing. Even the first half of 1977 was still characterized by a very high level of imports, partly in anticipation of post-election devaluation and import restrictions. It is only in the latter half of 1977 that the foreign exchange gap developed into an acute crisis with no more short-term finance forthcoming, imports declining in absolute nominal value and import rationing reaching dramatic proportions. According to the TGT model, the average degree of import rationing was only 14 percent in 1977. This probably reflects the fact that during the first six to eight months of the year, imports were allowed to be much higher than they would have been without the speculative anticipation of events to come and the Demirel's governments' pre-election willingness to encourage every possible source of

short-term finance. Thus cumulative January-August imports were still 21.2% higher in 1977 than in 1976. It is only in the Fall of 1977, when possibilities for further financing had greatly diminished, that the painful process of adjustment had to begin and it is only at that time that the underlying crisis situation became fully apparent.

Since then the nominal exchange rate adjustment has been substantial and the new government formed in January 1978 has undertaken or is attempting to undertake important complementary measures ranging from monetary tightening and proposals for comprehensive tax reform to even longer-range plans for reorganizing State Economic Enterprises. But as argued above the exchange rate adjustment came after inflation had increased to an annual rate of almost 50 percent in the latter half of 1977. It is quite clear that a 25TL = 1 dollar parity for 1978 implies a price-deflated exchange rate that is not much higher than it had been at the beginning of 1977. Thus even if the nominal exchange rate is henceforth adjusted in step with differential inflation, the Turkish Lira will remain substantially overvalued and the necessity of severe import rationing will persist.

Such a situation would of course not be a new one for Turkey. With the exception of a brief period after the 1958-1960 devaluation-cum-stabilization episode and of a somewhat longer period after the 1970 devaluation, there has always been upward pressure on the price of foreign exchange in Turkey. Another manifestation of the same disequilibrium situation can be found in the fact that desired imports have always been above the actual imports that could be financed by available foreign

exchange earnings and that foreign exchange has always been more or less severely rationed. It is only when the underlying disequilibrium became too overwhelming and shortages too severe that exchange rate adjustments were undertaken in the past. This has amounted to a development strategy strongly oriented towards the domestic market and consisting of successive phases of import substitution efforts, first concentrated on the light consumer industries and then on consumer durables and basic intermediates. Turkey now perceives itself to be at the threshhold of another phase of intensive import substitution this time aimed at the capital goods industries.

The first forward-looking experiment undertaken with the TGT model assumes that the price deflated exchange rate will remain constant throughout the FFYP period reflecting a continued strong inward orientation of Turkish development strategy. We assume a small drift to 26TL = 1 dollar in 1978 and devaluations every year thereafter to compensate for differential inflation -- but no more. The inflation we project for 1979-1980 is 18 percent and we assume a 15 percent domestic inflation rate thereafter. World inflation is projected at 9 percent per annum. A constant PLD exchange rate therefore implies a 5.5 percent upward adjustment in the exchange rate every year after 1979.* The projected scenario is thus one where no attempt at a major exchange rate adjustment is made and where the 1978 devaluation is considered sufficient by Turkish policy makers. A series of mini-devaluations is allowed, but they leave the real price deflated exchange rate constant. It is not difficult to foresee that the resulting growth path would be characterized by continued excess demand for foreign

*The term PLD exchange rate means "price level deflated" and is used by Krueger and Bhagwati. See Krueger (1978).

exchange and import rationing. The Turkish economy would retain its domestic market orientation. But how severe would import rationing have to be? What kind of overall growth performance could be expected under these conditions? What level would be reached by the debt-service ratio under alternative assumptions about capital inflow and how dependent on foreign borrowing would the economy remain? These are the major questions addressed in this section.

Important variables that must be projected exogenously are workers' remittances and the net new flow of foreign borrowing. There is much disagreement on the likely values of these flows and we have experimented with many alternative values. For the experiment reported here, a net capital inflow of 1,200 million dollars is assumed for 1978, followed by a flow of about 650 million dollars annually thereafter. Workers' remittances are projected at 1,250 million dollars for 1978, increasing to 2,200 million dollars by 1983. There is little doubt that these are optimistic projections but perhaps not unduly so. In the spring of 1978, Turkey appears to have received new pledges of assistance from various trading partners such as Germany, the USSR, Libya, Rumania and Bulgaria. The IMF and the World Bank may jointly provide as much as 600 million dollars disbursement in 1978. Thus the figure of 1,200 million net for 1978 should be feasible. It assumes a rollover and restructuring of most of Turkey's short-term debt leading to a debt service and amortization flow of about 0.8 billion dollars in 1978. Thus the projected gross new borrowing figure is 2.0 billion dollars. But many of the credits presently extended to Turkey have been made possible by special economic

and political circumstances. They are unlikely to be repeated for another year. We project an average of 650 million dollars net for the 1979-1983 period, which would still probably constitute gross new borrowing of about one and a half billion dollars a year. Again, this is probably on the optimistic side.

The projections for workers' remittances reflect the rather discouraging level of remittances realized in the first 5 months of 1978. Despite the March devaluation remittances seem to be falling. Assuming that it will be possible in the future to redirect the significant portion of remittances that enters Turkey unofficially into official channels, we project 1,250 million dollars for 1978 and a slowly rising trend thereafter with a projection of 2,200 for 1983, the terminal year of the Fourth Five Year Plan. This implies a 12% per annum average increase in the current dollar value of remittances and therefore implicitly assumes that Turkish workers in Western Europe remain constant in number and continue to send home a constant proportion of their income. If this assumption does not hold and workers abroad begin to feel more like permanent residents in the countries they work in, living with their families and not necessarily planning to return, our projections may be too high. When evaluating these figures one should not forget that a small but significant amount of outmigration still continues, mostly to the Middle East and that the stock of Turkish workers abroad is unlikely to diminish. It may even increase. Thus a 12% per annum average increase in current dollar value may be a reasonable guess. How much of it will come through official channels depends of course on the policies and regulations adopted.

Regarding government expenditures, we assume that current expenditure will increase at a target rate of 6.5% per annum in real terms. Tax rates, seignorage and transfers are exogenously projected so that government investment expenditure is a residual arrived at after satisfying the 6.5% current expenditure growth target. Private savings rates are for the moment assumed constant at their 1977 levels. Total investment is the sum of private and government investment. In real terms investment will be sensitive in particular to overall GDP growth, to total government revenue and to the relative price of capital goods. Since the savings rates are fixed as nominal proportional rates, a decline in the relative price of capital goods will lead to a rise in real capital accumulation.

Table 4.1 summarizes the macroeconomic characteristics of the growth rate generated by the TGT model assuming the constant real exchange rate policy and the capital flows described above.

The results underline the depth of the present crisis and the difficulties that lie ahead. Under the fixed PLD exchange rate policy, the TGT model predicts a growth rate of GDP around 2.5% in 1978 and 1979 and of about 6.2% thereafter until 1983. Consumption (in base year prices) grows by less than 1% annually in 1978 and 1979, recovering and growing at a rate close to 6.0% thereafter. This implies an actual decline in per capita consumption for the 1978-1980 period.

Investment declines substantially in 1978 and recovers its real 1977 level only in 1982! The real wage also declines in 1978 and continues to fall marginally in 1979. It then settles on a 2.0% per annum growth after 1980. Given that the real wage in the organized sector grows exogenously the burden of the initial decline in the average real wage is assumed to fall on the unorganized sector and will result in increased underemployment.

Table 4.1: Results of a Constant PLD-Exchange Rate Policy, Macroeconomic Indicators

	Experiment Base						FFYP Average Growth Rates
	1978	1979	1980	1981	1982	1983	1979-1983
GDP Growth Rate***	2.5%	2.6%	6.1%	6.4%	6.2%	6.2%	5.5%
Value Added Growth ****							
Agriculture	5.6%	2.3%	4.2%	4.3%	4.3%	4.3%	3.9%
Industry	3.1%	4.2%	7.0%	7.8%	7.4%	7.4%	6.7%
Services	4.5%	3.1%	5.9%	6.2%	6.0%	6.0%	5.4%
Growth of Consumption	0.9%	0.3%	5.9%	6.1%	5.8%	5.9%	4.8%
Growth of Investment	-14.6%	0.2%	6.3%	6.5%	5.8%	5.8%	4.9%
Total Urban Labor Force (1000)	7115	7435	7766	8093	8411	8724	--
Growth Rate	5.0%	4.5%	4.5%	4.2%	3.9%	3.7%	4.2%
Employment in Industry (1000)	2319	2426	2512	2609	2691	2768	--
Growth Rate	0.2%	4.5%	3.5%	3.9%	3.1%	2.9%	3.6%
Growth of Average Urban Wage, Real	-6.3%	-1.3%	1.7%	2.0%	2.1%	2.4%	1.4%*
Average Economy-Wide Profit Rate	18.9%	17.2%	17.3%	17.5%	17.6%	17.7%	17.5%*
Profit Rate in Manufacturing	32.2%	33.3%	34.3%	35.3%	36.0%	36.6%	35.1%*
Investment Rate (of GDP)	21.3%	22.6%	22.9%	23.1%	23.1%	23.2%	23.0%*
ICOR	9.1	7.2	3.0	2.9	3.0	3.0	3.8*
Exports (million $, current)	2310	2679	3113	3601	4181	4847	16.0%
Imports (million $, current)	5064	5163	5958	6889	7916	9058	12.3%
Import-Elas.	-9.2	-3.1	0.9	0.9	0.9	0.8	--
Net Invisibles ($)	407	628	755	907	1093	1322	26.6%
Remittances ($)	1250	1400	1600	1800	2000	2200	12.0%
Net Capital Inflow ($)	1200	550	600	650	700	750	650
Debt Service Ratio**	21.7%	24.5%	28.5%	33.1%	36.1%	35.7%	31.6%*
Degree of Import Rationing	40.0%	52.0%	54.0%	55.0%	57.0%	58.0%	52.7%*
Domestic Inflation	42.0%	18.0%	15.0%	15.0%	15.0%	15.0%	15.6%*
Exchange Rate (to the dollar)	26.0	28.2	29.7	31.3	33.1	34.9	6.0%
Devaluation (%)	42.9%	8.3%	5.5%	5.5%	5.5%	5.5%	6.0%

* Average over FFYP period

** Amortization + interest divided by exports + remittances + nfs.

*** Constant market prices, 1973 base.

**** Real value added, double deflated, 1973 base. Includes indirect taxes but excludes tariffs. GDP equals total value added plus tariffs.

On the foreign trade side, TGT predicts 2.3 billion dollars worth of merchandise exports for 1978 and 400 million dollars of net revenue from invisibles including tourism. In conjunction with the exogenously projected capital flows, these foreign exchange earnings allow about 5 billion dollars worth of merchandise imports. In constant dollars this represents a 20% decline over 1977. Desired imports are 8.3 billion dollars in 1978 and the degree of rationing is 40%. This constitutes more severe import rationing than occurred in 1977. Capacity use therefore further diminishes and in spite of the substantial investment rate in 1977, growth is projected to be slower in 1978 than in 1977. At this point it should again be emphasized that 1977 was an awkward year, with the first half quite different from the second half. The degree of excess capacity and the severity of import rationing projected for 1978 is similar to that prevailing during the second half of 1977, but it is worse than the 1977 average.

The foreign trade and balance-of-payments situation does not improve in later years. On the contrary, the degree of rationing becomes more severe every year, reaching 58% in 1983. The entire FFYP period would thus be characterized by severe import rationing.

1978 constitutes the worst year of the crisis with GDP growth only 2.5%, investment and real-wages falling and industrial employment stagnating. The situation improves somewhat in 1979, but 1979 is still very much a crisis year. A moderate recovery is finally achieved in 1980 and GDP growth settles at about 6.3% per year for the rest of the FFYP period.

The growth path the economy reaches by 1980 is characterized by chronic excess demand for imports, sluggish export growth and substantial import substitution (see section 4.3 below). Between 1978 and 1983, imports grow by less than 2.8 percent per year in real terms, while GDP grows at an average rate of 5.6 percent. The propensity to import would thus be declining significantly, in sharp contrast to what happened in the early 1970's.

While the path generated by a fixed price deflated exchange rate policy is certainly not an attractive one, and while the growth rates generated fall far below policy objectives and expectations in Turkey, it should be stressed that the TGT model suggests that the economy can probably continue to grow at a moderate pace without a great increase in imports and in spite of foreign exchange shortages. Indeed, the path described above appears not unlike the path Turkey followed in the 1960's. Between 1963 and 1968 real imports were growing at 2.9% while output was growing at 6.6% per year in real terms.[1/] Turkey has in the past been able to grow moderately rapidly under conditions of foreign exchange shortage and declining import-GDP ratios. These periods have been periods of substantial import substitution and it is quite possible that Turkey is again preparing to go through a similar phase of intensified import substitution, particularly in such sectors as steel, petrochemicals, fertilizers and machinery.

1/ See the tables prepared for the "Sources" project of the Economics of Industry Division by Merih Celasun.

Without going more into the microeconomic details of the path summarized above, one cannot really form a judgment on how likely a path it is in terms of the possible pace of import substitution. But three important observations can be made just looking at the macroeconomic indicators:

a. All exogenous flows and variables have been projected at optimistic levels. In spite of that, the overall growth rate remains quite low.

b. The degree of import rationing increases throughout the period reflecting continuous and very strong excess demand for imports and foreign exchange.

c. At the end of the FFYP period, total merchandise exports are still below 5 billion dollars, manufactured exports still have not reached the one billion mark and the trade deficit exceeds 4 billion dollars.

To test the sensitivity of the growth path to the exogenously projected variables which we have projected at optimistic levels so far, we undertook an experiment with the following "pessimistic" assumptions:

	1978	1979	1980	1981	1982	1983
Workers' Remittances (M $)	1100	1200	1300	1400	1500	1600
Net Foreign Capital Inflow (M $)	1000	500	500	500	500	500
Total Inflow (M $)	2100	1700	1800	1900	2000	2100

This should be compared with the total inflow assumed so far which was:

	1978	1979	1980	1981	1982	1983
Total Inflow (M $)	2650	1950	2200	2450	2700	2950

For this more "pessimistic" experiment, we also assumed that the inflation rate would reach 47% between 1977 and 1978 instead of 42% assumed previously so that the 26 TL = 1 dollar initial exchange rate is lower in real terms.

The results are not encouraging and underline Turkey's vulnerability to shortfalls in foreign capital inflows and workers' remittances. Table 4.2 provides a condensed summary of the macroeconomic results.

Table 4.2: Results of Projected Low Levels of Borrowing and Workers' Remittances

	1978	1979	1980	1981	1982	1983	FFYP Average Growth-Rates 1974-1983
GDP Growth Rate	0.8%	2.4%	5.4%	5.7%	5.9%	5.9%	5.0%
Growth of Consumption	0.6%	1.2%	5.4%	5.5%	5.6%	5.5%	4.8%
Growth of Investment	-18.0%	1.5%	4.0%	5.0%	5.3%	5.6%	4.3%
Degree of Import Rationing	45.0%	57.0%	59.4%	61.0%	62.1%	63.2%	60.6%*

* Average over FFYP period

What is perhaps most important is that compared to a 2.5% growth rate in 1978 when foreign borrowing and remittances are forthcoming at optimistic levels, growth in 1978 is close to zero when foreign capital flows are scaled down by 20% in 1978. The difference between 2.5% and 0.8%

on GDP growth for 1978 is a very important one. It may constitute the crucial difference between a return to socioeconomic stability or further serious disintegration. Given the crisis atmosphere currently prevailing in Turkey, the total standstill that may well occur if foreign funds are not forthcoming at the substantial levels we projected previously, may lead to a collapse of expectations and a deepening of the crisis that would vitiate the basic assumptions about savings rates, continued investment and social stability that underlie our projections for a recovery by 1980.

While our initial optimistic projections may be achieved with enough foreign cooperation, it is quite clear that without a much more substantial increase in exports, Turkey remains extremely vulnerable to shortfalls in workers' remittances and foreign borrowing. While optimistic assumptions about borrowing and remittances allow moderate recovery and growth without a major devaluation, the situation appears to be a very tenuous one. What is quite clear and needs to be strongly emphasized is that the March 1978 devaluation is very far from being one that corrects the fundamental imbalance behind the foreign exchange gap. It simply compensates for the differential inflation rates in 1977 and 1978 but it does not constitute an adjustment to past differential inflation rates, to the reality of a high oil price and to the fact that workers' remittances can no longer be expected to grow significantly in real terms. Quite apart from these factors, the equilibrium value of foreign exchange may be following an upward trend in Turkey due to ongoing shifts in the structure of output and national expenditure.

It is therefore quite likely that Turkish policy makers, watching the inadequate performance of exports, feeling the pressure of increasing excess demand for imports and realizing that GDP growth could be increased if the foreign exchange constraint was not so tight, will eventually consider important policy changes aimed at export expansion, better growth performance, and less vulnerability to foreign capital flows. The need for an expansion of manufactured exports as a basic condition for rapid growth and continued industrialization is increasingly recognized in Turkey. Ambitious targets are being set in this area. But the fundamental fact is that incentives are very heavily biased against exports and that the exchange rate is by far the most important variable determining the structure of incentives and the degree of price competitiveness of Turkish manufactured exports. It will not be possible to achieve substantial export growth without a major readjustment of the exchange rate. All other measures are bound to remain marginal compared to what could be achieved by a major readjustment of the real exchange rate.

It should be stressed that an adjustment in the real price deflated exchange can only be achieved if monetary and fiscal policy is able to control the price level in the post-devaluation period (see Section 2 above). A real devaluation is a package in which the nominal rate of devaluation is only one part that must be complemented by measures to keep the price level from rising enough to dissipate the effects of the devaluation. A real devaluation must be able to change relative prices and incentives. While all prices may rise after a devaluation, some prices

must rise more than others to allow a change in the structure of incentives. In the TGT model a devaluation of the nominal exchange rate, holding everything else constant, implies a decline in at least some domestic prices relative to a situation of no devaluation. While we keep the overall inflation rate at a constant exogenously specified level, the structure of price increases will be strongly affected by a change in the exchange rate.

This paper does not attempt to predict the policy changes that will actually take place or their timing. A constant price deflated exchange rate from 1978 onwards may be quite a likely scenario. It is even possible that the nominal exchange rate will be kept constant for a certain period. On the other hand the exchange rate may be allowed to drift somewhat faster than differential inflation, leading to a progressive real devaluation. The constant PLD exchange rate projection captures the essential characteristics of growth paths reflecting continued adherence to an inward oriented growth and industrialization strategy. Whether the nominal exchange rate is devalued a bit more or a bit less rapidly than required by differential inflation does not change the fundamental nature of the growth paths characterized by massive import substitution in the basic intermediates and capital goods sectors.

What the TGT model suggests is that while such a path may well be feasible it is not one that can generate very rapid growth in the medium term. An annual growth rate of 5.5% constitutes an upper bound for the FFYP period if extreme inward orientation persists and exports fail to expand rapidly.

In terms of self-reliance and economic independence, the growth path generated by our basic run is characterized by conflicting features. On the one hand it can be interpreted as promoting a more independent economy through the rapid building up of the capital goods industries. But on the other hand the tightness of the foreign exchange constraint will tend to further increase Turkey's dependence on foreign capital and foreign creditors. The debt service ratio increases to levels above 30% threatening a crisis of confidence that could lead to a collapse of the flow of borrowed funds. Turkey would be walking on a tightrope with another severe foreign exchange crisis always threatening. It is therefore hard to see how a strategy that fails to promote dramatic export expansion can really succeed in successfully strengthening economic independence and self confidence. Furthermore, as will become apparent when discussing the microeconomic nature of the basic run, the extent and pace of import substitution implied would have to constitute a record performance when compared to performance in a sample of semi-industrialized economies in the past two decades. While the trade substitution elasticities embodied in the microeconomic structure of the TGT model are quite low and are therefore unlikely to understate the difficulty of substituting domestic production for imports, it is possible that we underestimate the effects continuous severe import rationing might have on capacity utilization, technical progress and x-efficiency in the economy. The basic run projections provide an optimistic upper bound to what can be achieved with a single minded strategy of import substitution. If everything goes right, Turkey might overcome the crisis by the end of 1979 and settle on a steady

growth path of about 6% a year after 1980 without a major reorientation of industrial strategy towards exports. But it is far from clear that everything can go right and that foreign money will be forthcoming in sufficient amounts under those circumstances. And even if everything that is optimistically projected does materialize, a 6% growth rate remains well below what is considered desirable or even acceptable in Turkey. As the basic constraints limiting other growth performance become more obvious and as it becomes clearer that a major export drive is an indispensable condition for a more rapid trend growth rate in the 1980's, it is quite possible, therefore, that a very serious reorientation of industrial strategy will be considered by Turkish policy makers. The most important signal for such a change would have to be a major real devaluation and a shift of incentives and resource pulls towards exports. Real savings would have to be embodied more in exports and less in domestic import substitutes. It is the implications of such a shift that we explore in section 4.3 below.

4.3 Macroeconomic Consequences of Alternative Trade and Exchange Rate Policies

The real exchange rate is one of the most important relative prices characterizing the price and incentive structure of a mixed market economy. Its absolute nominal value does not carry much significance but its relative real value has a determining influence on resource allocation, resource pulls and the direction of growth. What determines resource pulls and the relative structure of incentives is primarily the relative structure of net prices or "value added" prices. Trade policy influences net prices through the exchange rate, import taxes, export subsidies and import rationing. The causal links are complex and we shall return to a more detailed discussion later. Note only at this stage that the mechanisms linking trade policy instruments to relative prices and incentives in a model that recognizes product differentiation and reflects strict exchange control are different from those discussed in the simpler models of pure trade theory assuming perfect substitutability and free convertibility.

In this section, we will report on two experiments with the TGT model and compare the results with those obtained from the basic run which assumed a constant price-deflated exchange rate. The focus of the analysis will be on macroeconomic performance. However, both experiments involve changes in the real exchange rate, and it is these changes which dominate the results. Thus it is important to explore the incentive and resource-pull effects, even at the macro level. Detailed sectoral analysis will be done in Part 5 below.

Experiment B-1: A Higher Exchange Rate Policy

Experiment B-1 assumes a further major devaluation bringing the value of the Turkish Lira to 36 TL = 1 dollar in 1979 and letting the parity slide down thereafter by 10% (nominal) every year. Given a differential inflation rate that is projected to be only 5.5% after 1979, this implies a real devaluation of about 30% in 1979 and of 4.3% annually thereafter.

Experiment B-2: A Manufactured-Exports and Investment-Oriented Policy Package

Experiment B-2 assumes the same path for the exchange rate as experiment B-1, but the high exchange rate policy is complemented by the following measures:

- A once-and-for-all 50% increase in export subsidies for all nontraditional manufactured exports in 1979 (Sectors 5 through 16).
- An increase in public investment complemented by an increase in the savings rates of labor households designed to increase the average investment rate to 25.5% by 1983.
- A substantial increase in the effective average tax rate on capital income necessary to allow the non-inflationary financing of the above policies.

Before starting to analyze and discuss the results obtained from the two experiments it is important to stress again that the 30% devaluation refers to a 30% change in the exchange rate, ER, relative to the domestic price-level, PL. It should be clear that a 30% real devaluation in 1979 can be achieved by various combinations of domestic

inflation rates and nominal exchange rate changes. The particular one we are assuming is an 18% domestic inflation rate, a 9% world inflation rate and a 38.5% nominal devaluation. But a lot of other combinations could lead to the same amount of real devaluation that matters. The real variables of the TGT model in its forward running form are not affected by the inflation rate as long as the latter is accompanied by an appropriate amount of nominal exchange rate adjustment. If, however, the ratio of the nominal exchange rate to the price level changes, in other words if there is a real devaluation, relative prices and resource allocation will change and the real variables of the model will be affected.

Another point that needs emphasis is that the TGT model does not specify a lag structure in export demand. While there is an explicit distinction between short run and long run responses on the supply side via fixed capital stocks and profit rate responsive investment, the demand response to exchange rate adjustment is specified to take place within a single year. This may overstate the impact effect of devaluation. The five year averages and terminal 1983 projections should therefore be considered more reliable than the 1979 figures that may overstate the speed of response to a major policy shift.

Tables 4.3 and 4.4 summarize some of the most important macroeconomic indications derived from experiments B-1 and B-2. These results should be compared to those presented for the basic run in Table 4.1 above. Tables 4.7, 4.8 and 4.9 are comparative tables and summarize results from all three experiments.

First consider the high exchange rate experiment whose results are summarized in Table 4.3 and in various tables below. The re-

Table 4.3: Results of a High Exchange Rate Policy, Macroeconomic Indicators

	Experiment B-1						FFYP Average Growth Rates
	1978	1979	1980	1981	1982	1983	1979-1983
GDP Growth Rate***	2.5%	7.3%	7.6%	7.8%	7.9%	8.0%	7.7%
Value Added Growth****							
Agriculture	5.6%	5.6%	5.4%	5.5%	5.7%	5.9%	5.6%
Industry	2.6%	9.1%	8.8%	8.9%	8.9%	8.9%	8.9%
Services	4.5%	7.1%	7.2%	7.6%	7.5%	7.7%	7.4%
Growth of Consumption	0.9%	1.6%	6.5%	6.7%	6.8%	6.8%	5.7%
Growth of Investment	-14.6%	9.2%	8.6%	8.5%	8.6%	8.4%	8.7%
Total Urban Labor Force (1000)	7115	7435	7744	8043	8334	8616	--
Growth Rate	5.0%	4.5%	4.2%	3.9%	3.6%	3.4%	3.9%
Employment in Industry (1000)	2319	2400	2490	2569	2648	2716	--
Growth Rate	0.2%	3.5%	3.8%	3.2%	3.1%	2.6%	3.2%
Growth of Average Urban Wage, Real	-6.3%	0.1%	2.3%	2.9%	3.1%	3.4%	2.3%*
Average Economy-Wide Profit Rate	18.9%	17.8%	18.0%	18.1%	18.3%	18.3%	18.1%*
Profit Rate in Manufacturing	32.2%	30.5%	30.8%	30.6%	30.2%	29.4%	30.3%*
Investment Rate (of GDP)	21.3%	22.9%	23.2%	23.3%	23.5%	23.6%	23.3%*
ICOR	9.1	2.6	2.5	2.5	2.5	2.5	2.5%*
Exports (million $)	2310	3350	4076	4943	5986	7294	25.9%
Imports (million $)	5064	5706	6736	7928	9315	10943	16.7%
Import-Elas.	-9.2	0.7	1.1	1.1	1.1	1.1	--
Net Invisibles ($)	407	496	563	640	723	805	14.6%
Remittances ($)	1250	1400	1600	1800	2000	2200	12.0%
Net Capital Inflow ($)	1200	550	600	650	700	750	650
Debt Service Ratio**	21.7%	21.8%	24.7%	27.9%	29.7%	28.5%	26.5%*
Degree of Import Rationing	40.0%	30.0%	27.0%	24.0%	20.0%	15.0%	23.2%*
Domestic Inflation	42.0%	18.0%	15.0%	15.0%	15.0%	15.0%	15.6%*
Exchange Rate (to the dollar)	26.0	36.0	39.6	43.6	47.9	52.7	15.2%
Devaluation (%)	42.9%	38.5%	10.0%	10.0%	10.0%	10.0%	15.2%

* Average over FFYP period

** Amortization + interest divided by exports + remittances + nfs

*** Constant market prices, 1973 base.

**** Real value added, double deflated, 1973 base. Includes indirect taxes but excludes tariffs. GDP equals total value added plus tariffs.

Table 4.4: Results of a High Exchange Rate/Policy Package Policy, Macroeconomic Indicators

	Experiment B-2						FFYP Average Growth Rates
	1978	1979	1980	1981	1982	1983	1979-1983
GDP Growth Rate***	2.5%	7.3%	7.7%	7.8%	8.0%	8.2%	7.8%
Value Added Growth****							
Agriculture	5.6%	5.7%	5.3%	5.4%	5.6%	5.8%	5.5%
Industry	2.6%	9.3%	9.3%	9.4%	9.6%	9.7%	9.5%
Services	4.5%	6.9%	7.2%	7.5%	7.5%	7.6%	7.3%
Growth of Consumption	0.9%	1.3%	6.2%	6.3%	6.3%	6.3%	5.3%
Growth of Investment	-14.6%	9.2%	10.3%	10.0%	10.3%	10.5%	10.1%
Total Urban Labor Force (1000)	7115	7435	7744	8047	8343	8633	--
Growth Rate	5.0%	4.5%	4.2%	3.9%	3.7%	3.5%	3.9%
Employment in Industry (1000)	2319	2423	2531	2632	2735	2842	--
Growth Rate	0.2%	4.5%	4.5%	4.0%	3.9%	3.9%	4.2%
Growth of Average Urban Wage, Real	-6.3%	0.0%	2.9%	3.3%	3.6%	3.9%	2.7%*
Average Economy-Wide Profit Rate	18.9%	17.8%	17.9%	18.0%	18.0%	17.9%	17.9%*
Profit Rate in Manufacturing	32.2%	30.8%	31.1%	31.1%	30.8%	30.3%	30.8%*
Investment Rate (of GDP)	21.3%	22.9%	23.6%	24.3%	24.9%	25.6%	24.3%*
ICOR	9.1	2.6	2.5	2.5	2.5	2.5	2.5%*
Exports (million $)	2310	3388	4124	5010	6082	7409	26.2%
Imports (million $)	5064	5729	6775	7980	9393	11058	16.9%
Import-Elas.	-9.2	0.7	1.2	1.1	1.1	1.1	--
Net Invisibles ($)	407	490	553	630	716	807	14.7%
Remittances ($)	1250	1400	1600	1800	2000	2200	12.0%
Net Capital Inflow ($)	1200	550	600	650	700	750	650
Debt Service Ratio **	21.7%	21.7%	24.6%	27.7%	29.5%	28.2%	26.3%*
Degree of Import Rationing	40.0%	30.0%	27.0%	25.0%	22.0%	19.0%	24.6%*
Domestic Inflation	42.0%	18.0%	15.0%	15.0%	15.0%	15.0%	15.6%*
Exchange Rate (to the dollar)	26.0	36.0	39.6	43.6	47.9	52.7	15.2%
Devaluation (%)	42.9%	38.5%	10.0%	10.0%	10.0%	10.0%	15.2%

* Average over FFYP period

** Amortization + interest divided by exports + remittances + nfs

*** Constant market prices, 1973 base.

**** Real value added, double deflated, 1973 base. Includes indirect taxes but excludes tariffs. GDP equals total value added plus tariffs.

covery sets in with the devaluation in 1979, leading to a 7.3% GDP growth rate instead of the 2.5% projected in the basic run. GDP growth remains continuously higher and the FFYP average reaches 7.7% compared to 5.5% in the basic run. Investment grows substantially more rapidly with the higher exchange rates. Consumption also grows more rapidly, although the difference is much smaller. The effect of devaluation on the average real urban wage is positive. It no longer declines in 1973 and its growth throughout the FFYP period is one percentage point higher than in the basic run, reaching 3.4% instead of 2.4% by 1983. Note finally that while the average economy-wide profit rate is not affected by the higher exchange rate policy, the profit rate in manufacturing does fall by about 5 percentage points. The impact is every uneven with the export oriented subsectors gaining at the expense of the import substituting subsectors. But on average the static resource pull created by a devaluation adversely affects manufacturing. In the TGT model this does not mean that dynamically devaluation will slow down growth in manufacturing output. The whole economy, including manufacturing, grows more rapidly after an effective devaluation that succeeds in generating a substantial increase in exports.

There are essentially three reasons for the positive macroeconomic growth effect of a high exchange-rate policy: resource reallocation effects, capacity utilization increases and more rapid real capital accumulation.

A successful real devaluation will lead to a reallocation of resources both statically and dynamically. We shall discuss the resource reallocation mechanism in greater detail in Section 5 below. Essentially what happens is that statically labor is reallocated to the more export-oriented sectors away from the sectors producing very high-cost import substitutes. This static reallocation alone is responsible for a once-and-for-all 2.6 percentage point increase in GDP. Dynamically, the structure of prices and profit rates is altered by the devaluation and the growth of both employment and capital stock becomes more rapid in the more export-oriented sectors. These are characterized by lower incremental capital-output ratios and therefore the dynamic reallocation process leads to a lowering of the economy-wide ICOR. This adds about 0.75 percentage points to the annual growth rate. The static and dynamic resource reallocation effects are therefore the most important explanation of the increase in the growth rate that occurs after a successful devaluation.

Changes in the degree of capacity utilization constitute a second important factor. They lead to a 2.0 percentage point increase in GDP in 1979 and to about 0.5 percentage point dynamically from 1980 onwards.

The specification adopted implies that it is the change in the degree of rationing that leads to a contraction in effective resources. Once the economy settles on a "steady-state" degree of import rationing, the growth rate of GDP ceases to be affected.

While there is ample documentation on the link between the degree of capacity utilization and the degree of import rationing, 1/ there is much less knowledge about possible dynamic links between the pace of technical progress and trade policies. The TGT model does not contain any such dynamic links. If one believes that export orientation and the absence of quantity allocation processes has a positive effect on the pace of technical progress and innovation, the growth rate differentials generated by the TGT model should be considered as lower bounds. On the other hand, it can be argued that technical progress and learning is inherently more rapid in the import-substituting "heavy" industries, and that therefore an inward-oriented strategy emphasizing growth in those sectors will tend to increase the average economy-wide rate of technical progress. 2/ By not specifying any dynamic link between technical progress and trade policy we adopt a cautious attitude that is probably justified, particularly given our relatively short time horizon.

What is important to remember when evaluating the resource allocation and capacity utilization effects discussed above is that the economy is not operating on its transformation frontier when the exchange

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1/ See Krueger (1978).

2/ See De Melo and Dervis (1977) and Findlay (1974) for models that emphasize these dynamic issues.

rate is fixed and imports are rationed. If the economy were operating on its transformation frontier, any increase in exports could only be obtained by a decrease in domestically used consumer and investment goods. The situation is quite different in the experiments as emphasized by Table 4.5 below.

Consider first the impact effect of devaluation in 1973. The economy produces 42% more exports in real terms and, in exchange, gets only 15% more imports, reflecting a quite severe terms-of-trade effect. Even so, investment increases by almost 9% and consumption also increases marginally. All this reflects a movement of the economy towards its transformation frontier. Thus, if export expansion is the outcome of a more efficient allocation of resources and of better capacity utilization, it need not occur at the expense of investment or consumption at home. If, to the contrary, it were to reflect a simple diversion of goods from the domestic market achieved by administrative methods without an underlying change in resource allocation and efficiency, then it would have to be paid for by quite severe cuts in domestic consumption and/or investment. This is a point that needs to be strongly stressed, particularly when facing an unfortunate tendency to deal with exports by administrative methods.

Dynamically, considering the cumulative sums in the second part of Table 4.5, the effective resource augmentation effect of a high exchange-rate policy is even stronger. The cumulative stream of consumption is higher with than without a major devaluation. The difference for the stream of investment is a very substantial 14%. The static and dynamic

Table 4.5: Effects of Devaluation on Consumption, Investment and the Trade Balance in Constant Domestic Prices

1979 Static Impact	Basic Run	Experiment B-1
Consumption a/	346.9	349.5
Investment	85.4	92.7
Exports	35.8	50.9
Imports	-36.9	-42.3
GDP	431.2	450.8

1979-1983 Cumulative Sum	Basic Run	Experiment B-1
Consumption a/	1,958.4	2,000.6
Investment	481.0	547.7
Exports	207.5	333.6
Imports	-206.2	-250.7
GDP	2,440.7	2,631.2

Units: billions at 1973 TL

a/ Includes private plus government consumption.

resource reallocation and resource augmentation effects are thus sufficient to more than outweigh the adverse terms-of-trade effect.

We have so far discussed resource allocation and capacity utilization. But the total amount of real capital accumulation is also affected by devaluation. Total real capital formation in any one year is determined by the size of the nominal investment fund and the price of investment goods. Both are affected by trade policy.

With a higher exchange rate, government tariff revenue increases substantially. Given that we are exogenously fixing government consumption expenditure in real terms, increased total revenue leads to greater government investment. This is, however, partly offset by a decrease in profit incomes induced by the devaluation. Table 4.6 below summarizes these results.

Table 4.6: Effects of Devaluation on Total Nominal Investment in 1979

1979	Basic Run	Experiment B-1
Total profit income	719.0	692.3
Total government revenue	370.4	384.4
Government investment	112.8	122.8
Private & corporate sector investment	245.6	242.0
Total nominal investment	358.4	364.3
Total nominal fixed investment	341.9	334.4

Units: billions of TL.

The increase in the investment fund depends crucially on the type of government behavior specified. If the government spent its additional revenue on consumption, the investment fund would decline. Thus the assumption that the government keeps the real level of its current expenditure constant is important.

Real capital accumulation is determined by dividing nominal investment by the price of aggregate capital goods. In experiment B-1, the latter falls by 7% after the 1979 devaluation, leading to a significant increase in real capital accumulation. The opposite is often assumed to occur. The relative price of capital goods is taken to increase after a devaluation, reflecting the higher cost of imported machinery. But this reasoning again assumes conditions of free convertibility. While the price of imported capital goods may be lower before devaluation, the demand for imports cannot be satisfied and the domestic user is forced to buy much more expensive domestic substitutes. The same occurs for intermediates that enter the production of capital goods. With the relaxation of the import constraint after a successful devaluation, domestic production costs decrease as resources are utilized more efficiently. While imports may be more expensive than before the exchange rate adjustment, they are still less expensive than the domestic substitutes produced under conditions of tight rationing. On balance, these trends lead to a significant decline in the relative cost of capital goods and the rate of growth of the economy-wide aggregate capital stock, valued in constant base year prices, rises from 4.5% to 5.2% in experiment B-1 (See Table 4.7 below).

The results of experiment B-1 reflect a growth path that is much closer to the target path of Turkish policy makers, at least in terms of overall growth rates. It does however have an important impact on industrial structure and the pattern of industrialization. Sectors such as chemicals, steel and machinery grow significantly less rapidly then when protected by severe import rationing as in the basic run. Exports remain heavily concentrated in food, textiles and clothing, and industrial structure shifts significantly towards the lighter consumer goods industries. This indicates that while overall growth is substantially higher, the implied structure of growth is not consistent with the desire of Turkish policy makers to achieve rapid development of heavy industries.

Rapid growth in the capital goods and basic intermediate industries has to proceed on a broad integrated front if there is to be substantial net import substitution. This in turn does not release enough resources for rapid export expansion. An inward-oriented strategy based on massive import substitution in heavy industry would constrain the economy to a rather moderate growth rate of 5 or 6 percent. To achieve a growth rate in the vicinity of 8%, the emphasis would have to be shifted, at least initially, to the export-oriented sectors and to subsectors producing exportables in the basic intermediate and capital goods industries. While the possible growth rate of exports originating in the capital-intensive and technology-intensive sectors

may be very high, their base is so small that it is inevitable that the bulk of exports will consist of primary products, food, textiles, clothing and other relatively simple products. This is certainly true in the short to medium run. In the long run, it can be argued that a prior condition for the successful development of the technologically more advanced industries is the end of the continuous crisis situation and a resource-use and allocation mechanism that is more geared to world-market norms and conditions. But from a shorter-run perspective, a trade-off does exist between the objective of quickly expanding the capital-goods and intermediate-goods sectors on a broad front, and the objective of overcoming the foreign-exchange constraint by a massive export drive.

To test the feasibility of combining rapid overall growth performance with an industrial strategy that continues to emphasize the development of the capital goods and intermediate goods sectors, and to analyze the extent of the resource mobilization effort necessary to achieve success with such a strategy, we conducted a third experiment, assuming the manufactured exports and growth-oriented policy package described above.

The macroeconomic results of complementing the high exchange rate policy with substantial export subsidies to nontraditional exports and an investment drive financed by higher taxes on capital income and higher savings from labor income are summarized in Table 4.7 and 4.8. The aggregate results are not dramatically different from those reported

Table 4.7: Effects of Alternative Policies on Growth Performance in the FFYP Period

Average Annual Growth Rates: 1979-1983

	Basic Run	B-1	B-2
	Constant Price Deflated Exchange Rate Policy	High Exchange Rate Policy	Manufactured Exports & Investment Oriented Policy Package
GDP	5.5%	7.7%	7.8%
Agriculture	3.9	5.6	5.5
Industry	6.7	8.9	9.5
Services	5.4	7.4	7.3
Economy-wide Capital Stock	4.5	5.2	5.4
Urban Labor Force	4.2	3.2	3.9
Real Average Urban Wage	1.4	2.3	2.7
Exports, current dollars	16.0	25.5	26.2
constant dollars	6.4	15.5	15.8
Imports, current dollars	12.3	16.7	16.9
constant dollars	3.0	7.1	7.2

Table 4.8: Effects of Alternative Policies on Macroeconomic Variables in 1983

1983	Basic Run	Experiment B-1	Experiment B-2	Ratios (%) to Basic Run Experiment B-1	Experiment B-2
GDP	548.5	608.9	611.5	110.0%	114.7%
Total consumption	438.9	454.0	446.5	103.4	101.7
Gross fixed investment	100.9	120.3	128.4	119.2	127.3
Economy-wide capital stock	1,153.8	1,196.3	1,205.7	103.7	104.5
Capital stock in manufacturing	225.8	235.0	237.1	104.0	105.0
Employment in manufacturing	2,128.1	1,997.1	2,053.4	93.8	96.5
Economy-wide profit rate	17.5%	18.3%	17.9%	104.6	102.3
Profit rate in manufacturing	35.1	29.4	30.3	83.8	86.3
Capital goods price index (1973 = 100)	756.6	673.9	693.1	89.1	91.6
Merchandise imports (billion $)	9.1	10.9	11.1	120.8	122.1
Merchandise exports (billion $)	4.8	7.3	7.4	150.5	152.9
Manufacturing exports (billion $)	0.9	1.5	1.6	162.6	170.4
Exchange rate (TL/$)	34.9	52.7	52.7	151.0	151.0
Degree of import rationing a/	58.0	15.0	19.0	25.8	32.8
Debt service ratio b/	35.7	28.5	28.2	79.8	79.0
Net capital inflow/merchandise exports	15.5	10.8	10.1	66.5	65.2

Units: GDP, consumption, investment, capital stock: billion 1973 TL.
Employment: thousand workers

a/ Defined as 1 - actual imports/desired imports.

b/ (Interest + amortization)/(exports + nfs + workers' remittances)

for the high exchange rate case (B-1). GDP grows only marginally faster. Exports in 1983 are not much higher than before. The attempt at more rapid real capital accumulation faces two difficulties: the relative price of investment goods increases and the foreign exchange constraint becomes relatively more binding, leading to an increase in rationing. The subsidies to nontraditional exports do not have a major impact on the total quantity of exports because of their very small initial share (14% of total exports in 1973). Overall economic growth remains constrained by the growth of exports as well as the small base from which they grow.

There are, however, significant differences between the policy package experiment (B-2) and the high exchange rate scenario (B-1), and the differences become more important towards the end of the planning period when the gradually rising investment rate has significant effects. Industrial growth is 0.6 percentage points higher over the plan period (1979-83) and almost a full percentage point higher in the final year than in the devaluation-only experiment (B-1). While consumption in 1983 is slightly lower in experiment B-2, the economy-wide capital stock is about one percent higher than in experiment B-1, leading to an increase in urban employment and the real urban wage, both of which grow significantly faster in experiment B-2.

The experiments also differ substantially with respect to the share of government in national expenditure. While current government expenditure and transfers are always held constant in real terms across

all experiments, government investment increases substantially in experiment B-2. Table 4.9 compares some of the results with respect to the government's share and role in the economy. 1/ In addition, experiment B-2 significantly reduces the after tax share of profits and the composition of saving.

Table 4.9

Comparing the Effects of Alternative Policies on Government Revenue, Profits, and the Financing of Investment in 1983

(percent)	Basic Run	Experiment B-1	Experiment B-2
Government Expenditure/GDP	26.1%	27.0%	28.6%
Direct Taxes/GDP	13.0	11.5	13.1
After Tax Profit Income/GDP	40.5	39.3	35.3
Share of Investment Financed by:			
Labor Saving	5.6	5.7	9.2
Direct Government Saving	34.4	38.3	40.8
Capitalist Saving & SEE's	60.0	56.0	50.0

While important changes are brought about by the manufactured-exports and investment-oriented policy package, overall growth performance remains very close to what it was in experiment B-1. But the sectoral pattern of growth is in fact quite different. The combination of export subsidies to "infant" export sectors and increasing investment demand

1/ Note the total government expenditure refers to expenditure from the Consolidated Budget and does not include the SEE's which the TGT model in its present form treats as consolidated with the private corporate sector.

creates important resource pulls favoring the heavy industries and the machinery sector in particular. Thus the policy-package strategy is one that achieves relatively rapid and rising overall growth without shifting the pattern of growth too strongly towards the light consumer industries. It is this kind of strategy that conforms best to Turkey's objectives. It does however imply not only a major devaluation in 1979, but also a very successful effort at resource mobilization and a relatively slow growth of consumption.

The results described so far have provided a consistent view of the macroeconomic variables over the FFYP period and their sensitivity, in particular, to the exchange rate. They seem to provide a strong case for a major exchange rate adjustment to take place as soon as possible. Without being too optimistic about the response of exports to devaluation, the combined effects of export expansion and lessening of import rationing that would follow such a major adjustment allow the growth rate to increase from 5.5% in the basic run to 7.7 or 7.8% in experiments B-1 and B-2.

Comparing the basic run with the two policy experiments indicates that, during the fourth five-year plan period, Turkey probably cannot achieve her historical 7-8% rate of growth without dealing with the foreign-exchange problem through a major real adjustment in the exchange rate and a shift to export-intensive growth. This conclusion is further supported by the analysis of sectoral changes implied by the different policy regimes that is presented in the next section. However, as discussed above, there are trade-offs and there is no policy that

achieves all objectives without costs. It is thus especially important to consider carefully the implications of the different policy regimes on the structure of the economy, to identify the sectors which gain or lose, to get a better sense of the timing and sequences of sectoral growth involved, and to evaluate the reasonableness of the different regimes from the point of view of their sectoral implications.

5. Microeconomic Analysis of the Impact of Trade Policy on Industrial Structure and the Sources of Industrial Growth

5.1 Introduction: Trade Policy and Resource Allocation

The economy-wide perspective and the alternative scenarios presented so far rely on developments in each of the 19 sectors distinguished by the TGT model. While a 19 sector disaggregation is not enough to allow a real link between economy-wide analysis and analysis at the microeconomic project level, consideration of sectoral developments implicit in the macro-perspective is important in evaluating the macro results. The reasonableness of the overall growth projections depends on the reasonableness of the underlying sectoral growth rates, and 19 sectors represent enough disaggregation to provide a useful framework for more detailed sectoral analysis. Evaluation of sectoral growth must focus not only on the rise in domestic production as such but also on the pace of import substitution and/or export expansion that is implicit in the sectoral growth projections. It is not only overall growth performance, but also the sectoral pattern of growth that concerns most policy makers. What is required is not only rapid growth but also a deepening of the industrialization process through the development of the technologically more advanced industries.

Relative prices and relative price effects play a very important role in determining the resource allocation and resource growth that in turn determine the structure of sectoral growth. The low-exchange-rate

experiment that keeps constant the price-deflated exchange rate leads to quite different resource pulls than those of the high exchange rate strategies of experiments B-1 and B-2. In the first case, severe import rationing provides a great stimulus to import substitution and resources are pulled into such sectors as chemicals, basic metals and machinery. Exports on the other hand are not encouraged and resources are pulled away from export-oriented sectors. On the other hand, a high exchange rate changes the structure of relative prices and incentives in favor of export-oriented activities. The rise in imports and relaxation of import rationing allowed by export expansion diminishes the relative profitability of import substitution and pulls resources away from import substituting sectors. In the policy package experiment, this tendency is partly counteracted by the higher investment rate and the subsidies to non-traditional exports.

The mechanisms at work in the TGT model are quite different from the simpler mechanisms stressed by pure trade theory and models that analyze devaluation under conditions of free convertibility. As recently stressed by Anne Krueger 1/ in her comparative analysis of trade liberalization attempts in several countries, including Turkey, a devaluation under conditions of tight exchange control can have very different effects from a devaluation under free convertibility. In the latter case a devaluation simply results in an increase in the relative price of all tradeable commodities, be they exportables or import substitutes. Resources will be pulled into all tradeable sectors, away from the non-tradeable sectors. Within the

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1/ See Krueger (1978)

framework of the TGT model, the situation is quite different. First of all there is no clear-cut distinction between tradeables and non-tradeables. Instead, there is a continuum: some sectors where import or export shares are large and substitution elasticities are high are very "tradeable," while other sectors where import or export shares are small and the substitution elasticities are low can be characterized as more "non-tradeable." Furthermore, import rationing and exchange control imply that a successful devaluation will lead not to a decline but to an increase in realized imports and therefore to a reduction in the relative profitability of import substitution. Thus, contrary to traditional analysis, a devaluation, while favoring export expansion, will not encourage import substitution.

Finally, the TGT model specifies an inverse link between capacity utilization and the degree of import rationing. This can also be interpreted to mean that rationing absorbs real resources that would be released with a decrease in the degree of rationing. Real resources are used not only by the government in the administration of the rationing system but also by producers who have to use some of their resources to compete for licenses and lobby for their share of imports.

These fundamental points should be kept in mind when evaluating the results presented below and when relating them to the microeconomics of neoclassical trade theory.

5.2 Sectoral Aggregation and Sectoral Trade Characteristics in the TGT Model

The TGT model distinguishes 19 sectors which are aggregations of the sectors distinguished in the 1973, State Institute of Statistics

Input-Output Table. Details of the sectoral aggregation are provided in Appendix B, but some important characteristics of the aggregation should be kept in mind when evaluating the microeconomic results presented in this section.

First, lightly processed agriculture commodities appear in the manufacturing sectors, not in agriculture. Thus, preserved fruits and vegetables, olive oil and tobacco are included in the food sector and cotton ginning is included in the textiles sector. Second, crude oil and natural gas are aggregated with refining in an integrated petroleum and petroleum products sector. These sectoral definitions are especially important to keep in mind when analyzing the trade projections.

Table 5.1 below summarized some important data that help characterize the individual sectors' role in trade. A complete description of sectoral production function parameters is given in Appendix B. The first column presents the ratio of imports to domestic goods in domestic use of each category of commodities. This RMD_i ratio is measured in constant base year (1973) prices. The second column presents the proportion, IMD_i, of imported intermediates in total intermediate input use for each sector, measured in base year prices. The third column tabulates the Armington trade substitution elasticities, σ_i, assumed in the TGT model. Column four provides the ratio REX_i of exports to total domestic production, again in constant prices. Finally, column five contains the assumed export demand elasticities.

Several things should be noted in Table 5.1. Turkey does not import significant amounts of finished consumer goods or agricultural

Table 5.1: SECTORAL IMPORT DEPENDENCE, EXPORT SHARES, AND TRADE ELASTICITIES

	Ratio of Imports to Domestically Produced Goods in Total Domestic Use	Share of Imported Intermediates in Total Intermediate Inputs	Armington Trade Substitution Elasticities	Share of Exports in Total Domestic Production	Sectoral Export Demand Elasticities
	RMD_i	IMD_i	σ_i	REX_i	η_i
1. Agriculture	1.0	8.6	2.00	1.5	Fixed World Price
2. Mining	6.9	18.5	0.50	15.2	Fixed World Price
3. Food	0.9	2.1	0.66	11.0	2.00
4. Textiles	1.7	8.2	0.66	14.3	Fixed World Price
5. Clothing	2.0	4.0	0.66	5.7	2.00
6. Wood & Wood Products	0.4	3.6	0.66	0.4	2.00
7. Paper & Printing	8.1	10.8	0.66	0.4	2.00
8. Chemicals	59.1	31.0	0.33	1.5	2.00
9. Rubber & Plastics	15.5	22.6	0.33	1.1	2.00
10. Petroleum & Pet. Prod.	21.5	20.8	1.50	1.2	2.00
11. Non-Met. Min. Prod.	5.9	10.5	0.66	2.7	2.00
12. Basic Metals	29.7	20.6	0.50	1.2	2.00
13. Metal Products	15.4	22.8	0.50	2.0	2.00
14. Non-Electric Machinery	86.1	44.3	0.33	0.5	2.00
15. Electric Machinery	50.3	27.3	0.33	0.2	2.00
16. Transp. Equipment	29.1	22.9	0.75	0.1	2.00
17. Construction	--	17.0	--	--	--
18. Infrastructure	1.7	16.3	0.20	5.8	1.25
19. Services	1.4	4.4	0.20	3.4	1.25

Note: Following the 1973 S.I.S. Input-Output Table trade and transportation margins are not distributed to the individual sectors but appear in the last two sectors.

products and the proportion of imports in total domestic demand for "light" manufactured goods such as processed food, textiles, clothing and wood products is minimal. But Turkey imports almost half of its non-electrical machinery, and is heavily dependent on imports of chemicals, electrical machinery, basic metals and transport equipment. Turkey is also very dependent on imports of crude petroleum. Almost all refining is done domestically, so that the import ratio in sector 10 which aggregates crude petroleum with petroleum products is only 21.5%. But in this case it would be more meaningful to look at the share in current prices that partly reflects the much higher world price of oil.[1/] The current price ratio is 35% for 1977.

The RMD_i ratios tell us something about which sectors will face strong excess demand when import rationing increases. But the degree of import dependence and the degree to which capacity utilization will be effected by rationing is reflected in the IMD_i ratios that give the proportion of imported intermediates in total intermediate inputs. Note that the IMD_i ratios provide only "first-round" direct estimates of import dependence since they do not take into account the indirect dependence created through input-output linkages, capital requirements and general equilibrium price effects. Food, clothing, wood products and services are the sectors that appear least dependent on imports, followed by textiles and agriculture. The average IMD_i ratio in manufacturing is 15.2% and the economy-wide ratio is 11.7%. The sectors most dependent on imported intermediate inputs are non-electrical machinery with an IMD_i ratio of 44%, followed by chemicals, 31% and electrical machinery, 27%.

1/ Turkey had not, as of July 1978, fully adjusted the domestic price to the world price.

Column three provides the assumed substitution elasticities. These are guessed parameters attempting to capture intrasectoral product mix characteristics. They are lower than the kind of elasticity estimates one gets from the econometric studies of trade between industrialized countries [1/] and reflect the much more important quality and product mix differences that exist between a developing economy and its developed trading partners. They constitute an intermediate specification between the pure complementarity assumption of fixed-coefficients models and the perfect substitutability assumption made by pure trade theory.

Column four in Table 5.1 gives the share of exports in total domestic output. There are really only 3 sectors that have a substantial export ratio: mining, [2/] textiles and food. Other sectors with an export ratio above 2% are clothing, non-metallic mineral products and metal products. Trade and transportation margins, as well as tourism revenues and revenues from air-travel, lead to significant REX_i ratios also in infrastructure and services. It is striking how low the export ratio is in most manufacturing sectors. If one excludes food, clothing and textiles, the export ratio in manufacturing averages to only 1%! The bulk of Turkish exports still consists of only lightly processed agricultural products: tobacco, hazelnuts, dried fruit, ginned cotton, cotton cloth and, in recent years, wheat. To this must be added a small amount of mineral products; principally raw borates and chromium.

1/ See, for instance

2/ Excludes crude petroleum.

While manufactured exports remain insignificant, they showed the first signs of life in the 1970-1973 period with the appearance of exports in clothing, leatherware, cement, building materials, glass and glass products, fabricated metal products and light electrical machinery. With appropriate policy support, these exports could probably have grown rapidly in the 1973-1977 period, taking advantage of the vicinity of the booming Middle Eastern market. Their very small base should also have allowed rapid expansion in the markets of industrialized countries. But in real terms these exports declined over the 1973-1977 period reflecting the increasing overvaluation of the Turkish Lira and the extreme domestic-market orientation of economic policies, relative prices and incentives.

The last column in Table 5.1 presents the assumed export demand elasticities for all sectors except agriculture, mining and textiles where it was preferable to make the small country assumption, Turkey essentially being a price taker for such homogenous products as cotton, wheat and mining products that dominate trade in these sectors. All other elasticities were set equal to 2, which reflects an intermediate position between the extreme elasticity pessimism common in Turkey and the more optimistic view of many outside researchers such as Krueger. It should also be emphasized that these elasticities are short to medium-term elasticities. Truly long-run elasticities should probably be set higher.

5.3 Growth and Industrial Structure Under Alternative Trade Exchange Rate, and Investment Policies

Table 5.2 presents changes in sectoral prices, net prices (value-added prices), wages and profit rates that generate the important resource pulls

Table 5.2: RATIOS TO THE BASIC-RUN VALUES OF DOMESTIC PRICES, NET PRICES, WAGES, AND PROFIT RATES IN 1983

	Experiment B-1 Devaluation Only				Experiment B-2 Policy Package			
	Domestic Price PD_i	Net Price PN_i	Wage	Profit Rate R_i	Domestic Price PD_i	Net Price PN_i	Wage	Profit Rate R_i
	(Percent)							
1. Agriculture	110.1	115.9	120.0	135.4	107.8	112.9	116.8	127.5
2. Mining	82.6	94.2	100.2	106.6	83.8	94.9	99.8	108.2
3. Food	107.4	118.7	106.0	147.5	106.0	116.9	106.6	140.1
4. Textiles	84.3	110.0	105.5	159.2	83.3	110.5	106.1	151.3
5. Clothing	102.8	112.9	113.9	141.5	103.6	115.5	116.5	142.6
6. Wood & wood products	105.9	112.5	114.1	135.1	105.7	115.3	116.5	136.4
7. Paper and printing	93.9	89.8	106.1	100.7	94.1	89.7	106.8	97.0
8. Chemicals	64.7	37.2	101.6	33.2	66.4	40.1	101.5	35.6
9. Rubber and plastics	84.2	76.9	107.9	76.3	85.2	78.4	109.0	76.3
10. Petroleum & pet. prod.	88.1	76.8	100.2	94.5	90.6	79.7	99.8	95.1
11. Non-met. min. prod.	98.8	104.8	104.6	133.7	100.5	108.3	105.1	138.4
12. Basic metals	70.2	54.5	100.2	53.1	74.6	61.4	99.8	61.1
13. Metal products	83.3	99.1	112.3	118.0	85.9	100.3	114.4	115.8
14. Non-electric machinery	68.2	41.9	106.8	41.5	73.0	50.4	107.6	51.5
15. Electric machinery	75.6	63.9	108.4	63.4	78.9	68.9	109.6	68.8
16. Transp. equipment	86.1	81.1	109.6	87.7	88.9	85.2	111.2	91.8
17. Construction	92.4	98.5	100.2	125.8	95.3	102.7	99.8	134.5
18. Infrastructure	99.9	101.2	100.2	119.6	99.5	98.0	99.8	110.7
19. Services	101.9	102.1	109.8	114.1	101.7	102.0	113.3	109.6

in the TGT model. Taking the basic run values as 100.0, the Table presents changes in these values due to experiments B-1 (devaluation only) and the policy package experiment B-2 (devaluation complemented by export subsidies and an investment drive financed by taxes on capital income).

Compare first the basic-run constant price-deflated exchange-rate scenario to experiment B-1 characterized by a substantial real devaluation and a continued high exchange rate policy. Both scenarios are characterized by a moderately rising nominal investment rate that increases from about 21.5% in 1978 to 23.5% in 1983. Note, however, that real capital accumulation is significantly higher in experiment B-2 due largely to a decline in the average cost of capital goods allowed by the relaxation of import constraints.

The sectors that clearly gain from a "pure" devaluation policy are the export oriented light manufacturing sectors as well as agriculture and mining. On the other hand, basic intermediates and capital goods sectors are adversely affected by the higher exchange rate policies--particularly chemicals, basic metals and machinery. The greater availability of imports diminishes the need for these three sectors to produce high-cost import substitutes and the resources attracted to the basic industries under tight import rationing are released into the more export-oriented light manufacturing activities. Note that the policy package (B-2) to some extent counteracts this tendency and raises the prices and relative profitabilities of basic industries.

The mechanism at work in these experiments is very different from the mechanism stressed by pure trade-theory models that assume free convertibility. As discussed above, the analysis of devaluation under conditions

of exchange control is quite different from the usual analysis that argues that all sectors producing tradeables will be positively affected by a devaluation. In the TGT model the mechanism at work correctly reflects the dilemma perceived in Turkey: a high exchange rate policy that stimulates exports and overcomes the foreign exchange constraint does lead to negative resource pulls affecting basic intermediates and capital-goods sectors and also to a pattern of growth that does not reflect the Turkish desire to deepen the industrialization process.

Table 5.3 describes sectoral growth and economic structure under the three alternative scenarios. Total gross output grows at 5.9% in the basic run (reflecting an inward-looking, import-substitution-biased growth strategy), at 7.2% with the high exchange rate policy and at 7.5% when the high exchange rate policy is complemented by an investment and manufactured exports oriented policy package. Note that while the differences in growth rates are substantial, 5 years is too short a period for them to really have an impact on the structure of output. Table 5.4 summarizes the growth of sectoral export earnings in current dollars and emphasizes why a major devaluation is considered necessary in the first place.

Let us again start by comparing the basic run with pure devaluation experiment. The sectors that gain and lose from a high exchange rate policy are grouped and ranked by the absolute value of average output growth differential from the Basic Run in Table 5.5 below.

There is not a one-to-one correspondence between Table 5.2 on the one hand and Tables 5.3 and 5.5 on the other. Several other factors, notably changes in capacity utilization are at work besides prices and profit rates. The sectors that grow faster include not only

Table 5.3

Sectoral Growth and Structure

	Annual Growth Rates 1978-83			Structure of Output, 1983		
	Constant PLD-ER Base Run	High Exchange Rate B-1	Policy Package B-2	Constant PLD-ER Base Run	High Exchange Rate B-1	Policy Package B-2
1. Agricuture	4.6%	5.5%	5.4%	19.1%	18.7%	18.5%
2. Mining	8.2	9.3	10.0	1.0	1.0	1.0
3. Food	5.7	9.0	9.0	8.4	9.2	9.1
4. Textiles	4.7	10.4	10.2	4.3	5.2	5.2
5. Clothing	7.0	10.1	10.5	2.1	2.2	2.3
6. Wood & Wood Products	5.6	7.0	7.7	1.3	1.3	1.3
7. Paper & Printing	6.7	6.5	6.7	1.1	1.0	1.0
8. Chemicals	10.3	5.7	6.5	2.9	2.2	2.3
9. Rubber & Plastics	7.5	5.9	6.3	1.2	1.0	1.0
10. Petroleum & Pet. Prod.	10.0	13.2	13.4	3.9	4.2	4.2
11. Non-Met. Min. Prod.	5.7	8.1	9.0	1.2	1.3	1.4
12. Basic Metals	9.8	7.4	8.8	4.2	3.6	3.8
13. Metal Products	5.1	6.7	6.8	1.1	1.2	1.1
14. Non-Elec. Machinery	10.7	5.7	7.8	3.1	2.4	2.5
15. Elec. Machinery	9.0	5.7	7.0	1.3	1.1	1.1
16. Transp. Equipment	8.3	7.6	8.7	3.0	2.8	2.9
17. Construction	5.3	8.6	10.3	5.4	6.0	6.4
18. Infrastructure	7.4	9.4	9.5	12.8	13.2	13.0
19. Services	6.8	7.4	7.3	22.6	22.4	22.0
Average	5.9	7.2	7.5	100.0	100.0	100.0

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Sectoral Growth and Structure

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	Constant PLD-ER Base Run	High Exchange Rate B-1	Policy Package B-2	Constant PLD-ER Base Run	High Exchange Rate B-1	Policy Package B-2
1. Agricuture	4.6%	5.5%	5.4%	19.1%	18.7%	18.5%
2. Mining	8.2	9.3	10.0	1.0	1.0	1.0
3. Food	5.7	9.0	9.0	8.4	9.2	9.1
4. Textiles	4.7	10.4	10.2	4.3	5.2	5.2
5. Clothing	7.0	10.1	10.5	2.1	2.2	2.3
6. Wood & Wood Products	5.6	7.0	7.7	1.3	1.3	1.3
7. Paper & Printing	6.7	6.5	6.7	1.1	1.0	1.0
8. Chemicals	10.3	5.7	6.5	2.9	2.2	2.3
9. Rubber & Plastics	7.5	5.9	6.3	1.2	1.0	1.0
10. Petroleum & Pet. Prod.	10.0	13.2	13.4	3.9	4.2	4.2
11. Non-Met. Min. Prod.	5.7	8.1	9.0	1.2	1.3	1.4
12. Basic Metals	9.8	7.4	8.8	4.2	3.6	3.8
13. Metal Products	5.1	6.7	6.8	1.1	1.2	1.1
14. Non-Elec. Machinery	10.7	5.7	7.8	3.1	2.4	2.5
15. Elec. Machinery	9.0	5.7	7.0	1.3	1.1	1.1
16. Transp. Equipment	8.3	7.6	8.7	3.0	2.8	2.9
17. Construction	5.3	8.6	10.3	5.4	6.0	6.4
18. Infrastructure	7.4	9.4	9.5	12.8	13.2	13.0
19. Services	6.8	7.4	7.3	22.6	22.4	22.0
Average	5.9	7.2	7.5	100.0	100.0	100.0

Table 5.5: THE SECTORAL IMPACT OF EXCHANGE RATE POLICY (B-1): GAINERS AND LOSERS (in decreasing order)

Sectors that grow faster than in Basic Run	Sectors that grow more slowly than in Basic Run
Textiles	Non-electrical machinery
Food products	Chemicals
Construction	Electrical machinery
Petroleum & petroleum products	Rubber and plastics
Clothing	Basic metals
Non-metallic mineral products	Transport equipment
Wood and wood products	Paper and printing
Infrastructure	
Metal products	
Services	
Mining	
Agriculture	

all the export-oriented sectors but also construction, petroleum and petroleum products and, less importantly, infrastructure and services. The sectors that grow more slowly constitute a more homogenous group: they are the import-substituting sectors for which rationing creates the greatest excess demand. But they are also the technologically more advanced manufacturing sectors and it is their rapid development that is taken to reflect deepening of the industrialization process and constitutes a major objective of Turkish development policy.

It is therefore clear that a successful devaluation alone cannot be regarded as an optimal policy. It does lead to export expansion, it does overcome the foreign exchange gap and it does lead to rapid economy-wide growth but at the expense of a slowdown in the development of the basic intermediates and capital goods industries. While in the short-run, Turkey may not have much choice given the absolutely overriding need to expand exports, it appears that a high-exchange-rate policy, undertaken on its own, does not constitute an acceptable solution to Turkey's problems.

The third scenario (experiment B-2) reflects the search for a better policy package that reconciles the need for expanding export earnings with the desire to emphasize development of the basic intermediates and capital-goods sectors. While experiment B-1 only assumes a high-exchange-rate policy, the "policy package" experiment B-2, complements higher exchange rates with a 50% increase in the subsidies accorded to non-traditional exports and a significant investment drive that raises the investment rate from a terminal year value of about 23.5% in the basic run and experiment B-1, to 25.6% in experiment B-2.

As can be observed in Table 5.3, relative to the high-exchange-rate policy alone, output grows faster with the policy package in all sectors except agriculture, food, textiles and services. The growth differential is substantial in mining, chemicals, non-metallic mineral products, basic metals, machinery, transport equipment and construction. Thus in basic metals the average annual growth rate goes up from 7.4% to 8.8%. In non-electrical machinery it goes up from 5.7% to 7.8%. These are not average rates that are as high as the ones projected by the basic run, but they are significant

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Table 5.6: COMPARISON OF SECTORAL OUTPUT GROWTH RATES IN 1983

	Base run Output	B-1 Output	B-2 Output	Base Rank	B-1 Rank	B-2 Rank
1. Agriculture	4.9%	5.8%	5.8%	19	17	19
2. Mining	8.6	9.4	10.5	5	4	3
3. Food	5.9	9.0	7.9	16	7	12
4. Textiles	5.1	10.1	9.2	18	2	9
5. Clothing	7.1	9.0	10.0	10	7	5
6. Wood & wood products	6.3	6.9	7.7	15	14	13
7. Paper and printing	7.1	7.1	7.2	10	13	17
8. Chemicals	10.1	5.6	6.8	2	18	18
9. Rubber and plastics	8.1	6.7	7.6	9	15	15
10. Petroleum & pet. prod.	11.8	14.4	14.7	1	1	1
11. Non-met. min. prod.	6.6	9.3	9.8	13	5	6
12. Basic metals	9.5	7.6	9.5	4	10	7
13. Metal products	5.2	7.3	7.6	17	12	15
14. Non-electric machinery	9.7	5.4	8.2	3	19	10
15. Electric machinery	8.5	6.2	8.0	6	16	11
16. Transp. equipment	8.4	8.1	9.4	7	9	8
17. Construction	6.7	9.2	11.1	12	6	2
18. Infrastructure	8.2	10.1	10.1	8	2	4
19. Services	6.5	7.6	7.6	14	10	15
Total	7.0	8.1	8.5			

that merchandise exports in 1983 would have reached 7.4 billion dollars instead of 4.8, the debt-service ratio would be 24% instead of 32% and GDP would be 11.4% higher in real terms! With the policy package (B-2), total consumption would have to be 1.7% lower than with pure devaluation policy (B-1), but it would still be 1.6% higher than in the basic run. Investment would be 7% higher than in experiment B-1 and as much as 27% higher than in the basic run.

The message that emerges from these experiments is relatively clear. If Turkey were to devalue and resolutely start pursuing export-oriented industrial strategy without significantly raising the investment rate and without giving special support to "infant" manufacturing exports, the result would be a growth path biased towards the light manufacturing sectors, agriculture and services. If, on the other hand, Turkey were to raise its investment rate and attempt to achieve rapid growth centered on the advanced industrial sectors without first achieving a real devaluation and a massive increase in exports, the attempt would fail because of the binding foreign—exchange constraint. What is best, therefore, is a mixed strategy. A real devaluation and substantial export-oriented production increases in the light manufacturing sectors where Turkey can be immediately competitive and has a market, are necessary conditions for overcoming the crisis. But, complementing the real devaluation, it is necessary to provide additional subsidies to infant manufactured-exports sectors and, even more importantly, to raise the economy-wide investment rate. A target of 25.5% for 1983 should not be too difficult to achieve. If it can be realized, the initial bias towards light manufacturing activity, that is necessary

at the beginning of the FFYP period, can quickly be overcome and Turkey could enter the Fifth Five-Year Plan period with a healthy base of manufactured exports, ready for rapid and more export-oriented growth in the basic intermediate and more advanced engineering industries.

5.4 Export Expansion, Import Substitution and the Sources of Growth

In this section we continue the analysis of the underlying sectoral developments implied by the various scenario experiments undertaken with the TGT model by decomposing sectoral growth into three components: domestic demand expansion, export growth and import substitution. The decomposition will complement the preceding analysis of sectoral production growth rates and lead to a much more complete view of what is implied by different policies and growth paths.

The general approach was used by Chenery, Shishido and Watanabe (1962) in their analysis of Japanese growth and the decomposition measures have been further refined by Syrquin (1976). The decomposition measures start from the material-balance equations of the input-output system and then derive the expression for changes in sectoral output as a function of changes in the various components of demand.

In the TGT model, the material-balance equations for the supply of and demand for domestically produced goods can be written as:

$$X_i = \mu_i(F_i + W_i) + E_i$$

where X_i = domestic production in sector i,

μ_i = ratio of domestic goods to composite goods

F_i = final domestic use demand for composite goods

W_i = intermediate domestic use demand for the composite goods

E_i = export demand for the domestically produced commodity

Since, in the model, the composite goods (F_i and W_i) are CES aggregations of domestic and imported goods, the ratios μ_i are functions of the parameters of the aggregation function and of the ratio of the import price to the domestic-good price in each sector.

Intermediate demands are determined by fixed input-output coefficients, a_{ij}. In matrix notation, the material-balance equation can thus be written:

$$X = (I - \hat{u}A)^{-1} (\hat{u}F + E)$$

where $\hat{u}$ is a diagonal matrix of the μ_i ratios, A is the matrix of input-output coefficients, and X, D, and E are vectors. The matrix $\hat{u}A$ is the matrix of domestic-goods input-output coefficients.

Denoting the change in a variable by Δ [$\Delta X = X(t+1) - X(t)$], the change in total domestic demand can be written (after some algebraic manipulation) as:

$$\begin{aligned} \Delta X = \quad & R\hat{u}(\Delta F) && \text{domestic demand expansion} \\ & + R(\Delta E) && \text{export expansion} \\ & + R(\Delta\hat{u})(F + W) && \text{import substitution} \\ & + R\hat{u}(\Delta A)X && \text{change in input-output coefficients} \end{aligned}$$

where $R = (I - \hat{u}A)^{-1}$

This equation gives the basic decomposition of the change in sectoral output into different sources (i.e., ΔF, ΔE, $\Delta\hat{u}$, and ΔA). In the TGT model, input-output coefficients are assumed to remain constant, so the

last term will always be zero. Sectoral growth is thus allocated among three sources: domestic demand expansion, export expansion, and import substitution.

A few points are worth noting about the decomposition equation. Import substitution is defined sectorally as arising from changes in the ratio of imports to total composite-good demand. The aggregate contribution of import substitution to growth is thus sensitive to the level of sectoral disaggregation. For example, it is possible to have positive import substitution in every sector, but have the ratio of total imports to total composite-goods demand increase because of changes in the sectoral composition of demand. Second, each term in the decomposition equation is pre-multiplied by the inverse of the matrix of domestic input-output coefficients. It therefore measures both the direct and indirect impact on total output of each effect, taking account of the indirect linkages through induced intermediate demands. Note also that there is an index-number problem implicit in the decomposition equation because the decomposition can be defined using the combinations of initial and terminal year weights which are analogous to Paasche and Laspeyres price indices. In the tables below, both indices have been separately computed for the decomposition in each period and the averages of the two results are presented.

When evaluating the decomposition measures derived from the TGT model for Turkey, it is important to be able to place them in a wider context and to compare our projections to the experience of other countries as well as to the performance of Turkey in the past.

Table 5.7 presents the percentage decomposition by different sources of aggregate growth (obtained by summing algebraically over the sectoral changes) for five countries: Japan, Korea, Norway, Taiwan, and Turkey. The countries are part of a group being studied in a World Bank research project and represent all of the countries for which the decomposition has been done so far. Unfortunately, they are not a very representative collection of countries.[1/] With the exception of Turkey, they have all followed an open development strategy with exports being very important. In spite of the rather special nature of the sample it is useful to take Table 5.7 as a point of reference. It is particularly interesting to compare our projections for the FFYP period to Turkey's performance in the past.

Unfortunately the Turkish data start from 1958. Indications are that import substitution was very important during the years of tight rationing between 1953 and 1958.[2/] It seems clear that there has been a definite cyclical sequence in the post-war period in Turkey. There was substantial import substitution in 1953-58. In the 1958-63 period, the contribution of import substitution to growth was negative, indicating that import coefficients actually rose after the 1958 devaluation. In the 1963-68 period, when there was significant rationing of imports, the contribution of import substitution to growth was positive and much larger than that of export

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1/ The other countries in the project (Mexico, Colombia, and tentatively, Yugoslavia) would provide a wider basis for comparison. Unfortunately, the data construction for these countries is not yet completed.

2/ See Krueger (1974).

Table 5.7

Selected Countries,
Decomposition of Aggregate Growth,
Percentage Composition By Source

Country	Period	Domestic demand expansion	Export expansion	Import substitution	Input-Output coefficient change
Japan:	1955-70	85.4%	13.9%	-3.1%	3.8%
Korea:	1955-63	74.5	10.0	21.4	-5.9
	1963-73	67.8	37.7	-2.5	-3.0
Norway:	1953-69	60.0	46.0	-12.3	6.1
Taiwan:	1956-61	54.3	23.9	15.1	6.7
	1961-66	61.3	37.6	-1.1	2.2
Turkey:	1958-63	96.3	6.4	-7.5	4.8
	1963-68	83.6	4.9	8.3	3.2
	1968-73	81.8	16.3	-1.4	3.3
	1958-73	85.3	10.5	0.6	3.6

Notes:

Data are from World Bank research project, "A Comparative Study of the Sources of Industrial Growth and Structural Change", (RPO 671-32) the results tabulated are preliminary.

Aggregate percentage contributions are computed by algebraically summing changes in sectoral output and sources of growth over all sectors and then dividing by total change in aggregate output between the two benchmark years.

The 1958-73 results for Turkey are obtained by chaining the results for the three subperiods. A more detailed analysis of the historical trends in Turkey is given by Celasun (1977).

expansion. In the 1968-73 period, the role of exports increased and again the contribution of import substitution was negative (but small). While the benchmark years in our data are 1968 and 1973, the actual turning points are closer to 1970 and 1977.

It is somewhat surprising, given Turkey's consistent and strongly inward-oriented development strategy, that the relative contribution of import substitution has not been very great in any of the subperiods. Over the whole 1958-1973 period, it turns out to be negligible. But the end-points for this period are very special years with 1958 representing the peak of a foreign exchange crisis and a very low level of imports and 1973, on the contrary, being the only year in the last two decades in which Turkey accumulated a massive amount of foreign exchange. It is therefore more interesting to focus on the 1963-1968 period characterized by chronic foreign exchange shortage. The contribution of import substitution was 8.3 percent during those years, which is substantial but not enormous. It is a smaller contribution than that experienced by Korea and Taiwan in the late fifties and early sixties.

Historically, the role of exports in growth has also varied. From the end of the war to about 1970, export expansion contributed little to growth. However, the substantial expansion of exports after the exchange rate adjustment in 1970 contributed significantly to aggregate growth. From Table 5.7, export expansion constituted 16.3 percent of total growth in the 1968-73 period, much greater than in any previous subperiod. The rapid expansion of exports in the 1968-73 period seems to indicate that,

with proper policies, exports can play an increasingly important role in generating growth. After 1973, with the drift in incentives against exports discussed earlier, their role diminished. In the 1973-77 basic run of the TGT model (see Table 5.8), their contribution to aggregate growth was even slightly negative.

Table 5.8 presents the decomposition of aggregate growth for the various experiments with the TGT model. In analyzing the forward runs, it is important to be aware of the problems created by choosing different starting points. Since the start of the fourth five-year plan is 1979 and since the 1977-78 results do not vary across the experiments (the alternate policy simulations all start in 1979), we have so far taken 1978 as our base. However, 1978 is far from being a "normal" year. It constitutes the depth of the crisis, with extreme import rationing. Measuring import substitution starting from the extremely low import ratios of 1978 may not be reasonable. The contribution of import substitution to growth in 1977-78 is enormous, while for the 1978-83 period it is very small. This result is to be expected since, given the extreme situation reached in 1978, further import substitution would be very difficult to achieve. For the sources of growth decompositions we have therefore chosen 1977 as our base. One can reasonably argue that the import ratios realized in 1977 reflect "normal" levels. The period from 1974 to 1976 was characterized by abnormally high import levels. In 1977, imports stabilized in real terms. While severe import rationing started in the fall of 1977, the yearly

Table 5.8

TGT Model Experiments,
Decomposition of Aggregate Growth,
Percentage Composition By Source

TGT Model Runs	Period	Domestic demand expansion	Export expansion	Import substitution
Historical Run:	1973-77	100.4	-1.0	0.6
Basic Run:	1977-78	-32.6	36.0	96.6
(Constant	1978-83	69.8	9.9	20.3
PLD-ER)	1977-83	57.4	13.1	29.5
Experiment B-1:	1977-78	-32.6	36.0	96.6
(Devaluation)	1978-83	71.5	29.2	-0.7
	1977-83	61.2	29.9	8.9
Experiment B-2:	1977-78	-32.6	36.0	96.6
(Policy Package)	1978-83	70.1	29.7	0.2
	1977-83	60.2	30.3	9.5

Notes:

The contribution of "input-output coefficient change" is zero by assumption. 1977-83 results are chained from 1977-78 and 1978-83 results.

average import ratios are not extremely low when compared to the 1970-76 averages. Thus 1977 provides a more reasonable base than 1978 from which to measure relative growth contributions.

Table 5.8 gives the decompositions for both the 1977-83 and 1978-83 periods separately. The results for 1977-83 are calculated by chaining the sources-of-growth measures for the two subperiods. We can thus separately consider the "crash" of 1978.

The depth of the crisis is clearly evident in 1978. Domestic demand collapses and, with severe rationing, the squeeze on imports is very severe. The negative contribution of domestic demand expansion to growth in 1977-78 is mostly due to the large decline in aggregate investment (which falls 13 percent in real terms). The direct and indirect effects of this decline are felt strongly in the producer goods sectors. Indeed, construction and non-metallic minerals (cement) decline absolutely. Consumer goods sectors such as food and clothing are much less affected.

After 1978, all the forward runs move onto relatively smooth (but different) paths. In the basic run, the 1978-83 period is characterized by massive import substitution (contributing 20.3 percent to aggregate domestic output change). Considering the entire 1977-83 period, the contribution of import substitution to growth is even higher (29.5 percent). This projected contribution in the basic run is much higher than has previously occurred in Turkey, and is also higher than in any of the other countries in Table 5.8. Only the post-war reconstruction period in Korea exhibited a comparable contribution (21.4 percent).

The high contribution of import substitution to growth which is projected by the basic run underlines the magnitude of implied effort and brings into question the feasibility of achieving the targets and of holding to the modelled policy regime.

On the other hand, both the high-exchange-rate and policy-package experiments (B-1 and B-2) yield reasonable projections of growth contributions. In both experiments, the contribution of import substitution to growth is high (8.9 and 9.5 percent), but is comparable to the contribution in the 1963-68 period. The projected contribution of export expansion (around 30%) is greater than in previous periods in Turkish history, but not unreasonably so and still smaller than the 38 percent achieved by Korea between 1963 and 1973. It does assume a serious re-orientation of policy in favor of exports and a corresponding response on the part of the domestic economy that is greater and much more sustained than that which occurred after the 1970 devaluation.

The discussion in section 5.3 above of changes in the structure of the economy implied by the various forward-running experiments provided some evidence of the "reasonableness" of the various scenarios. To complement the earlier analysis of structural change, we now turn to a discussion of the decomposition of growth contributions at the sectoral level. Table 5.9 presents the percentage composition by source of growth in each of the 19 sectors for the basic run and for experiments B-1 and B-2. In general, the sectoral results from the two experiments are broadly similar to one another and quite different from the basic run.

Table 5.9

TGT Model Experiments, 1977-83
Decomposition at Sectoral Growth
Percentage Composition By Source

Sector	Domestic demand expansion			Export expansion			Import substitution		
	Basic Run	B-1	B-2	Basic Run	B-1	B-2	Basic Run	B-1	B-2
1. Agriculture	76.8	62.2	60.4	15.1	33.5	34.8	8.1	4.3	4.8
2. Mining	27.2	44.9	44.7	20.2	42.2	41.7	52.6	12.9	13.7
3. Food	60.3	37.4	34.4	33.5	61.4	64.1	6.2	1.2	1.5
4. Textiles	51.2	51.1	49.2	33.4	45.9	47.3	15.4	3.0	3.5
5. Clothing	71.6	56.1	50.0	20.5	41.8	47.8	7.9	2.1	2.2
6. Wood & Wood Products	83.3	88.2	87.4	4.2	8.7	9.4	12.5	3.1	3.2
7. Paper & Printing	36.9	56.8	52.1	8.2	25.6	27.5	54.9	17.6	20.4
8. Chemicals	4.1	37.8	32.3	4.5	32.0	32.6	91.4	30.2	35.0
9. Rubber & Plastics	14.7	59.3	54.7	6.7	26.3	27.2	78.6	14.4	18.1
10. Petroleum & Pet Prod	45.8	43.1	42.2	8.8	20.4	21.0	45.4	36.5	36.8
11. Non-Met. Min. Prod.	49.2	63.6	62.6	12.8	28.1	28.9	38.0	8.3	8.5
12. Basic Metals	18.8	55.3	56.4	1.3	16.4	16.1	79.9	28.3	27.5
13. Metal Products	7.6	55.4	48.6	6.9	26.4	30.6	85.5	18.2	20.8
14. Non-Elec. Machinery	5.1	52.2	56.8	0.6	8.4	7.5	94.3	39.4	35.7
15. Elec. Machinery	6.9	69.9	69.2	0.6	3.8	3.6	92.5	26.3	27.2
16. Transp. Equipment	28.5	57.1	58.3	3.2	8.7	8.3	68.3	34.3	33.4
17. Construction	100.0	100.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0
18. Infrastructure	74.8	68.2	67.3	16.0	29.6	30.2	9.2	2.2	2.5
19. Services	77.6	73.0	72.0	11.5	24.1	24.8	10.9	2.8	3.2
Total	57.4	61.2	60.2	13.1	29.9	30.3	29.5	8.9	9.5

Notes: The contribution of "input-output coefficient change" is zero by assumption. Results are chained from 1977-78 and 1978-83 figures.

As noted above, the increasing investment rate implicit in the policy package shows its real effects only at the end of the planning period. Over the 1977-1983 period as a whole, experiments B-1 and B-2 give quite similar results.

Compared to the basic run, the higher exchange rate in both experiments leads to an increase in the relative contribution of export expansion to growth and a decrease in the relative contribution of import substitution in every sector. The changes in the relative role of domestic demand expansion vary across sectors. The sectors for which the relative contribution of domestic demand expansion decreases the most compared to the basic run are the major export sectors: agriculture, food products, clothing and textiles. On the other hand, those sectors for which the relative contribution of domestic demand expansion increase the most are the large import-substitution sectors: machinery (both electric and non-electric), metal products, basic metals, chemicals, and rubber & plastics. Note that this implies that while Turkey produces less basic industrial products after devaluation it uses more of them. This point can easily be overlooked when looking at production growth rates alone.

Since Table 5.9 gives only the relative contributions of the separate effects in each sector, it cannot tell much about the intersectoral linkages at work and the actual magnitudes of the different effects in each sector. It is thus useful to consider the contributions of the different effects on the change in physical output by sectors. We have selected eight particularly interesting sectors to analyze: processed

food, textiles, chemicals, basic metals, metal products, non-electrical machinery, electrical machinery, and transport equipment.[1/] Figures 5.1 to 5.8 present the total output change in each of these sectors for the basic run and for the experiments, and its decomposition into changes due to domestic demand expansion, export expansion and import substitution.[2/]

Processed food and textiles include the bulk of Turkish exports and, no matter what happens in other sectors, they will continue to dominate exports for the coming five years simply by virtue of their large initial base. Together, they account for about two thirds of total merchandise exports in 1977.[3/] From Figures 5.1 and 5.2 it is clear that there is a substantial impact of the real devaluation on both sectors. In the case of food processing, the change is due entirely to export expansion while, for textiles, the change is due both to export expansion and domestic demand expansion. Import substitution is very small in both sectors.

The reason for the different impact of domestic demand expansion in the two sectors can be deduced from an examination of the behavior of prices in the two sectors (given in Table 5.3 above). While net prices rise in both sectors (compared to the basic run), the gross domestic price actually falls in the textiles sector. The fall in domestic price induces an increase in domestic demand and hence a significant contribution of

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1/ We do not here include petroleum and petroleum products because so much depends on the growth potential for local production of crude and we do not feel qualified to discuss this.

2/ When looking at the figures it is important to note that the scale is specific to each sector.

3/ Note that the sectors include ginned cotton and tobacco products.

FIGURE 5.1

FOOD PROCESSING

1977-83

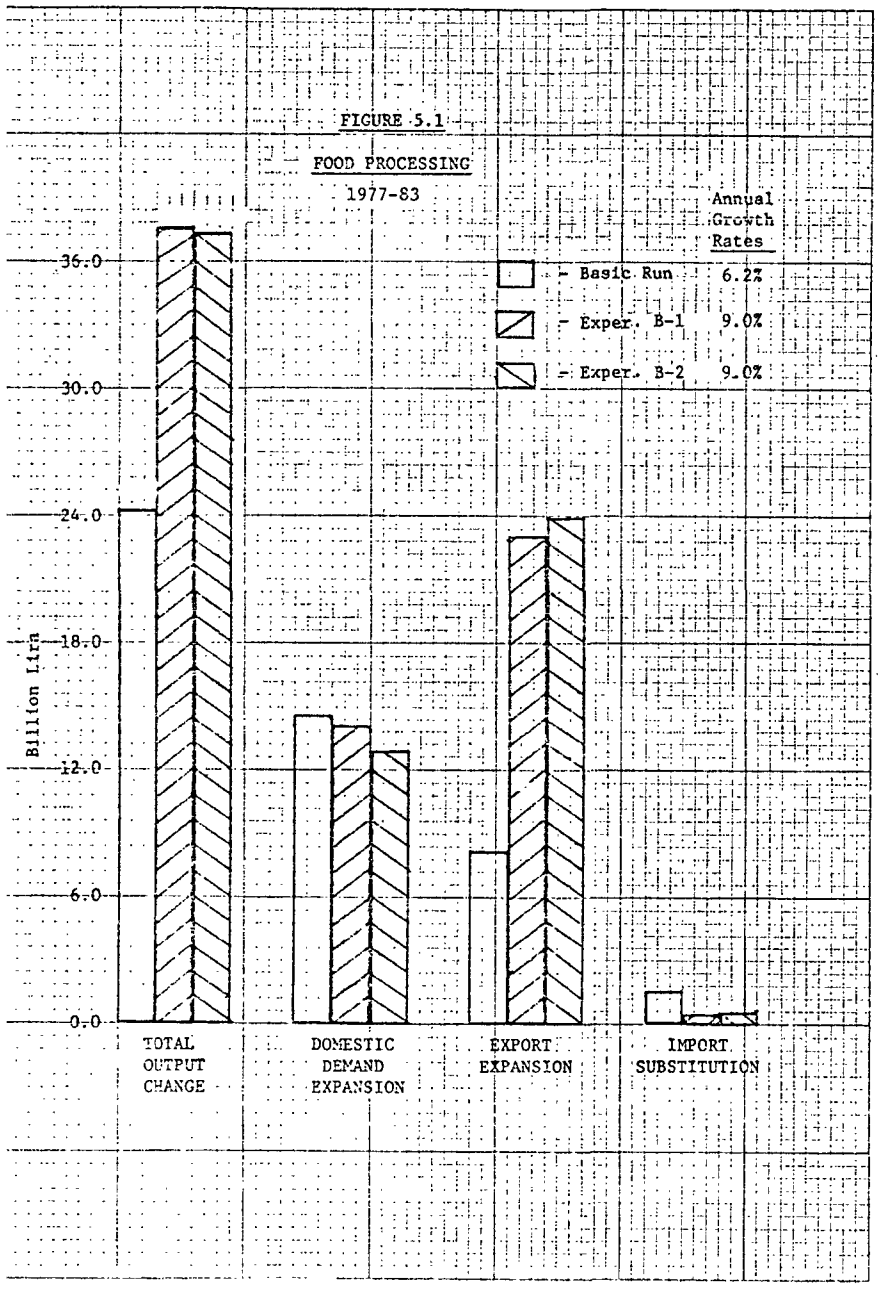
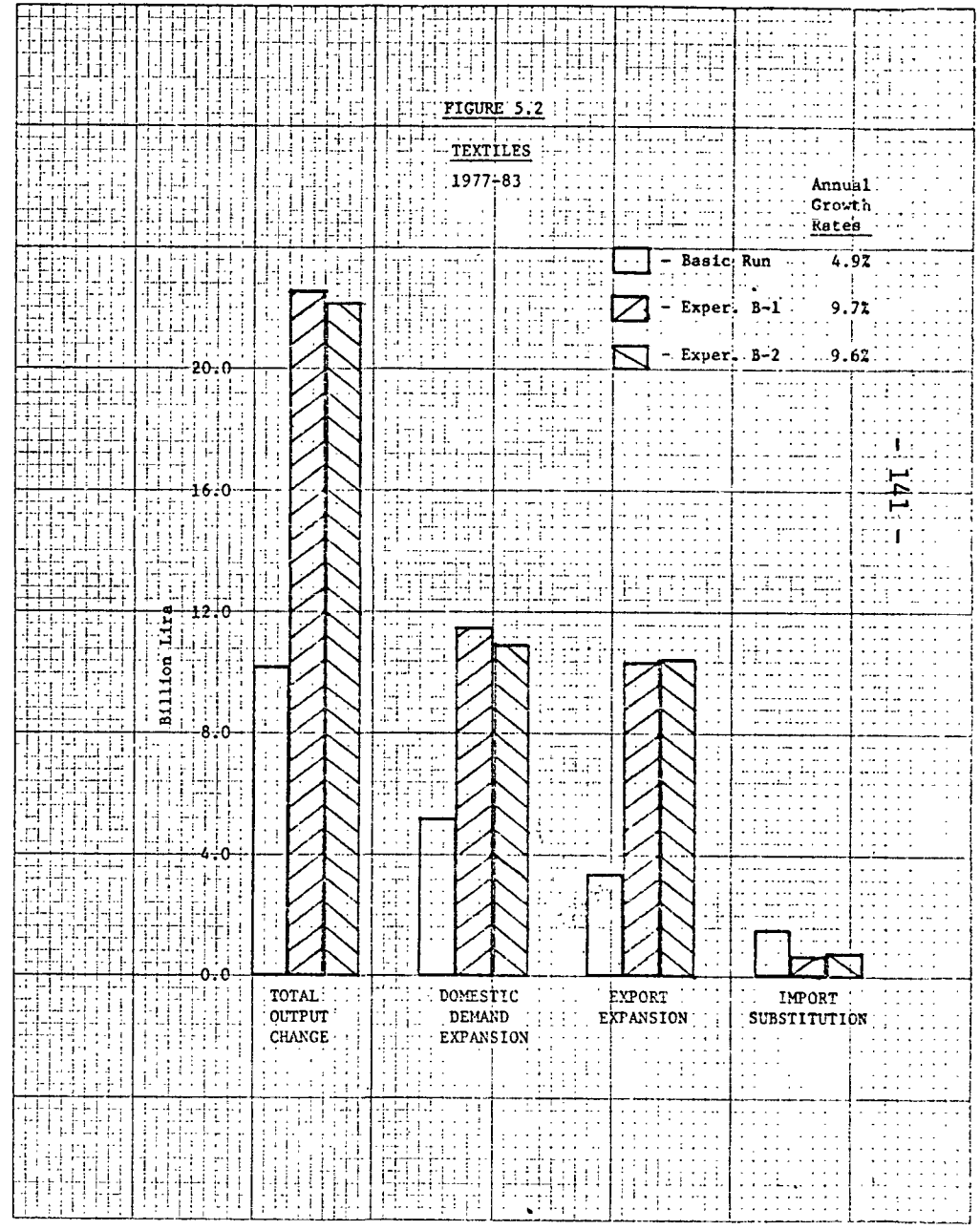


FIGURE 5.2

TEXTILES

1977-83



domestic demand expansion to growth in textiles. One of the reasons that the textile sector exhibits both a fall in domestic price and a rise in net price is that the net price is a weighted average of net receipts from both domestic and export sales. In the case of textiles, the world price is assumed not to be affected by the volume of Turkish exports. Thus, after the devaluation, the export price remains fixed at the higher level and the net price rises even though the domestic price falls. In the case of processed food, the export price is sensitive to the volume of Turkish exports and so the domestic and export prices are more closely linked. Another factor explaining the behavior of textiles is the price of chemicals which provide important intermediate inputs into textiles. The cost of chemicals declines when import rationing is relaxed, positively affecting the net price of textiles.

It is also important to note that in both textiles and food processing, exports expand through increases in production and not through squeezing domestic demand. In food processing, domestic demand does decline, but only marginally. In textiles, as already noted, it actually expands. It is therefore clear that the resources that make this possible must either have been "created" (increases in efficiency, capacity utilization and investment) or they must have been attracted from other sectors.

Figure 5.3 presents the growth decomposition for the chemicals sector, one of the most interesting import-dependent sectors in the Turkish economy. First consider the basic run with a constant price-deflated

FIGURE 5.3

CHEMICALS

1977-83

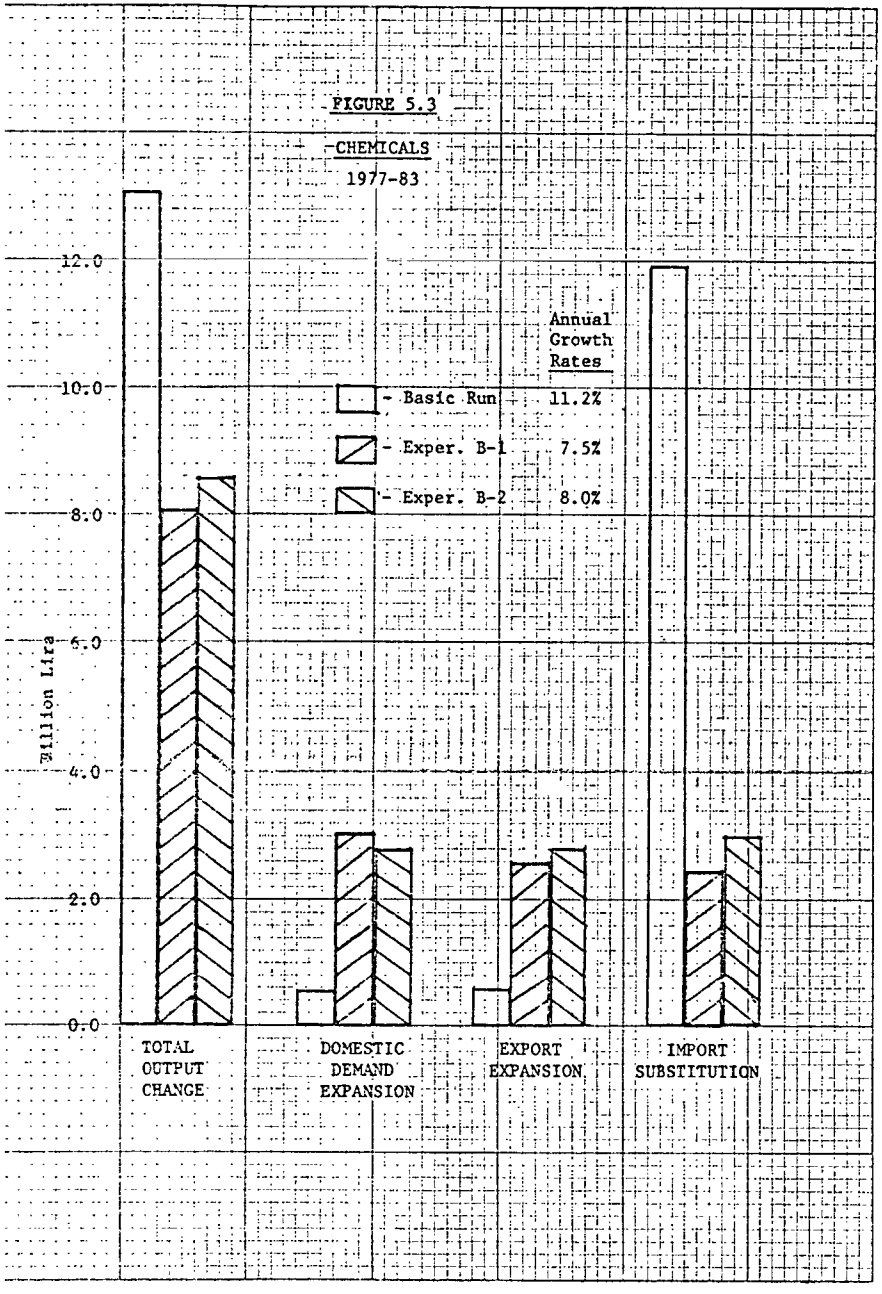
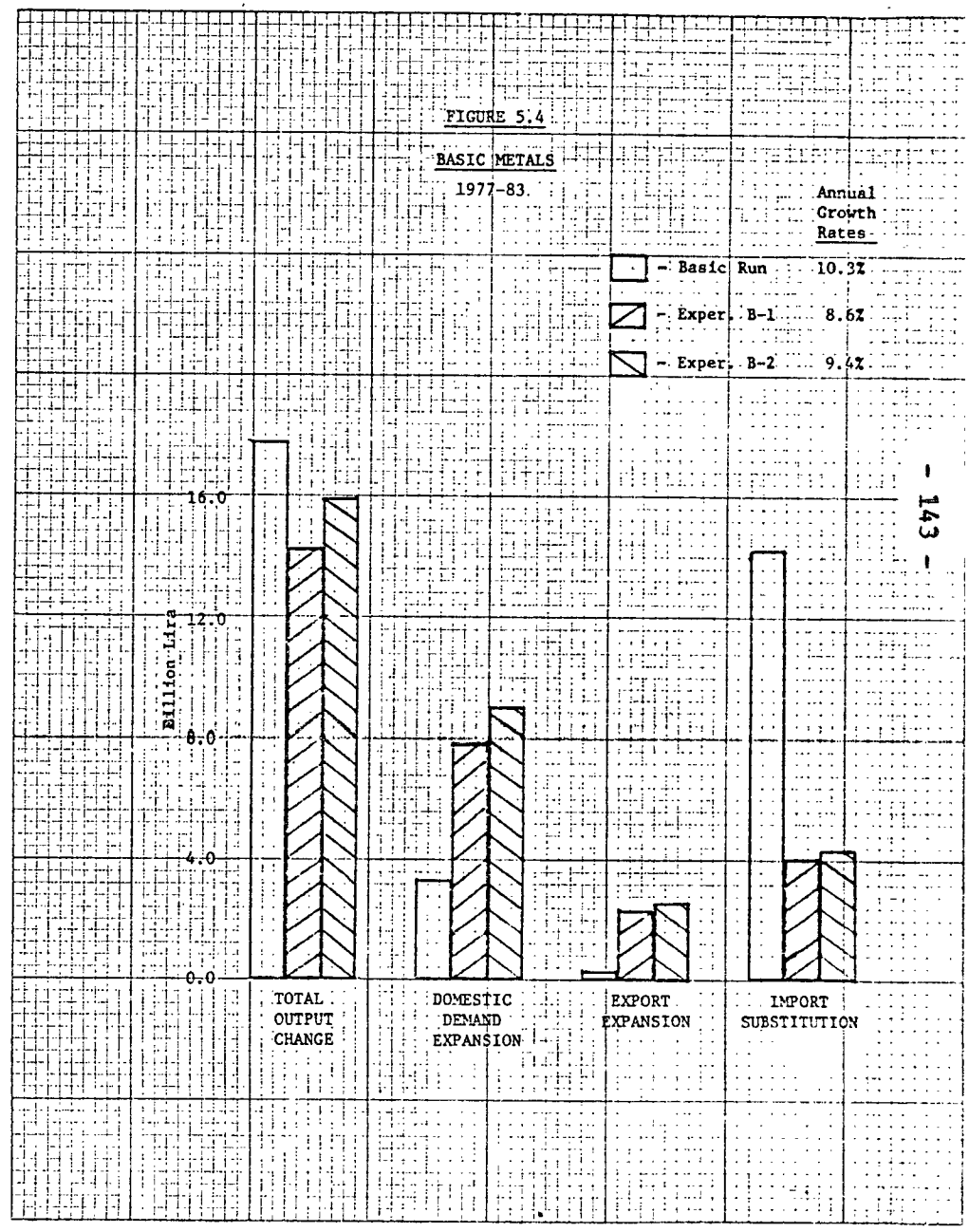


FIGURE 5.4

BASIC METALS

1977-83



exchange rate scenario. Growth is very rapid, but it is almost entirely due to import substitution. Historically, chemicals has been a sector in which the import ratio has steadily increased. To assume that it could decline dramatically over the next five years may well be overstating the adaptability of the sector. Fertilizers constitute an important part of chemicals and the kind of import substitution projected by the basic run would imply dramatic increases in fertilizer production. It is true that a lot of capacity is presently idle but whether such increases are feasible must be judged by a more detailed examination of the sector than is possible here. The basic-run numbers do seem unrealistically high.

With higher real exchange rates, the situation is quite different in experiments B-1 and B-2. Total growth is roughly evenly distributed among domestic demand expansion, export expansion, and import substitution. The total projected change in sectoral output is also much smaller. The two high-exchange rate scenarios thus seem much more realistic. Note that export expansion can be significant for chemicals with the appropriate trade policies. Chemicals is a large and diversified sector dominated by high-cost import substituting activities. However, it also contains subsectors processing low-cost domestic minerals that may provide a base for future export expansion.1/

1/ Raw borates, for example, are in plentiful supply in Turkey and could, with increasing degrees of domestic processing, lead to significant exports from the chemicals sector.

With chemicals, basic metals is the most important import-substituting, intermediate-goods-producing sector. Figure 5.4 shows the impact of the experiments on the sector. The story is quite similar to that of chemicals. With a constant price-deflated exchange rate, import substitution is responsible for almost all of total output growth. With high exchange rates, its role diminishes. Note, however, that contrary to chemicals, overall growth does not much decline with higher exchange rates. One of the reasons is that the basic metals sector has very strong forward linkages through intermediate deliveries to a number of sectors: metal products, non-electric machinery, electrical machinery, transport equipment, and construction. The input-output coefficients from basic metals to these sectors are .42, .13, .26, .13, .14 respectively. Chemicals has significant forward linkages only to textiles and rubber & plastics (coefficients of .08 and .20 respectively). Thus, the induced increases in intermediate demand reduce the decline in the price of basic metals.

Figures 5.5 to 5.8 show the impact of the experiments on a number of sectors "downstream" from basic metals. In the case of metal products, the forward linkage from basic metals is so strong that the high exchange rate experiments actually lead to an increase in output, overcoming the negative gross-price effect of the devaluation. In all these "downstream" sectors, import substitution is the most important source of growth in the basic run and is replaced by domestic demand expansion in the high exchange rate experiments.

FIGURE 5.5

METAL PRODUCTS

1977-83

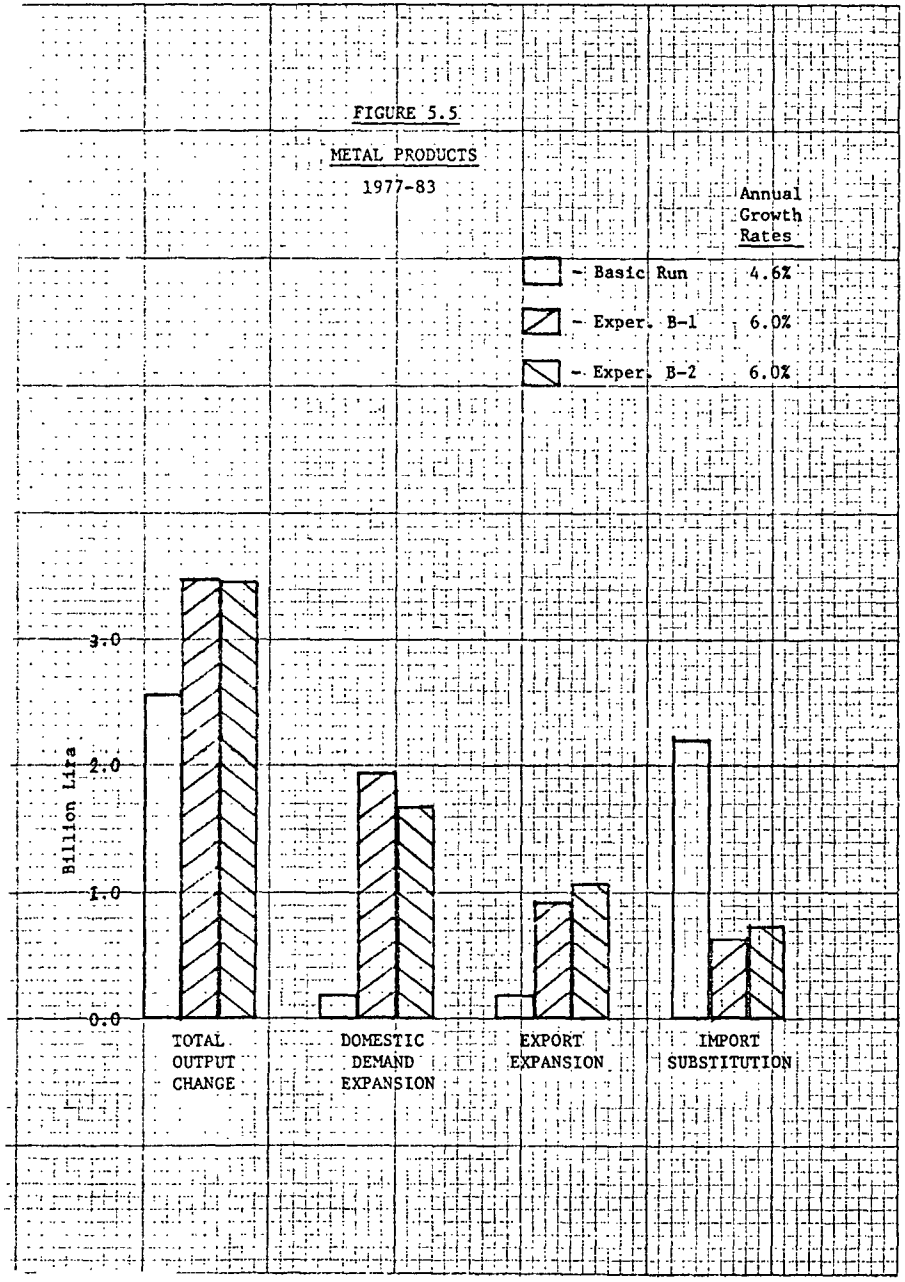


FIGURE 5.6

NON-ELECTRICAL MACHINERY

1977-83

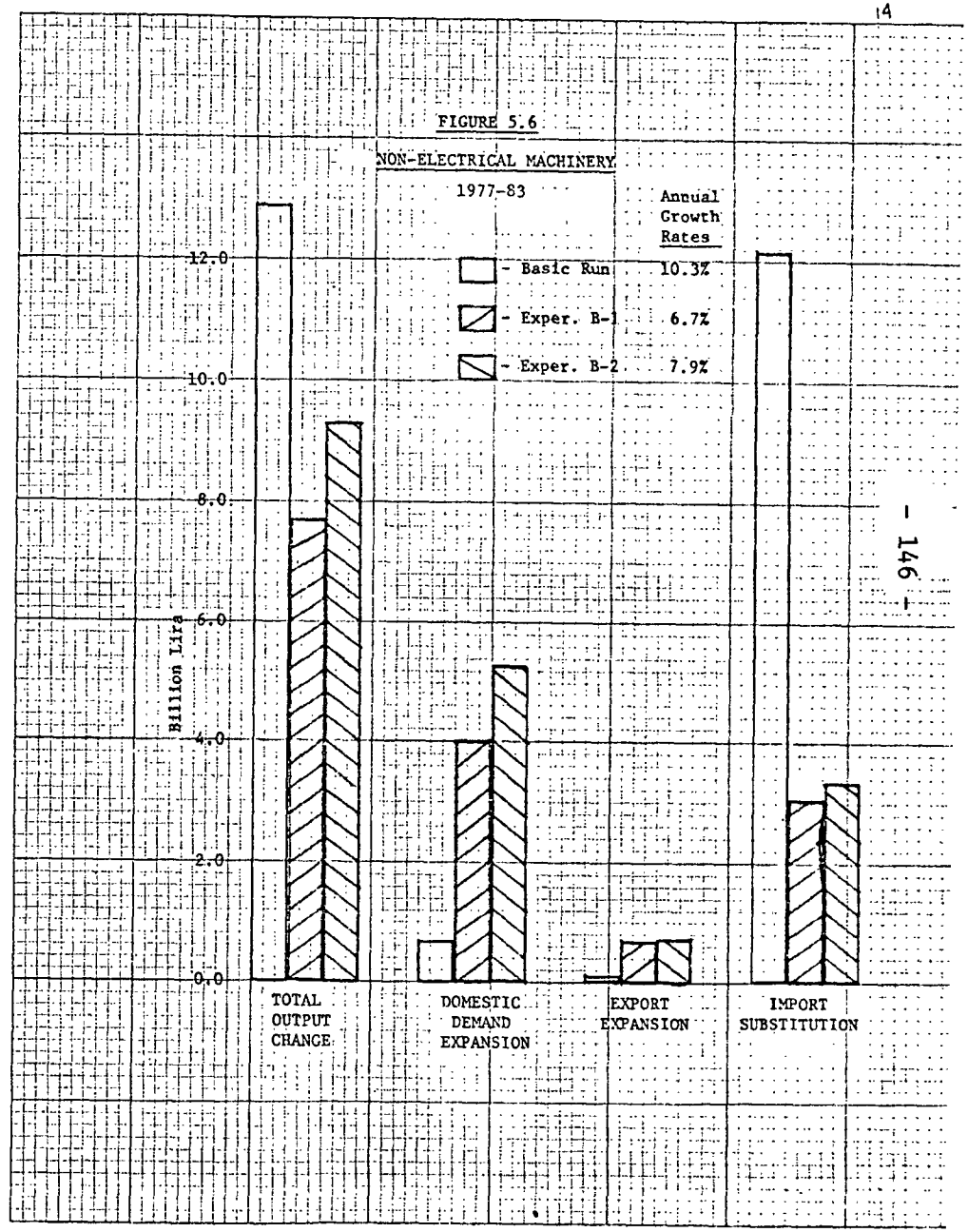


FIGURE 5.7

ELECTRICAL MACHINERY

1977-83

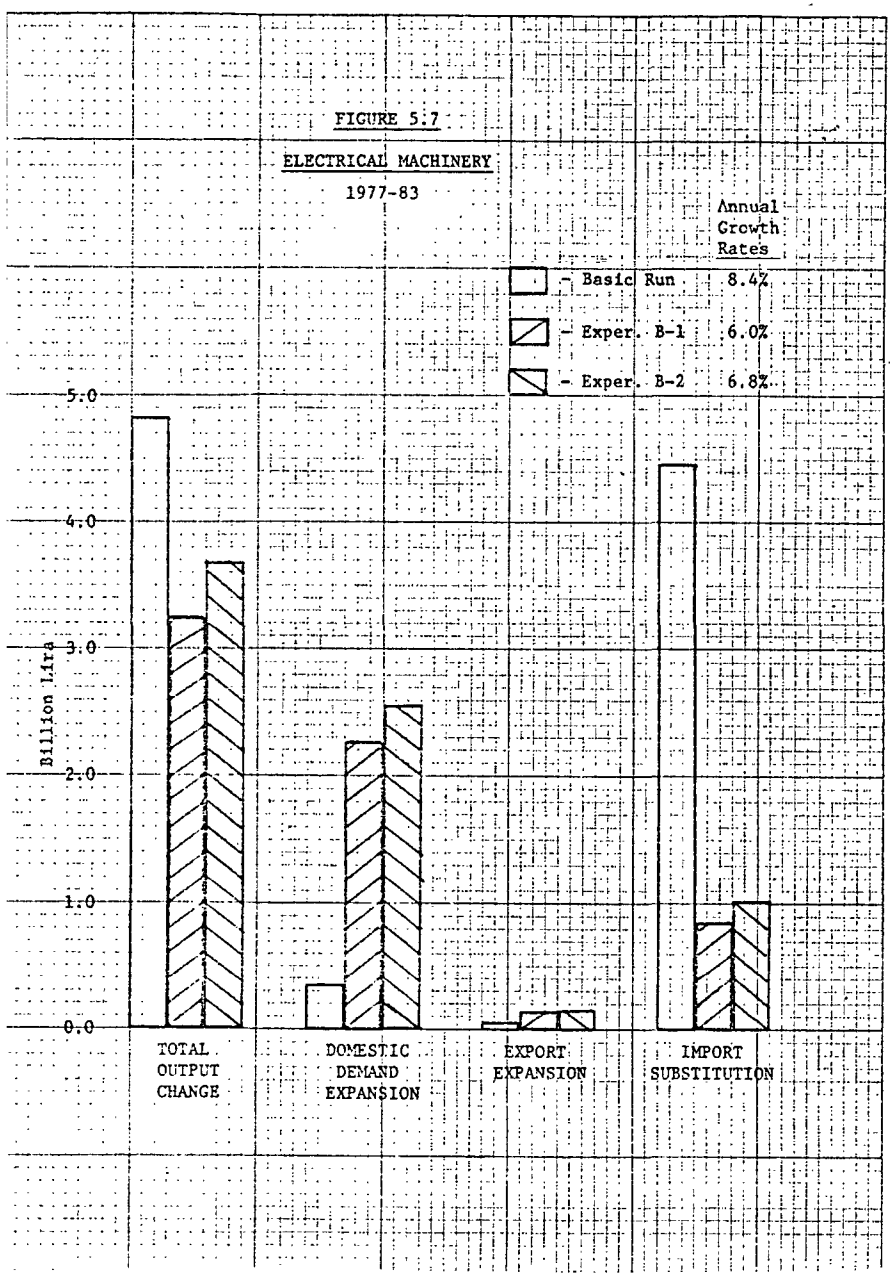
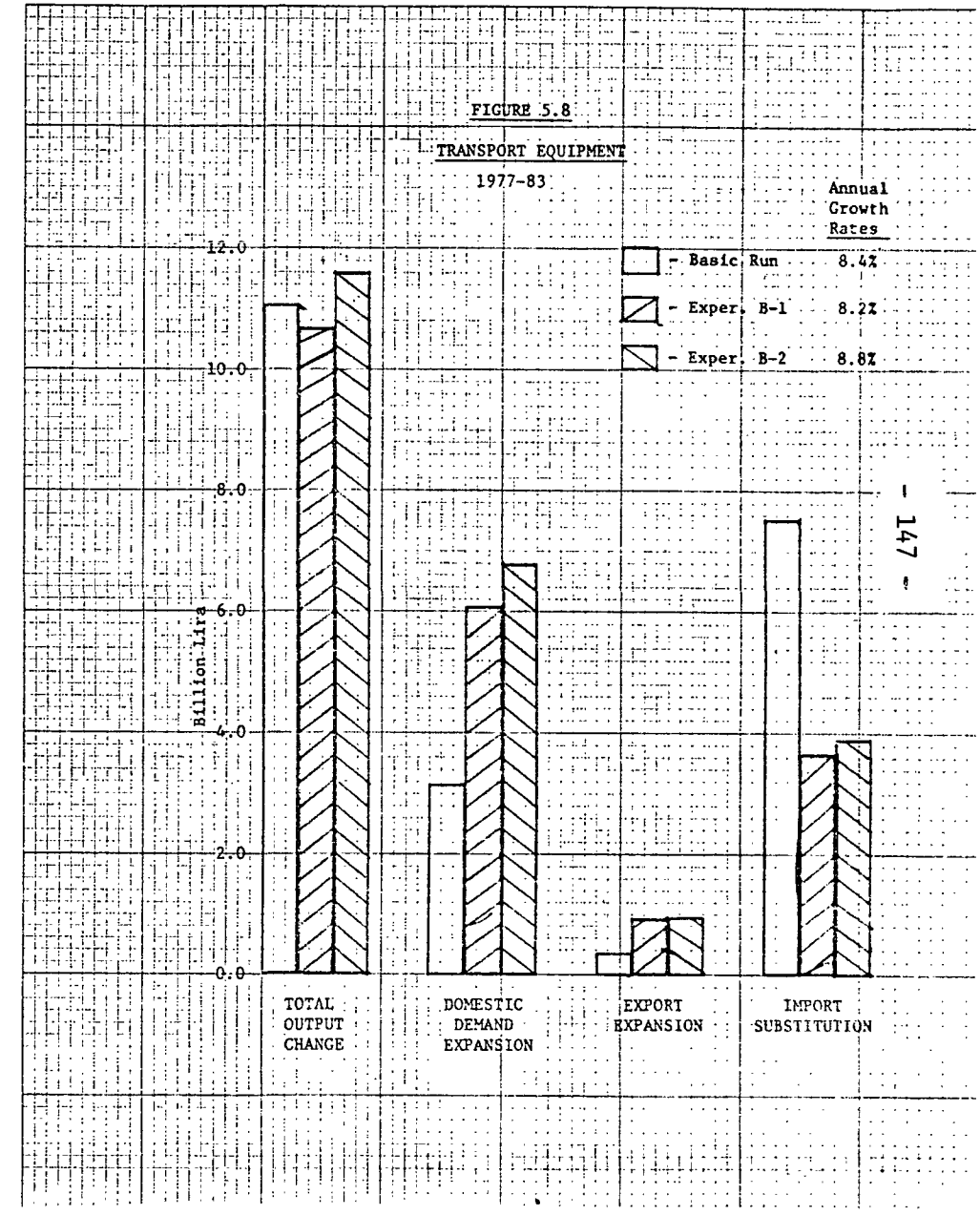


FIGURE 5.8

TRANSPORT EQUIPMENT

1977-83



In the metal products and the electrical and non-electrical machinery sectors, domestic demand expansion is virtually nil in the basic run. This result reflects the substantial decline in real investment that takes place from 1977 to 1979. In the basic run, total fixed investment does not reach its 1977 level before 1982, with obvious consequences for these sectors.

The story that emerges from the analysis of these sectors emphasizes that looking at domestic production growth alone may be misleading. For example, in the chemicals and machinery sectors, the growth of output in the basic run appears very impressive. But one must realize that it is all due to the import squeeze and represents the high-cost production of domestic substitutes. It does not reflect an increased availability of the products to the domestic market -- indeed, quite the contrary. With higher exchange rates and increased foreign exchange earnings, the necessity for import substitution diminishes and total availability of the goods to domestic users increases substantially, at lower cost.

Regarding exports, the analysis of the composition of the sources of growth indicates that, in the next few years, the expansion of non-traditional exports must come primarily from the currently important export sectors: food processing and textiles. The initial base in all other sectors, with the possible exception of clothing and mining, is just too small to allow them to have a substantial impact within the next five years. But the TGT model does project very significant export

expansion in a large number of manufacturing sectors if relative prices and incentives are strongly altered in favor of export activities. As can be seen by referring back to Table 5.4, experiment B-2 projects the highest export growth rates in non-electrical machinery (38.1%), chemicals (37.8%) and electrical machinery (34.1%). While exports from these sectors will still be very small in 1983, their growth rate might be very high. And it is this kind of performance that is needed to create strong confidence both inside and outside the country in Turkey's ability to overcome the crisis, speed up growth and deepen the industrialization process.

6. Conclusion

After two decades of remarkably rapid growth and development, Turkey faces in 1978 a very serious crisis and a difficult challenge. Economic and social change has been very important over the last decades. From an overwhelmingly rural and traditional society, Turkey has become a predominantly urban and industrial economy in a very short period of time. Old values and restraints have crumbled and the demand for a better life style, once restricted to a small elite, has become universal. Given the essentially free and democratic political environment and the extremely competitive nature of the political process, a constant strain on existing resources and capabilities is natural and healthy.

In the last few years, however, the tension has become too great and the gap between expectations and reality, from being a source of dynamism, has become a threat to continued development, social stability and growth. This gap must be narrowed both by scaling down and controlling the extreme form that consumerism and excess demand have taken in the early 1970s and by rapidly expanding the productive capacity of the Turkish economy. That much is clear to everyone and however difficult it is politically, serious attempts are and will be made in the right direction.

But there are many ways to attempt to expand productive capacity. Everything cannot be achieved at once, priorities must be set and certain sequences must be chosen as better than others. To try and achieve everything at once is a dangerous strategy that courts defeat. Human

and material resources are scarce and will lose all effectiveness if spread too thin.

Turkey is entering the Fourth Five Year Plan period with a huge foreign exchange gap and the effective constraint on growth over the next few years will be foreign exchange. Assuming a high exchange rate policy that would achieve a real devaluation of about 50% between 1978 and 1983, starting with a 30% devaluation in 1979, the TGT model projects the feasibility of 25 billion dollars worth of merchandise exports during the F.F.Y.P. Merchandise imports would sum to 40 billion dollars. The 15 billion dollar deficit in merchandise trade and a 500 million dollar reserve accumulation target would be financed by 3.2 billion dollars of net invisible earnings and 12.3 billion dollars of remittances and net foreign capital inflow.[1/] This scenario allows for a GDP growth rate between 7.5 and 8.0 percent. But to achieve 25 billion dollars worth of exports requires a major shift in priorities and industrial strategy that will require great determination to succeed.

The constant price deflated exchange rate scenario, on the contrary, assumes continued inward orientation of the economy. Exports would only sum to 18 billion dollars, constraining imports to 33 billion dollars. The ratio of imports to domestic output would be continuously falling requiring rapid import substitution on a broad front. The average annual growth rate would fall to 5.5 percent.

1/ These figures are in current dollars and assume a 9.0% "dollar" world inflation rate.

It will be very difficult to achieve massive import substitution in all basic industries simultaneously. The strain that this would put on Turkey's administrative, managerial and technical capabilities would be extreme. By assuming the continuation of historical rates of technical progress into a period of massive import substitution aimed at all basic industries, the basic run of the TGT model is probably overstating the growth potential implicit in a continued inward-oriented industrialization strategy. But even if the 5.5 percent annual growth rate projected by the basic run were achieved, it is far from the 7 or 8 percent growth rates that constitute Turkey's objective and that are necessary for the rapid improvement in the standard of living of a population that is still growing at 2.5 percent every year.

It is clear that a dramatic expansion of exports is the necessary precondition for realizing annual GDP growth rates in the vicinity of 8 percent. This need for export expansion is widely recognized in Turkey. But what is less clearly understood is that for such a massive expansion in exports to take place resources must be diverted from other activities into export-oriented production. It will not be possible to achieve dramatic growth in the production of chemicals, basic metals and machinery for the domestic market and simultaneously succeed in a massive export expansion program. Resources are not unlimited and priorities must be established. If massive export expansion is to take place, the required resources must be released to export-oriented activities.

It must also be realized that in a mixed economy where the market and profitability calculations play an important role, resources will not be attracted to export-oriented production if domestic market oriented activity remains much more profitable.

Finally, it must be recognized that Turkey will be able to expand her share in the world market rapidly enough only if the dollar price of Turkish exports is sufficiently competitive.

All this emphasizes that exports can only be expected to expand if the price and incentive relationships are such as to attract sufficient resources into export production and allow the sale of those exports on the world market. It is these price and resource pull relationships that have been emphasized throughout this study and that have led us to conclude that a major real devaluation is a necessary condition for substantial export expansion and rapid growth over the FFYP period. Administrative measures and subsidies cannot succeed in an atmosphere of extreme excess demand and severe import rationing. While a realistic exchange rate is certainly not the only policy variable that should be used to promote exports, it is by far the single most important variable. To try and embark on a major export drive with a grossly overvalued exchange rate cannot lead to success. And Part 3 above has attemped to demonstrate just how overvalued the exchange rate has become. Furthermore a once and for all devaluation is not enough. What is crucial is a clear commitment to keep exports profitable and to keep the real exchange rate from drifting back down again.

From the point of view of microeconomic structure and sectoral growth, it must be recognized that export expansion for the coming few years, will require more rapid growth in sectors where Turkey can be immediately competitive and does not face important bottlenecks of technology and scale. Production must be increased rapidly and at moderate cost, and an important exportable surplus must be generated quickly. Once the peak of the crisis is overcome and confidence is restored, a more ambitious program of selective import substitution can start simultaneously with continued and broad based export expansion. Our microeconomic results suggest that it may be efficient to concentrate import substitution efforts on finished products in the metal working and machinery sectors rather than pressing for rapid import substitution in basic intermediates and forcing domestic producers to use the high cost domestic inputs. When choosing priority sectors for import substitution it is important to ensure that export potential also exists in the near future. By this method the structure of production and the structure of exports could be gradually changed with more diverse and technologically more advanced products steadily gaining in weight. Metal products, machinery and domestic resource based chemicals may gain an increasing share in manufactured exports. The speed of this transformation process will primarily depend on the overall degree of resource mobilization as reflected in the investment rate. In guiding and stimulating this process, export subsidies and preferential treatment have a major role to play. While export subsidies cannot substitute for a realistic exchange rate, they can and should be used to stimulate "infant" exports from the capital goods and intermediate goods sectors. In an economy

characterized by a history of price distortions and rigidities in factor allocation, a sudden move towards fully unified effective exchange rates is neither possible nor desirable.

It is worth repeating that the TGT model attempts to capture medium term mechanisms and does not include an analysis of macroeconomic monetary mechanisms and very short term adjustment processes. Nevertheless, to reach the longer run Turkey must bridge the short run, and do it in such a way that an effective export-oriented increase in production can materialize quickly. While our model has nothing to say about the interaction between monetary policy and real magnitudes, the relationship is important. A monetary squeeze which is too severe may have strong negative effects on production and capacity utilization. It is important to weigh the gains from lower inflation rates against the losses in potential output, employment, and perhaps even exports. A strongly deflationary approach to crisis management may in fact make the beginning of an export-led growth effort more difficult to achieve. In our opinion, a gentler approach including adjustments and indexation in exchange rate and interest rates, coupled with a substantial injection of new foreign borrowing made possible by the introduction of resolute export-oriented policies, may be a much more successful policy package for short term crisis management than severe deflation policies.

Concluding, it is important to stress again that an attempt at rapid inward-oriented growth with a greatly overvalued exchange rate and without the support of an adequate export performance is unlikely to succeed and could lead to an even deeper crisis. On the other hand, devaluation and export expansion alone do not constitute a solution to

Turkey's long run industrialization problems. What is required is the combination of a realistic trade and exchange rate policy that recognizes the crucial importance of the exchange rate for trade performance, with an adequate domestic resource mobilization policy that succeeds in generating the real domestic savings necessary for the achievement of the growth and industrial deepening targets widely embraced in Turkey. A lot must be achieved and everything cannot be decided and allocated bureaucratically from the center. It is therefore important that the market mechanism be able to play an important and constructive role, which can only happen if relative prices in general and the relative price of foreign exchange in particular reflect the real scarcities constraining Turkish growth.

To advocate a more rational price structure and a greater role for the price mechanism is not enough. The market mechanism can only become effective and socially acceptable if the distribution of ownership and wealth is significantly altered in a more egalitarian direction. Prices do not only allocate resources between sectors but also economic welfare between people. A policy designed to get "prices right" must be combined with a policy to get "incomes right." This is no small task, but it will not be possible to reach economic equilibrium in Turkey without at the same time making great progress towards social equilibrium. Convesely, for Turkey's social problems to find a solution, an efficient economy and rapid growth are indispensable preconditions.

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The Foreign Exchange Gap, Growth and Industrial Strategy in Turkey: 1973-1983

Kemal Dervis

Sherman Robinson

Appendices A and B

The Equations of the TGT Model

The Data

July 1978

Appendix A

The Equations of the TGT Model

Kemal Dervişş

Sherman Robinson

July 1978

A.1. Static Model Equations

In this section, we present in summary form the complete set of equations for the within-period static model. The dynamic, intertemporal linkage model is discussed in the next section. The endogenous variables are listed in Table 3. A few notation conventions are followed throughout:

- Endogenous variables are all denoted by capital letters. Lower case letters, Greek letters, and letters with ^ are all parameters.
- Any letters with a bar (—) on them are exogenous variables in the within-period model but are updated as part of the dynamic model.
- Letters with an * are policy parameters assumed to be set exogenously by the government.
- The subscripts i and j are used for sectors. They always range from 1 to n.
- The subscript k refers to labor categories and ranges from 1 to m.
- The superscript d refers to domestic goods.
- The superscript m refers to imports.

The discussion of the variables and corresponding model equations will follow the order of the presentation in Table A.1.

A.1.1 Prices

The model will solve for the prices of domestic goods, P_i^d, endogenously to clear the markets for domestic goods. The market clearing conditions are given by the product market excess demand equations discussed

in the last part of this section. For the discussion of variables and equations in the first four parts, it is convenient to assume that domestic prices, P_i^d, are given -- perhaps by some initial guess.

Equation (1) defines the domestic price of imports:

(1) $$PM_i = \bar{\Pi}_i^m(1 + tm_i^*)ER^* \qquad n$$

where $\bar{\Pi}_i^m$ is the world price in dollars,

tm_i^* is the tariff rate ad valorem, and

ER^* is the exchange rate.

The price of the composite good, which is a C.E.S. aggregation of imports and domestically produced goods by the same sector, is given by:

(2) $$P_i = [PD_i + PM_i \cdot M_i^m/D_i^d]/f_i[M_i^m/D_i^d, 1] \qquad n$$

where M_i^m is imports,

D_i^d is domestic demand for domestic production,

$f_i(-)$ is the C.E.S. aggregation function.

Note that the C.E.S. aggregation function is evaluated at the point $(M_i^m/D_i^d, 1)$. The composite good price is a function only of the import ratio, not of the levels of import and domestic demands.

The world price in dollars of domestically produced goods which are exported is given by:

(3) $$PWE_i = PD_i/[ER^*(1 + te_i^*)] \qquad n$$

Table A.1: Engodenous Variables

Name	Variable	Equation Reference	Number
1. Prices			
Domestic prices	PD_i	(37)	n
Import prices	PM_i	(1)	n
Composite good prices	P_i	(2)	n
Export prices	PWE_i	(3)	n
Net prices (value added)	PV_i	(4)	n
Capital stock prices	PK_i	(5)	n
Price level equation	-	(6)	-
			$6 \cdot n$
2. Factor Markets and Domestic Supply			
Production functions	X_i^d	(7)	n
Capacity utilization	U_i	(8)	n
Labor aggregation function	L_i	(9)	n
Labor demand equations	L_{ki}	(10)	$n \cdot m$
Aggregate labor demands	L_k^D	(11)	m
Aggregate labor supplies	L_k^S	(12)	m
Average wages	W_k	(13)	m
			$3 \cdot n + 3 \cdot m + n \cdot m$
3. Foreign Trade			
Export demand	E_i^d	(14)	n
Desired imports	MD_i^m	(15)	n
Domestic supply	S_i^d	(16)	n
Total imports	TIM	(17)	1
Import rationing ratio	RM	(18)	1
Import demand	M_i^m	(19)	n
			$4n + 2$

Name	Variable	Equation Reference	Number
4. Income and Nominal Flow-of Funds			
Net labor income	YL	(20)	1
Net non-labor factor income	YK	(21)	1
Government non-factor income	YG	(22)	1
Total resources	RT	(23)	1
Labor resources	RL	(24)	1
Capital resources	RK	(25)	1
Government resources	RG	(26)	1
Total investment fund	TINV	(27)	1
Total private investment	PINV	(28)	1
Government investment	GINV	(29)	1
Total investment in stocks	SINV	(30)	1
Private consumption	PCON	(31)	1
			12
5. Consumption Demand and Supply			
Consumption demand	C_i	(32)	n
Stock accumulation by sector of origin	S_i	(33)	n
Fixed investment by sector of destination	Y_i	(34)	n
Fixed investment by sector of origin	Z_i	(35)	n
Intermediate demand	V_i	(36)	n
Domestic demand for domestic goods	D_i^d	(37)	n
			6n

Total number of variables: $19 \cdot n + 3 \cdot m + n \cdot m + 14$
Total number of equations: $19 \cdot n + 3 \cdot m + n \cdot m + 15$
of which $19 \cdot n + 3 \cdot m + n \cdot m + 14$ are independent

where te_i^* is the export subsidy rate ad valorem. Note that as discussed in Section 2.6 above, the small country assumption is dropped and the world prices of Turkish exports are set by the domestic price. Explicit export demand functions are introduced below (in Section A.1.3).

Value added per unit of output in each sector, or net price, is given by:

$$(4) \qquad PV_i = PD_i - \Sigma_j P_j a_{ji} - ts_i^* PD_i \qquad n$$

where a_{ji} are fixed input-output coefficients and ts_i^* are indirect tax rates.

The price of a unit of aggregate capital by sector is given by:

$$(5) \qquad PK_i = \Sigma_j P_j b_{ji} \qquad n$$

where b_{ji} are the fixed shares of capital goods by sector of origin required to make up one unit of aggregate composite capital by sector of destination. Note that $\Sigma_j b_{ji}=1$ for all i.

The overall absolute price level and hence the inflation rate are set exogenously in the model. The price level equation is given by:

$$(6) \qquad \Sigma_i \Omega_i P_i = \overline{PL} \qquad \text{one}$$

where Ω_i are the weights for the price index ($\Sigma_i \Omega_i=1$) and $\overline{PL}$ is the overall price level.

A.1.2 Factor Markets and Domestic Supply

The production functions are given by:

$$(7) \qquad X_i^d = U_i \overline{A}_i \cdot g_i(\overline{K}_i, L_i) \qquad n$$

where U_i is the utilization rate,

$\bar{A}_i$ is the productivity parameter,

$\bar{K}_i$ is aggregate sectoral capital stocks,

L_i is aggregate labor and

$g_i(-)$ is the C.E.S. function.

Note that the production function is a two-level function. Capital is a fixed-coefficients aggregation of capital goods and is assumed to be immobile across sectors within a period. Intermediate goods are assumed to be required according to fixed input-output coefficients.

The utilization parameter (U_i) in the production function was discussed in Section 2.5. In one variant of the model, it is always assumed to equal one. In another variant, it is a function of the overall degree of import rationing in the economy and of the degree of dependence of an individual sector on imported intermediate goods. The function is given by:

$$(8) \qquad U_i = (RM)^{\alpha m_i} \qquad n$$

where RM is the import rationing factor defined in equation (18) below,

α is a parameter, and

m_i is the ratio of the value of imported to total intermediate goods requirements in sector i.

Labor is a C.E.S. aggregation of labor of different skills categories, with the function given by:

$$(9) \qquad L_i = \lambda_i(L_{1i}, \ldots, L_{mi}) \qquad n$$

where L_{ki} is labor of skill category k in sector i and

$\lambda_i(-)$ is the C.E.S. function.

There are three types of labor: agricultural workers and two types of urban labor, "organized" and "unorganized." Urban labor does not work in the agricultural sector and vice versa.

The demand for labor is given by the first order conditions for profit maximization, that the wage equals the value of the marginal product. For organized urban labor (category 2), the wage is assumed to be fixed. For agricultural labor and unorganized urban labor, the wage is assumed to adjust to clear the labor market. The equations are:

$$(10a) \qquad PV_i \frac{\partial X_i}{\partial L_{ki}} = W_k \qquad k \neq 2 \qquad m \cdot n$$

$$(10b) \qquad PV_i \frac{\partial X_i}{\partial L_{ki}} = \bar{W}_k \qquad k = 2$$

where W_k is the wage, with $\bar{W}_2$ fixed exogenously.

Aggregate demand for labor of different categories is obtained by solving equations (10) and summing over sectors to get:

$$(11) \qquad L_k^D = \sum_i L_{ki} \qquad m$$

The supply of agricultural labor is fixed exogenously:

$$(12a) \qquad L_1^S = \bar{L}^A \qquad one$$

As discussed in Section 2.5, the model has a rather special treatment of the urban labor market. The total urban labor

supply is fixed and hence any unemployed organized labor will find jobs in the unorganized urban labor market. Thus, the supply of unorganized urban labor is given by:

$$(12b) \qquad L_3^S = \bar{L}^U - L_2^S \qquad \text{one}$$

The employment of organized labor is simply given by demand:

$$(12c) \qquad L_2^S = L_2^D \qquad \text{one}$$

Given that the urban organized wage is fixed, there are only two labor markets for which wages adjust endogenously. Thus, labor market equilibrium conditions are given by:

$$(13a) \qquad L_k^D - L_k^S = 0 \qquad k = 1, 3$$

$$(13b) \qquad W_k = \overline{W}_k \qquad k = 2$$

A.1.3 Foreign Trade

The world demand for exports by sector are a function of the supply price PWE_i and the average world price for that sector; $\bar{\Pi}_i^e$. The equation is:

$$(14) \qquad E_i^d = \overline{EB}_i \left(\frac{\bar{\Pi}_i^e}{PWE_i} \right)^{\eta_i} \qquad n$$

where $\overline{EB}_i$ is the "normal" demand for exports when $\bar{\Pi}_i^e = PWE_i$ and η_i is the elasticity of demand.

For three sectors (agriculture, mining and textiles) we retain the small-country assumption and specify that the world price of exports is not affected by Turkish exports. For these sectors, we instead assume that the share of domestic production which exported is a function of the ratio of the domestic price to the export price. Thus:

$$S_i^e = E_i^d/X_i^d = f(PD_i/PE_i)$$

where $PE_i = \bar{\pi}^e (1 + te^*)$ ER. Exports are now given by:

$$E_i^d = S_i^e \cdot X_i^d$$

The function $f(\cdot)$ is a symmetric logistic function with lower asymptote of zero and upper asymptote of twice the base-year export ratio for each sector. The equation for value added per unit of output (4) must also be adjusted to reflect the fact that exports and domestic sales are at different prices.

The demand for imports depends on combining imports with domestic goods in desired proportions which are a function of the relative prices of imports and domestic goods.

Desired sectoral imports are given by:

$$(15) \qquad MD_i^m = \left(\frac{\delta_i}{1-\delta_i} \right)^{\sigma_i} \left(\frac{PD_i}{PM_i} \right)^{\sigma_i} S_i^d \qquad n$$

where σ_i is the elasticity of substitution and

δ_i is the import share parameter in the C.E.S. function defining the composite good.

The variable S_i^d in equation (15) is the supply of the domestically produced good to the domestic market and is equal to total domestic production minus exports:

$$(16) \qquad S_i^d = X_i^d - E_i^d \qquad n$$

As discussed in Section 2.3 , we assume that imports are rationed (in proportion to desired imports) so that total imports do not exceed available foreign exchange. Total imports in dollars are given by:

$$(17) \qquad TIM = \sum_i \bar{\Pi}_i^e E_i^d + \overline{FK}_1 + \overline{FK}_2 + \overline{FK}_3 - \Delta R^* \qquad one$$

where $\overline{FK}_1$ is workers' remittances from abroad,

$\overline{FK}_2$ is long-term foreign capital inflow,

$\overline{FK}_3$ is short-term foreign capital inflow, and

ΔR^* is the target change in foreign reserves.

Imports are determined by multiplying the level of desired imports by a rationing factor, RM:

$$RM = TIM/\Sigma_i \Pi^m_i \cdot MD^m_i \qquad \text{one} \tag{18}$$

$$M^m_i = RM \cdot MD^m_i \qquad \text{n} \tag{19}$$

4.1.4 Income and Nominal Flow-of-Funds

Net labor income is given by:

$$YL = \Sigma_{ik}\Sigma W_k \cdot L_{ki}(1 - t^*_k) \qquad \text{one} \tag{20}$$

where t^*_k is the direct tax rate.

Net non-labor factor income is given by:

$$YK = \Sigma_i(PV_i X^d_i - \Sigma_k W_k L_{ki}) \cdot (1 - tk^*_i) \qquad \text{one} \tag{21}$$

where tk^*_i is the direct tax rate on sectoral non-labor income.

Government non-factor income is given by:

$$YG = \Sigma_{ik}\Sigma t^*_k W_k L_{ki} + \Sigma_i tk^*_i \cdot (PV_i X^d_i - \Sigma_k W_k L_{ki}) + \Sigma_i tm^*_i \bar{\Pi}^m_i ER^* M^m_i$$

$$- \Sigma_i te^*_i PWE_i ER^* E^d_i + \Sigma_i ts^*_i PD_i X^d_i \qquad \text{one} \tag{22}$$

Total resources are defined as the total amount of funds available to be spent on goods, either domestic or imported:

$$RT = \Sigma_i PV_i X^d_i + \Sigma_i tm^*_i \bar{\Pi}^m_i ER^* M^m_i - \Sigma_i te^*_i \bar{\Pi}^e_i ER^* E^d_i + \Sigma_i ts^*_i PD_i X^d_i + (\overline{FK}_1 + \overline{FK}_2 + \overline{FK}_3)ER^*$$

$$\text{one} \tag{23}$$

Labor resources are the total funds available to labor. They are given by:

$$RL = YL + \Theta_L TS^* - \mu_L \Delta H^* + \overline{FK}_1 ER^* - \mu_L \Delta R^* ER^* \quad \text{one} \tag{24}$$

where TS^* is total transfers

Θ_L is labor's share of total transfers,

ΔH^* is new money creation (seignorage), and

μ_L is labor's share of forced holding of new money.

Capital resources are defined as total funds available to recipients of capital income and are given by:[1/]

$$RK = YK - (\mu_K - \mu_S)\Delta H^* + \Theta_K TS^* + \overline{FK}_3 ER^* - \mu_K \Delta R^* ER^* \quad \text{one} \tag{25}$$

where μ_K is capital's share of forced holding of new money,

μ_S is capital's share of receipts from seignorage, and

Θ_K is capital's share of transfers.

Government resources are given by:

$$RG = YG + (1 - \mu_S)\Delta H^* - TS^* + \overline{FK}_2 ER^* \quad \text{one} \tag{26}$$

As discussed in Section 2.7, the treatment of new money creation, or seignorage, is designed to permit the model to be extended to include monetary and inflationary submodels. It can be seen as a special type of transfer mechanism. The seignorage account takes money, ΔH^*, in the form of forced savings from labor and capital income in the proportions μ_L and μ_K ($\mu_L+\mu_K=1$) and gives it to the government and to

---

1/ Note that in terms of the Social Accounting Matrix discussed in Section 2.7 this treatment combines the "enterprise" and "capitalist household" accounts.

capitalists in the proportions $(1-\mu_S)$ and μ_S. Note that changes in foreign reserve (ΔR^*) are assumed to be held by the private sector and are divided in the same proportions as holdings of new money. Thus, in the model, they are treated in a manner analogous to that of new money creation.

The transfer account, TS^*, simply takes money from government resources and gives it to labor and capital in proportions Θ_K and Θ_L ($\Theta_K+\Theta_L=1$). The account is included to capture transfer mechanisms that are both implicit and explicit in the Turkish accounts and to provide an interesting policy instrument for experiments.

Total nominal investment is given by:

(27) $\quad TINV = \hat{S}_L RL + \hat{S}_K RK + GINV$ one

where $\hat{S}_L$ is the average savings rate from labor resources,

$\hat{S}_K$ is the average "savings" rate from capital resources, and

GINV is government investment (defined below).

Total nominal investment outside the central budget is given by:

(28) $\quad PINV = TINV - GINV$ one

Nominal government investment is either determined residually or set exogenously. Thus,

(29) $\quad GINV = RG - GCON^*$ one

or $GINV = GINV^*$ in which case ΔH becomes endogenous.

$GCON^*$ is nominal government consumption which is set exogenously. Alternatively, it can be set endogenously instead of ΔH when GINV is fixed. What is required is that some component of the nominal flow-of-funds must be allowed to adjust endogenously to "close" the accounts. Different closure rules are discussed in Section 2.7 above.

Total nominal investment in stocks or inventories is given by:

(30) $SINV = \sum_j P_i S_i$ one

where S_i is real investment in stocks (determined below). Total nominal fixed investment equals TINV - SINV.

Total nominal consumption expenditure equals:

(31) $PCON = (1 - \hat{S}_L)RL + (1 - \hat{S}_K)RK$ one

We do not distinguish consumption patterns by different categories of consumers and hence treat all consumers as having the same tastes.

A.1.5 Product Demand and Supply

In this section, we present the sectoral demands for products by consumers, investors and government and derive the excess demand equations for the product markets. Note that, except for exports, the demands are for composite goods -- the superscript d is used to denote the domestically produced good.

Consumption demand is given by:

(32) $C_i = (\overline{cp}_i PCON + \overline{cg}_i GCON)/P_i$ n

where $\overline{cp}_i$ are private consumption shares and

$\overline{cg}_i$ are government consumption shares.

$\Sigma\overline{cp}_i = \Sigma\overline{cg}_i = 1.$

These expenditure equations are extremely simple, a linear expenditure system without subsistence minima.

Real investment in stocks, or inventory accumulation, is given by:

$$(33) \qquad S_i = \gamma_i(\bar{X}^d_{i(t+1)} - X^d_i) \qquad n$$

where γ_i are inventory coefficients and

$\bar{X}^d_{i(t+1)}$ is projected output next year.

Fixed investment by sector of destination is given by:

$$(34) \qquad Y_i = \overline{YS}_i(PINV + GINV - SINV)/PK_i \qquad n$$

where $\overline{YS}_i$ are the sectoral shares of private investment by sector of destination ($\Sigma\overline{YS}_i=1$).

The shares $\overline{YS}_i$ are determined as part of the investment model and are a function of sectoral shares in total capital stock and of differential sectoral profit rates. They can be determined endogenously in the within-period model and so be a function of current profit rates or can be set in the between-period dynamic model and so be a function of past profit rates. Their determination is discussed below in Section A2 as part of the dynamic model.

Fixed investment by sector of origin is determined by applying the fixed capital coefficients (b_{ij}) to investment by sector of destination:

$$Z_i = \sum_j b_{ij} Y_j \qquad n \tag{35}$$

The demand for intermediate goods is given by multiplying the fixed input-output coefficients by domestic production:

$$V_i = \sum_j a_{ij} X_j^d \qquad n \tag{36}$$

Effective domestic demand for domestic goods is determined by subtracting sectoral import expenditures from total expenditure on the composite good by sector.

$$D_i^d = \{P_i(C_i + Z_i + V_i + S_i) - PM_i M_i\}/PD_i \qquad n \tag{37}$$

Equilibrium in the product markets requires that the excess demand for domestic goods be zero in every sector (including export demand):

$$D_i^d - S_i^d = 0 \qquad n \tag{38}$$

The essence of the within-period solution problem is simultaneously to find a set of prices such that product excess demands are zero, a set of wages such that labor market excess demands - equation (13) - are zero, and an average import rationing rate (RM) such that the balance of payments is consistent with desired reserve accumulation. Such a solution represents a general equilibrium in the markets for products, labor and foreign exchange that is consistent with the behavioral constraints embodied in the model. Given the specification of the factor markets and of import rationing, the solution does not represent a neoclassical free-

market equilibrium. It is instead a solution constrained by behavioral and institutional specifications believed to represent a picture of the Turkish economy that is empirically reasonable for a model designed to explore questions of trade and industrialization strategies.

A.2 Dynamic Model Equations

Table A.2 presents a list of the exogenous and policy variables which are updated in the intertemporal model. Of the list, those relating to investment allocation ($\overline{YS}_i$) and rural-urban labor supplies ($\bar{L}^U$ and $\bar{L}^A$) are behaviorally the most important. The rest are projected using simple time trends, growth rates, exogenous projections, or accounting. We will not consider these variables further, but will instead discuss the models of investment allocation and of rural-urban migration which determine the basic structure of the supply of factors in the next period.

Table A.2

Dynamic Model: Variables To Be Updated

Non-policy Variables

$\bar{\Pi}_i^m$	:	world price of imports
$\bar{\Pi}_i^e$	:	average world price of sectoral exports
$\overline{PL}$	:	overall price level
$\bar{A}_i$	:	sectoral total factor productivity
$\overline{EB}_i$	:	export demand parameter
$\overline{FK}_1$	:	workers' remittances from abroad
$\overline{FK}_2$	:	long-term foreign capital inflow
$\overline{FK}_3$	:	short-term foreign capital inflow
$\overline{cp}_i$	:	private consumption shares
$\overline{cg}_i$	:	government consumption shares
$\bar{X}_{i(t+1)}^d$	:	projected sectoral outputs (for inventory investment equation)
$\bar{K}_i$	:	sectoral capital stocks
$\overline{YS}_i$	:	sectoral investment shares
$\bar{W}_2$	:	urban skilled wage
$\bar{L}^U$	:	urban labor supply
$\bar{L}^A$	:	agricultural labor supply

Policy Variables

ER^*	:	exchange rate
tm_i^*	:	tariff rates
te_i^*	:	export subsidy rates
ts_i^*	:	indirect tax rates
t_k^*	:	direct tax rates on labor income

Table A.2

Dynamic Model: Variables To Be Updated

Non-policy Variables

$\bar{\Pi}_i^m$	:	world price of imports
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$\overline{cp}_i$	:	private consumption shares
$\overline{cg}_i$	:	government consumption shares
$\bar{X}_{i(t+1)}^d$	:	projected sectoral outputs (for inventory investment equation)
$\bar{K}_i$	:	sectoral capital stocks
$\overline{YS}_i$	:	sectoral investment shares
$\bar{W}_2$	:	urban skilled wage
$\bar{L}^U$	:	urban labor supply
$\bar{L}^A$	:	agricultural labor supply

Policy Variables

ER^*	:	exchange rate
tm_i^*	:	tariff rates
te_i^*	:	export subsidy rates
ts_i^*	:	indirect tax rates
t_k^*	:	direct tax rates on labor income

The sectoral profit rates are defined as returns to capital when the entire capital stock is valued in current prices and also includes capital gains. The equation is:

$$(40) \qquad R_{i,t} = \frac{PV_{i,t}X^{d}_{i,t} - \Sigma_k W_k L_{ki,t}}{PK_{i,t-1}K_{i,t-1}} + \frac{PK_{i,t} - (1 - \bar{d}_i)PK_{i,t-1}}{PK_{i,t-1}}$$

where $K_{i,t-1}$ is the capital stock at the end of the last period (and which is used in production in this period),

$\bar{d}_i$ is fixed sectoral depreciation rates, and

PK_i is the capital goods price in equation (5).

When the investment mobility parameter μ is zero in equation (39), investment shares equal last period's capital stock shares. When μ is positive, the sectoral allocation of investment will respond to profit rate differentials and high profit sectors will attract funds from low profit rate sectors. Thus, μ measures the intersectoral mobility of investment funds. It is <u>not</u>, however, an index of the degree of perfection of capital markets. Even if μ is zero, the system may move towards equalizing profit rates over time, and, if μ is too large, it is easy to make sectoral profit rates oscillate. The parameter μ is rather an indicator of the responsiveness of capital markets to market signals, namely, differential profit rates among sectors.

A.2.2 Rural-Urban Migration

The rural-urban migration model treats migration as being a function

of the differential between the rural and urban wages. Migrants are assumed to be attracted by the average urban wage compared to the rural wage (W_1). Total rural and urban labor are also assumed to have exogenously specified natural rates of growth. The labor supply equations are given below:

$$(41) \qquad L^A_{t+1} = L^A_t(1 + G^A) - MIG_t$$

$$(42) \qquad L^U_{t+1} = L^U_t(1 + G^U) + MIG_t$$

$$(43) \qquad MIG_t = \varepsilon[\frac{W^e}{W_1} - 1]L^A_t$$

$$(44) \qquad W^e = \sum_i (W_2 L_{2i} + W_3 L_{3i})/L^U$$

As discussed in Section 2.8 above, this approach is similar, but not identical, to the Harris-Todaro formulation.

It should be clear from the discussion of the dynamic model that there is considerable scope for flexibility in the choice of which variables are to be determined in the static and intertemporal stages of the overall model. One could, of course, take a lot more "out" of the static model and put it "into" the intertemporal model. Indeed, price formation could be modelled dynamically as a disequilibrium adjustment process in the between-period model. This would dramatically reduce the degree of simultaneity in the static CGE model! However, such an approach would focus the model almost exclusively on short-run forecasting issues and would destroy much of its usefulness for examining issues of medium-term development strategy.

Appendix B

The Data

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July 1978

Appendix B: The Data

This appendix presents a summary of the data and parameters used to compute the 1973 base year solution of the TGT model. In common with other development planning models, the parameters of the TGT model are based on a single-year "calibration" of the model supplemented by adjustment in the dynamic trends of some parameters to fit the historical 1973-1976 path.[1/]

The base year solution is built around the 1973 State Institute of Statistics (S.I.S.) 63 sector input-output table which also forms the core data base to Turkey's offical Fourth Five Year Plan (FFYP). While the data underlying the FFYP are sufficient for a dynamic input-output modelling exercise, they are not sufficient for the TGT model. We have had to assemble additional data - notably on capital stocks, wages, employment and government revenues and expenditures - from various other sources. The most important among these are the following:

- The S.I.S. Census of Manufacturing Industries.
- The S.I.S. Annual Surveys of the Manufacturing Industries.
- The S.I.S. 1970 and 1975 (preliminary results) Population Census.
- The State Planning Organization's (S.P.O.) Annual Programs, particularly the 1975 and 1978 Programs.
- The S.P.O.'s FFYP model[2/]

1/ Efforts to extend the estimation procedure to formal time-series and cross-section analysis sill be undertaken under a separate research project to start in the fall of 1978. (RPO 671-79)

2/ See S.P.O. (1976) and S.P.O. (1977).

- A special S.P.O. study on capital and labor in the manufacturing industries.[1/]
- The Budget Revenues Yearbooks published by the Ministry of Finance.

We have also drawn on data assembled for the research project:[2/] "A Comparative Study of The Sources of Industrial Growth and Structural Change", notably by Merih Celasun of the Middle East Technical University. In addition, we have used wage-share data assembled for the Bogazici-Princeton income distribution project.

Table B-1 gives the sectoral aggregation scheme used for the TGT model. Note that the sectors outside manufacturing are highly aggregated and that the focus is clearly on the manufacturing industries. The petroleum sector is vertically integrated and includes crude petroleum, natural gas, refining and other petroleum and coal products. This vertical aggregation was chosen because of the special nature of price formation and indirect taxes in the sector.

Lightly processed agricultural products such as tobacco products and ginned cotton are included in the food and textiles sectors respectively. Thus much of cotton and tobacco exports do not appear as "primary" exports, an important point to remember when interpreting the trade statistics generated by the model.

Infrastructure includes electricity, gas and water as well as ownership of dwellings, although it is dominated by the transport and communications sectors. Services includes public services which, in the 1973 S.I.S. input-output table are treated as direct government purchases of value added.

1/ See Ebiri et al.(1977)

2/ RPO 671-32.

Tables B-2 and B-3 give the input-output coefficients and the capital shares matrices used in the TGT model. The input-output matrix is derived by straightforward aggregation from the 1973 S.I.S. matrix. The capital shares matrix was constructed using the composition of investment data in the S.I.S. Annual Surveys and the capital stock estimates described in Table B-4. The investment shares data were available only for manufacturing. Outside the manufacturing sectors, the share coefficients represent our best guesses, designed to add up to the overall economy-wide composition of investment as given in the investment column of the 1973 Input-Output Table.

Tables B-4 and B-5 give the data and parameters for the sectoral production functions. We have assumed that the elasticity of substitution between "organized" and "unorganized" labor is unity in all sectors which employ both categories of labor. The elasticity of substitution between aggregate labor and capital varies across sectors. For a number of sectors, it is assumed to be one (i.e., a Cobb-Douglas specification). A CES specification is used for a number of important manufacturing sectors and mining. The elasticities of substitution have not been estimated econometrically but are based on informal evidence in Turkey and on estimates from other countries.

Total domestic output is derived from the 1973 input-output table, with some adjustment necessary in the treatment of indirect taxes and subsidies. The export column in the 1973 table does not reflect the fact that unit export prices are affected by export subsidies. Given a positive subsidy, the same physical commodity will sell at a lower price in the export market than in the domestic market. Thus the export "units" are

adjusted upward in accordance with the subsidy rates to achieve strict comparability of units.

To determine employment levels by sector, we used the 1970 Census estimates and the S.I.S. data on the Manufacturing Industries. First, we determined total sectoral employment levels for 1970 using both the 1970 population census figures and the S.I.S. manufacturing census figures. When there was a conflict, we used the population census figures which tended to be somewhat larger. This procedure gives an estimate of total employment in both the modern, large-scale organized sector and in the more traditional, small-scale enterprises. From the 1970 manufacturing census, we also have the total number of workers in large-scale enterprises alone, where large-scale refers to enterprises with more than ten workers. It is therefore straightforward to obtain a sectoral ratio of small-scale to large-scale enterprise employment. We do not have figures on either total employment or small-scale industry employment for 1973. But the 1973 annual survey of manufacturing does provide the number of large-scale enterprise workers. Assuming that the small-scale to large-scale ratio has not changed in the three years from 1970 to 1973, we can therefore obtain an estimate of small-scale enterprise employment for 1973. (given in Table B-4).

For the sectors outside manufacturing, we simply use estimates based on interpolation between the 1970 and 1975 Census estimates. We somewhat arbitrarily classifed workers in construction and infrastructure into labor category 1 ("organized" sector) because they are largely covered by social security legislation and divided up employment in services according to the share of workers covered by social security and the share

of government employees.[1/]

To estimate wages and wage payments, we used the same method that was used for employment, relying on the S.I.S. annual surveys and a partition between large-scale and small-scale enterprises. The major problem is, of course, that a large proportion of the employed labor force even in industry still consists of unpaid family workers and self-employed.[2/] The assumption used is that all workers in small-scale enterprises, employees as well as self-employed and family workers, received the average wage of small-scale enterprise employees, computed from the 1970 census of small-scale manufacturing enterprises.[3/] No doubt for many family workers this assumption overstates the return to their labor. On the other hand, many self-employed may earn considerably more than the average wage of small-scale enterprise labor. So on average the assumption made is probably not too far from reality.[4/]

As is usual when building planning models, the data on capital stock present the greatest problems. There is no series of investment by sector of destination in Turkey that is reliable and has sufficient economy-wide coverage. We have had to rely on imperfect and incomplete sources to construct our 1973 capital stock estimates. The first source

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1/ See S.S.K. Yearbook (1973).

2/ See Ecevit and Ozutun (1975) for a careful breakdown of the labor force by employment status.

3/ See S.I.S. (1976).

4/ See Kuran (1978) for a more detailed discussion of the urban informal sector in Turkey.

used was the FFYP model document itself.[1/] On pages 108-110 it contains detailed sectoral estimates of marginal capital-output ratios for the FFYP period. Assuming equivalence between average and marginal capital-output ratios, once can get a preliminary estimate of 1973 capital stock. While it is useful to go through this exercise, the marginal ratios may differ from the average ratios, and it is the average ratios that are needed to estimate sectoral capital stocks.

More recently, three researchers in the Social Planning Division of S.P.O. have attempted to provide a consistent series of capital stock and investment in large-scale manufacturing enterprises based on the S.I.S. survey data and on the unpublished results of a more restricted S.P.O. survey of private manufacturing enterprises.[2/] This study represents a careful effort to reconcile the available data but it is only addressed to large-scale manufacturing enterprises. Nevertheless we have taken it as our starting point for capital stock estimates.

The average capital-output ratios implicit in this study are significantly lower than those obtained by using the incremental FFYP estimates and assuming them to be equal to the average ratios.

The capital stock figures provided in Table B-4 are close to what is implied by the Ebiri et al. S.P.O. study for the manufacturing sectors. For agriculture, mining, construction, infrastructure, and services they are weighted averages derived from the FFYP estimates of

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1/ See S.P.O. (1977).

2/ See Ebiri et al. (1977).

incremental coefficients and assuming that the average coefficient is equal to the marginal coefficient. The sectoral profit rates reported in Table B-5 provide a useful check on the "reasonableness" of the estimated sectoral capital stocks. The magnitude and variation in sectoral profit rates do, in fact, seem reasonable and support our use of the estimated average capital-output ratios.

Table B-6 gives the presentation of the base year trade data. The sectoral breakdown is based on the 1973 S.I.S. input-output table. Note that trade and transportation margins appear in infrastructure and services and are not distributed to the individual sectors. The Armington substitution elasticities and the export demand elasticities constitute the "best guesses" and represent a compromise between the extreme elasticity pessimism common in Turkey and the much more optimistic views of many outside researchers. They also represent an intermediate position between the "perfect complementarity" assumptions made by fixed coefficients models and the "perfect substitutability" assumptions of pure trade theory.

Table B-7 gives a number of miscellaneous sectoral parameters. Perhaps the most important are the productivity growth or technological shift parameters. They are essentially based on running the model for the 1973-1977 period and varying the technological shift parameters until growth in the major sectors projected by the model equalled growth that actually took place during that period. We did not have data on sectoral output growth rates at the two digit level and in the absence of such knowledge we did not attempt to specify differential rates of technical progress within manufacturing. While it is quite clear that technical

progress has been much slower in the service and infrastructure sectors than it has been in the manufacturing sectors, we lack knowledge on relative performance within manufacturing. If it is true that technical progress is going to be more rapid in the basic intermediate and capital goods industries than in the "light" consumer goods sectors, this would have a significant impact on the design of optimal long run industrialization policies.[1/] But the little evidence there is on this issue is conflicting and it was preferable to assume essentially uniform technical progress rates rather than introduce a variation that would add to the complexity of the results without being based on conclusive evidence.

The world-trade growth rates are somewhat higher than has materialized in the 1970's, reflecting a more optimistic view than is currently fashionable. However, one must take into account Turkey's geographical location near the booming Middle Eastern market where demand growth has been, and will continue to be, much more rapid than world averages.

The sectoral consumption shares, indirect tax rates and tariff rates are based on the 1973 S.I.S. input output table and the S.P.O.'s FFYP model document.[2/] We have also checked these estimates against tariff revenue data from the Finance Ministry's Budget Revenues Yearbook and the TGT model's projections are very close to the revenues actually collected during the 1973-1976 period. The same is true for direct and

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1/ See De Melo and Dervis (1977) for an exploration of the impact of differential technical progress on optimal trade policy.

2/ SPO (1974).

indirect tax rates that have been estimated by fitting a linear trend to the proportional rates so as to reproduce tax collections for the 1973-1976 period.

Finally the growth rate of world prices is projected in terms of nominal dollars and includes an assumption of a very small but continuous downward drift of the dollar against European currencies, yielding a 9.0 percent dollar denominated world inflation rate. Given that many of our porjections are reported in nominal dollar terms, this 9.0 percent world inflation assumption is important to keep in mind, although the real variables of the model are not affected by the world inflation rate as such but only by the difference between domestic Turkish inflation and world inflation, given the specified time path of the exchange rate.

Table B-1

Definition and Composition of the 19 Sectors Used in the TCT Model

TCT Sectors	[illegible] Sectors
1. Agriculture	01. Agriculture 02. Animal Husbandry 03. Forestry 04. Fishing
2. Mining	05. Coal Mining 07. Iron Ore Mining 08. Non-ferrous Ore Mining. 09. Non-Metallic Minerals 10. Stone Quarrying
3. Food	11. Slaughtering, Preparing, Preserving Meat 12. Canning & Preserving Fruits & Vegetables 13. Mfg. of Vegetables and Animal Oils & Fats 14. Grain Mill Products 15. Sugar 16. Manufacture of Other Food Products 17. Alcoholic Beverages 18. Soft Drinks 19. Tobacco Manufactures
4. Textiles	20. Cotton Ginning 21. Manufacture of Textiles (excluding ginning)
5. Clothing	22. Mfg. of Wearing Apparel 23. Leather & Fur Products 24. Manufacture of Footwear
6. Wood & Wood Products	25. Mfg. of Wood & Wood Products 26. Mfg. of Wood Furniture & Fixtures
7. Paper & Printing	27. Mfg. of Paper & Paper Products 28. Printing & Publishing
8. Chemicals	29. Manufacture of Fertilizers 30. Manufacture of Drugs & Medicines 31. Manufacture of Other Chemical Products
9. Rubber & Plastics	34. Mfg. of Rubber Products 35. Mfg. of Plastic Products 49. Other Manufacturing Industries
10. Petroleum & Pet. Prod.	06. Crude Petroleum and Natural Gas 32. Petroleum Refineries 33. Mfg. of Petroleum & Coal Products
11. Non-Metallic Mineral Prod.	36. Mfg. of Glass & Glass Products 37. Mfg. of Cement 38. Other Non-Metallic Mineral Products
12. Basic Metals	39. Iron and Steel 40. Non-ferrous Metal Industries (Copper, etc.
13. Metal Products	41. Mfg. of Fabricated Metal Products (Struct. & Heating Equipment, Tube & Sheet Iron, Kitchen Utensils, Products, etc....)
14. Non-Electrical Machinery	42. Mfg. of Machinery except Electrical 43. Agricultural Machinery (Note: includes refrigerators, washing machines)
15. Electrical Machinery	44. Mfg. of Electrical Machinery
16. Transport Equipment	45. Shipbuilding & Repairing 46. Mfg. of Railroad Equipment 47. Mfg. of Motor Vehicles 48. Mfg. of Other Transp. Equipment
17. Construction	52. Building Construction 53. Other Construction
18. Infrastructure	50. Electricity 51. Gas & Water 56. Other Land Transport 58. Water Transport 59. Air Transport 60. Communication 64. Ownership of Dwellings
19. Services	54. Wholesale & Retail Trade 55. Restaurants & Hotels 61. Financial Institutions 62. Pers. & Prof. Services 63. Public Services

TABLE B-2

INPUT OUTPUT MATRIX, AA

ROW	COLUMN	AGRICULT	MINING	FOOD	TEXTILES	CLOTHING	WOOD	PAPER	CHEMICAL	RUBB+PLA	PETR.PRO
1	AGRICULT	0.1730	0.0252	0.4215	0.2749	0.0412	0.3121	0.0551	0.0041	0.0323	0.0001
2	MINING	0.0000	0.0050	0.0039	0.0007	0.0028	0.0003	0.0008	0.0112	0.0007	0.0006
3	FOOD	0.0128	0.0007	0.1170	0.0001	0.0530	0.0003	0.0008	0.0197	0.0002	0.0000
4	TEXTILES	0.0006	0.0025	0.0255	0.2065	0.1073	0.0073	0.0021	0.0006	0.0741	0.0000
5	CLOTHING	0.0000	0.0045	0.0000	0.0001	0.1988	0.0002	0.0000	0.0000	0.0000	0.0000
6	WOOD	0.0010	0.0000	0.0010	0.0004	0.0003	0.1852	0.0004	0.0013	0.0037	0.0007
7	PAPER	0.0000	0.0005	0.0140	0.0028	0.0020	0.0042	0.2357	0.0335	0.0116	0.0000
8	CHEMICAL	0.0301	0.0137	0.0033	0.0779	0.0196	0.0279	0.0567	0.2681	0.2044	0.0082
9	RUBB+PLA	0.0018	0.0057	0.0012	0.0027	0.0076	0.0016	0.0022	0.0064	0.0862	0.0001
10	PETR.PRO	0.0117	0.0420	0.0064	0.0074	0.0020	0.0052	0.0232	0.0170	0.0076	0.4226
11	NOMINPRO	0.0000	0.0020	0.0043	0.0001	0.0000	0.0002	0.0004	0.0062	0.0038	0.0002
12	BASMETAL	0.0000	0.0191	0.0052	0.0010	0.0000	0.0005	0.0089	0.0009	0.0364	0.0038
13	METALPRO	0.0029	0.0096	0.0046	0.0004	0.0040	0.0055	0.0006	0.0129	0.0192	0.0035
14	NOELECMA	0.0007	0.0342	0.0008	0.0019	0.0000	0.0002	0.0002	0.0005	0.0011	0.0009
15	ELECMACH	0.0000	0.0083	0.0001	0.0001	0.0000	0.0000	0.0002	0.0000	0.0000	0.0001
16	TRANSEQP	0.0027	0.0185	0.0002	0.0000	0.0000	0.0000	0.0000	0.0000	0.0031	0.0002
17	CONSTRUC	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
18	INFRASTR	0.0140	0.0585	0.0408	0.0361	0.0195	0.0602	0.0546	0.0421	0.0491	0.0201
19	SERVICES	0.0398	0.1163	0.0798	0.0988	0.0968	0.0848	0.1604	0.1328	0.1620	0.0337
20	SUM	0.2912	0.3664	0.7293	0.7121	0.5550	0.6955	0.6022	0.5573	0.6954	0.4949

ROW	COLUMN	NOMINPRO	BASMETAL	METALPRO	NOELECMA	ELECMACH	TRANSEQP	CONSTRUC	INFRASTR	SERVICES
1	AGRICULT	0.0041	0.0003	0.0001	0.0016	0.0002	0.0005	0.0013	0.0061	0.0040
2	MINING	0.0720	0.0767	0.0019	0.0002	0.0006	0.0009	0.0093	0.0111	0.0008
3	FOOD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0012	0.0268
4	TEXTILES	0.0005	0.0003	0.0018	0.0000	0.0002	0.0002	0.0000	0.0002	0.0028
5	CLOTHING	0.0000	0.0000	0.0103	0.0000	0.0000	0.0001	0.0000	0.0002	0.0000
6	WOOD	0.0027	0.0010	0.0077	0.0064	0.0067	0.0069	0.0685	0.0006	0.0014
7	PAPER	0.0334	0.0002	0.0040	0.0010	0.0032	0.0001	0.0000	0.0005	0.0056
8	CHEMICAL	0.0295	0.0033	0.0146	0.0092	0.0289	0.0103	0.0102	0.0012	0.0025
9	RUBB+PLA	0.0013	0.0000	0.0095	0.0063	0.0091	0.0091	0.0001	0.0244	0.0025
10	PETR.PRO	0.0987	0.0167	0.0055	0.0062	0.0035	0.0048	0.0105	0.1533	0.0059
11	NOMINPRO	0.0541	0.0019	0.0027	0.0025	0.0083	0.0028	0.1026	0.0025	0.0008
12	BASMETAL	0.0106	0.4171	0.4203	0.1330	0.2576	0.1253	0.1438	0.0000	0.0004
13	METALPRO	0.0006	0.0022	0.0396	0.0129	0.0239	0.0090	0.0101	0.0005	0.0018
14	NOELECMA	0.0000	0.0000	0.0007	0.1938	0.0016	0.0000	0.0126	0.0007	0.0000
15	ELECMACH	0.0042	0.0011	0.0017	0.0073	0.1072	0.0009	0.0207	0.0017	0.0003
16	TRANSEQP	0.0000	0.0010	0.0000	0.0615	0.0018	0.2604	0.0043	0.0451	0.0003
17	CONSTRUC	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
18	INFRASTR	0.1584	0.0778	0.0426	0.0287	0.0325	0.0289	0.0354	0.0324	0.0192
19	SERVICES	0.0900	0.0705	0.0788	0.0692	0.0926	0.0982	0.0628	0.0522	0.0557
20	SUM	0.5600	0.6701	0.6419	0.5400	0.5779	0.5485	0.4923	0.3337	0.1309

TABLE B-3

CAPITAL COEFFICIENTS, BMAT

ROW	COLUMN	AGRICULT	MINING	FOOD	TEXTILES	CLOTHING	WOOD	PAPER	CHEMICAL	RUBB+PLA	PETR.PRD
1	AGRICULT	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	MINING	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	FOOD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	TEXTILES	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	CLOTHING	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6	WOOD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	PAPER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	CHEMICAL	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	RUBB+PLA	0.0010	0.0020	0.0060	0.0080	0.0080	0.0020	0.0040	0.0060	0.0080	0.0020
10	PETR.PRD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	NOMINPRD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
12	BASMETAL	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	METALPRD	0.0050	0.0080	0.0010	0.0020	0.0020	0.0060	0.0020	0.0060	0.0090	0.0030
14	NOELECMA	0.4900	0.5100	0.5090	0.5580	0.6470	0.4140	0.6340	0.4870	0.6230	0.4910
15	ELECMACH	0.0440	0.0500	0.0890	0.0900	0.1050	0.1420	0.1140	0.0850	0.0800	0.0840
16	TRANSEQP	0.0900	0.0940	0.0680	0.0230	0.0320	0.0680	0.0200	0.0270	0.0300	0.0480
17	CONSTRUC	0.3000	0.2660	0.2570	0.2490	0.1360	0.2980	0.1560	0.3170	0.1800	0.3020
18	INFRASTR	0.0250	0.0250	0.0250	0.0250	0.0250	0.0250	0.0250	0.0250	0.0250	0.0250
19	SERVICES	0.0450	0.0450	0.0450	0.0450	0.0450	0.0450	0.0450	0.0450	0.0450	0.0450
20	SUM	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

ROW	COLUMN	NOMINPRD	BASMETAL	METALPRD	NOELECMA	ELECMACH	TRANSEQP	CONSTRUC	INFRASTR	SERVICES
1	AGRICULT	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	MINING	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	FOOD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	TEXTILES	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	CLOTHING	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6	WOOD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	PAPER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	CHEMICAL	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	RUBB+PLA	0.0040	0.0010	0.0020	0.0010	0.0020	0.0060	0.0000	0.0040	0.0020
10	PETR.PRD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	NOMINPRD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
12	BASMETAL	0.0000	0.0000	0.0040	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	METALPRD	0.0090	0.0100	0.0050	0.0030	0.0040	0.0080	0.0040	0.0010	0.0030
14	NOELECMA	0.6460	0.3800	0.5620	0.5440	0.5640	0.5370	0.7100	0.0370	0.0850
15	ELECMACH	0.0910	0.0670	0.0990	0.0950	0.0960	0.0740	0.1000	0.0180	0.0920
16	TRANSEQP	0.0300	0.0680	0.0440	0.0600	0.0360	0.0440	0.0350	0.1580	0.0800
17	CONSTRUC	0.1500	0.4040	0.2180	0.2270	0.2260	0.2610	0.0810	0.7200	0.6680
18	INFRASTR	0.0250	0.0250	0.0250	0.0250	0.0250	0.0250	0.0250	0.0250	0.0250
19	SERVICES	0.0450	0.0450	0.0450	0.0450	0.0450	0.0450	0.0450	0.0450	0.0450
20	SUM	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Table B-4

The Arguments and Parameters of the Production Function, 1973

		Production	Capital Stock	Labor 1	Labor 2	Labor 3	Subst. Elast.[a/]
1.	Agriculture	103225	146300	9600	--	--	1.00
2.	Mining	4049	8383	--	106	--	0.50
3.	Food	45813	16034	--	145	53	1.00
4.	Textiles	24999	14999	--	142	47	1.00
5.	Clothing	8904	4274	--	41	288	1.00
6.	Wood & Wood Prod.	6592	4614	--	14	123	1.00
7.	Paper & Printing	5311	6373	--	25	9	1.00
8.	Chemicals	10803	8858	--	35	2	0.75
9.	Rubber & Plastics	5870	3404	--	27	17	0.75
10.	Petroleum & Pet. Prod.	16094	28165	--	11	--	0.25
11.	Non-Met. Min. Prod.	6646	10035	--	44	11	0.75
12.	Basic Metals	15200	25840	--	47	--	0.75
13.	Metal Products	6894	3447	--	34	89	1.00
14.	Non-Elec. Machinery	9953	4777	--	38	17	1.00
15.	Elec. Machinery	4774	2387	--	20	15	1.00
16.	Transp. Equipment	12047	5421	--	49	50	1.00
17.	Construction	28570	11428	--	448	--	1.00
18.	Infrastructure	59477	309280	--	439	--	0.75
19.	Services	107778	105000	--	1500	1580	1.00
	Total	482999	719019	9600	3166	2301	--

[a/] Elasticity of substitution between aggregate labor and capital.

Units:

Labor: 1000's workers

Production and capital stock: millions of 1973 TL.

Table B-5

Sectoral Wages and Profits

		Wages: Labor 1	Labor 2	Labor 3	Average Wage	Profit Rate
1.	Agriculture	4.57	--	--	4.57	23.96%
2.	Mining	--	19.50	--	19.50	6.28
3.	Food	--	19.05	12.17	17.20	42.33
4.	Textiles	--	20.17	10.79	17.86	12.76
5.	Clothing	--	18.27	6.30	7.78	39.99
6.	Wood & Wood Prod.	--	16.23	8.36	9.17	17.67
7.	Paper & Printing	--	29.83	11.40	24.76	20.19
8.	Chemicals	--	29.45	11.25	28.39	47.73
9.	Rubber & Plastics	--	21.74	9.21	16.95	32.71
10.	Petroleum & Pet. Prod.	--	38.00	--	38.00	25.71
11.	Non-Met. Min. Prod.	--	23.51	9.71	20.75	15.36
12.	Basic Metals	--	29.82	--	29.82	14.06
13.	Metal Prod.	--	22.48	8.23	12.14	34.55
14.	Non-Elec. Machinery	--	26.30	8.68	20.74	89.81
15.	Elec. Machinery	--	26.44	9.86	19.46	63.26
16.	Transp. Equipment	--	31.03	8.78	19.85	65.34
17.	Construction	--	18.50	--	18.50	66.23
18.	Infrastructure	--	20.00	--	20.00	12.28
19.	Services	--	24.00	9.00	16.30	45.50
	Average	4.57	22.36	8.72	8.94	23.57

Units:
Wages: 1000 TL per worker
Profit rate: percent

Table B-6

The Foreign Trade Parameters

	Imports	Domestic Demand	Import Ratio	Armington elast.[a]	Exports	Export Ratio	Export Elasticity
Agriculture	1213	101093	1.2%	2.00	2132	2.1%	F.W.P.[b]
Mining	284	3703	7.7	0.50	346	8.5	F.W.P.
Food	420	39276	1.1	0.65	6537	13.7	2.00
Textiles	373	19843	1.9	0.65	5156	20.5	F.W.P.
Clothing	188	8126	2.3	0.65	778	8.3	2.00
Wood & Wood Prod.	27	6551	0.4	0.65	41	0.6	2.00
Paper & Printing	491	5282	9.4	0.65	29	0.5	2.00
Chemicals	7364	10598	69.8	0.33	205	1.8	2.00
Rubber & Plastics	1038	5787	18.0	0.33	83	1.3	2.00
Petroleum & Pet. Prod.	4679	15258	31.2	1.50	836	5.0	2.00
Non-Met. Min. Prod.	395	6291	6.3	0.65	355	5.1	2.00
Basic Metals	4512	14740	30.8	0.50	460	2.9	2.00
Metal Products	1155	6695	17.4	0.50	199	2.8	2.00
Non-Elec. Machinery	9465	9841	96.5	0.33	112	1.1	2.00
Elec. Machinery	2652	4755	56.0	0.33	19	0.4	2.00
Transp. Equipment	3918	12031	32.8	0.75	16	0.1	2.00
Construction	--	28570	0.0	0.20	--	0.0	2.00
Infrastructure	993	55069	1.8	0.20	4408	7.2	1.25
Services	1569	102761	1.5	0.20	5017	4.5	1.25
Total							

[a] Elasticity of substitution in use between imports and domestic goods.

[b] Fixed world price.

Units:
Imports, domestic demand, exports: millions of 1973 TL.

Table B-7

Miscellaneous Sectoral Data

	Sector	Technical Progress Rate	World Trade Growth	1977 Consumption Shares	1977 Indirect Tax Rate	1977 Tariff Rate	1977 Export Subsidy
1.	Agriculture	4.5%	4.0%	22.8%	0.7%	19.9%	1.2%
2.	Mining	5.0	10.0	0.3	1.1	5.8	20.0
3.	Food	4.0	7.0	14.9	8.0	20.7	11.0
4.	Textiles	4.0	5.0	5.3	9.2	56.7	6.0
5.	Clothing	4.0	7.0	2.9	0.1	6.2	20.9
6.	Wood & Wood Prod.	4.0	8.0	1.1	0.8	12.9	21.7
7.	Paper & Printing	4.0	8.0	0.8	3.6	40.6	26.5
8.	Chemicals	4.0	9.0	3.0	3.0	35.6	20.1
9.	Rubber & Plastics	4.0	8.0	1.2	2.7	38.4	16.5
10.	Petroleum & Pet. Prod.	4.0	8.0	1.0	0.0	29.7	11.0
11.	Non-Met. Min. Prod.	4.0	10.0	1.2	7.5	40.6	17.2
12.	Basic Metals	4.0	8.0	0.0	3.5	12.3	25.0
13.	Metal Products	4.0	9.0	0.2	0.3	18.5	29.1
14.	Non-Elec. Machinery	4.0	9.0	1.7	0.1	30.3	27.2
15.	Elec. Machinery	4.0	9.0	1.4	3.0	17.4	19.4
16.	Transp. Equipment	4.0	9.0	1.3	5.6	31.0	32.2
17.	Construction	4.0	7.0	0.0	0.5	--	--
18.	Infrastructure	3.0	7.0	17.1	3.7	--	--
19.	Services	2.0	7.0	22.0	5.7	--	--

Note: Indirect tax, tariff and export subsidy rates are actual collection rates, not legal ad valorem rates. World Trade should be interpreted as a weighted concept where geographical areas closer to Turkey (such as the Middle East) have larger weights.

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