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The Budgetary Impacts of European Integration: a General Equilibrium Analysis of Turkish Accession Into the European Union.

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THE BUDGETARY IMPACTS OF EUROPEAN INTEGRATION: A GENERAL EQUILIBRIUM ANALYSIS OF TURKISH ACCESSION INTO THE EUROPEAN UNION

A Dissertation

Submitted to the Graduate Faculty of the
Louisiana State University and
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in

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TABLE OF CONTENTS

ABSTRACT

The main objective of this study is to examine the financial effects of Turkey's trade liberalization efforts, and evaluate the policy decisions made during the transition period toward full membership in the EU. In addition, trade relations between the enlarged EU and the rest of the world modeled to obtain complete general equilibrium results of Turkey-EU integration.

In order to accomplish this objective, a single-country, multi-sector computable general equilibrium model is developed. The sectors evaluated are agriculture, manufacturing, and services. The Turkish economy is divided into 22 sectors:2 agricultural, 18 manufacturing, and 2 services sectors. By so doing, the budgetary impacts of Turkish integration into the EU are analyzed using various policy scenarios. Also, comparative static analyses of production, tariff rates, and the budget relations are conducted.

CHAPTER 1

INTRODUCTION

An Overview

The long and unended journey of Turkey's accession to the European Community (EC) began with the Ankara Agreement in 1963. The main reason for this agreement was to help Turkey improve its economy and increase living standards. In this protocol, Turkey and the EC also agreed that they might establish a customs union in the future, which means both Turkey and European Community should lower their tariffs and quotas with respect to each other. After 1974, a serious setback developed in Turkey-EC relations as a result of the economic slowdown after the oil crisis of 1973, the invasion of Cyprus by Turkey, and the military takeover in 1980 (Tovias, 1993). The European Community's suspension of financial aid to Turkey in this period resulted in retaliation by Turkey. This retaliation involved Turkey not lowering its tariffs and other duties on the EC commodities that it imports. After the military takeover period was over, relations began to improve.

The early eighties were liberalization years for exports and imports, and successful by most standards despite the fact that world protection rates were increasing and that Turkey's trading partners experienced contracting trade (Ciller, 1990). In the mid-eighties the Turkish economy experienced export-induced policies. The total output of the manufacturing sector in total production increased from 22% in 1979 to 88% in 1987. The balance of payments showed dramatic improvement in exports, which increased from $2.9 billion in 1980 to $13.6 billion in 1991. This increase in exports in the eighties was achieved through a consistent export promotion

policy (Togan, 1994). The economic growth rate was 7.1% in 1986 and 6.8% in 1987, a rate envied by the European industrial countries (Musto, 1990). The foreign exchange regime was also affected by the liberalization policy. As Yeldan (1997) states, private banks were allowed to accept foreign money in 1986; the lifting of restrictions on foreign investment increased the amount of foreign transactions. Also, the increase in the real interest rate led to improvements in the capital account. As interest rates increased between 1980 and 1983, foreign capital inflows increased and the public sector deficit decreased by 1.7%. The domestic financing of the government was eased by exempting the government securities from taxes in 1986. But, in 1990, the domestic debt of government reached 30% of the private financial assets of the banking sector.

Following the liberalization period, Turkey officially applied for full membership in the European Community on April 14, 1987. However, no single member countries of the EC supported this application. There are several major reasons for their opposition, including Turkey's high population growth, inadequate economic development, concerns about human rights, a diverse but inefficient agricultural sector, and cultural differences.

If the relationship of Turkey and Greece is also accounted for, it is not difficult to understand the underlying barriers to Turkey's membership in the EU. On the other hand, Turkey is probably the most important non-member Mediterranean country for the EU, both economically and politically (Tovias, 1993). After long negotiations, Turkey was accepted for membership in the European customs union in 1996. This was a big step from Turkey's point of view. This customs union between EU and Turkey developed their mutual trade links. By

accepting the Common Custom Tariff (CCT) agreement, Turkey would lower its import tariffs on EU exports and adjust itself to the common commercial policy applied by member countries of the EU on third countries.

Undoubtedly, the changes in tariff policy of Turkey resulting from the full membership of Turkey will have an effect on both the Turkish and EU budgets. This research will seek to analyze the budgetary effects of the potential entry of Turkey into the EU from the Turkish point of view. The analysis will focus on three major sectors: the agricultural sector, the services sector, and the manufacturing sector.

This chapter of the dissertation will include an introduction of Turkey-EU relations, and liberalization efforts of Turkish economy during 1990s. In addition, the problem statement, justification, objectives and procedure of the dissertation will be included. Finally, the general outline of the dissertation will be presented in this introductory chapter.

What Did the Customs Union Bring to Turkey?

Turkey's entry into a customs union raises some important questions. What happens if Turkey's access to the EU is approved? What kind of policy changes should each country adopt? What are the losses and gains for the EU and Turkey? And what kind of social problems will arise? Economic theory suggests that an instant integration may result in very extensive social and economic problems for the countries involved, especially if they have differing levels of economic development. Therefore, the EU encouraged a transition period to avoid such negative impacts. In this transition period, Turkey is obligated to lower its tariffs, quotas, and other import duties on products from EU countries.

In order to implement customs union requirements, trading countries have to agree on an identical custom legislation and commercial policy (Peer, 1996). The simple tariff harmonization can be regarded only as a temporary period that leads to full market integration with the EU. In addition, it has been suggested that Turkey should remove all non-tariff barriers to improve social welfare. Failure to adopt this policy is much worse than the implementation of no policy at all (Yeldan, 1997), given that it opens new markets to Turkey including textiles, clothing, petroleum products, iron and steel. In the agricultural sector, Turkey's productivity is lower than that of the EU countries even though its average farm size is much greater. Adoption of the Common Agricultural Policy (CAP) would also change the income distribution in favor of large, more modernized, and more efficient farms, with small sized farms probably vanishing over time. This seems to be a positive effect at first glance, but it could generate unemployment problems in the rural areas of Turkey. Also, the European Community will be affected in three ways through Turkish involvement in the CAP: i) additional cost to the EU budget, ii) change in the Union's trade relations with third countries, and iii) change in the intra-community trade parities (Akder, 1987).

Even though Turkey is self-sufficient and may compete with the EU countries in the services and manufacturing sectors, some empirical analyses such as Yeldan (1996), Harrison et, al. (1996) show that Turkey's contribution to the EU will be less than burden that the EU will experience. Also, the relatively low per capita GNP of Turkey will put more strains on the EU's budget. The impact of intra-community trade would likely be significant in the manufacturing sector, but limited in the agricultural sector (Musto, 1990).

Problem Statement

Although there are pros and cons for Turkey's accession into the European Union, the effort of Turkish officials to join the EU will proceed. After major liberalization efforts by Turkey in the 1980s, the arguments about full membership in the EU become a priority for Turkey. Numerous studies have examined the effects of Turkey's possible entry into the EU and trade liberalization by Turkey (Harrison et al., 1992; Baysan, 1984; Blitzer and Baysan, 1991; Grais, de Melo and Urata, 1986; Arslan and van Wijnbergen, 1990). Some of these studies were static, and examined welfare implications of the liberalization efforts. Dynamic models have been used by, among others, Harrison (1993), Diao et al. (1996), and Mercenier and Yeldan (1997). Almost all of the dynamic models focused on welfare effects of possible entry, and none considered the budgetary side of the problem, with the exception of Diao et al. (1998). Also, the evaluation of the economy as a whole might indicate the gains or losses to the economy, but still allow the evaluation of the welfare effects for each sector. None of these studies differentiated the sectors, or analyzed the separate impact of possible entry for individual sectors.

Turkey's joining the EU will have a strong impact on Turkey's budget as well as the EU's budget and financial structure. Since the decisions are made politically, Turkish policy-makers need to know how to concentrate their efforts over the transition period, and produce policies accordingly. The research question then becomes which integration policy maximizes the net gains. This analysis will focus on three major sectors: agriculture, services, and manufacturing. Considering these three sectors, the effects of various integration scenarios in the transition period on the financial structure of Turkey will be analyzed using a general equilibrium approach.

Justification

Governments often transfer wealth between generations. That is why the present financial structure of governments becomes a very important issue. Even though Barro (1974) concludes that budget deficits have no effect on inter-generational distribution of wealth, consumption, savings, and the business cycle under the Ricardian view, we know that budget deficits have at least two effects under the standard view. First, they increase the country's balance of payment deficit by increasing internal and external government debts. Second, by increasing the balance of payment deficit, they increase the domestic currency exchange rates with respect to other currencies. In Lewis' (1985) model for Turkey, the overall effects of price level on production was ignored, and no real balance effects were considered. In particular, the model considered all policy changes as a whole, did not distinguish fiscal policies from monetary policies.

As Diao et al. (1998) explained, not only the transition economies such as Bulgaria, Romania, and the Slovak Republic, but also most market economies such as Greece, Turkey, Pakistan, and Egypt have very high fiscal deficits. The fragility of the economic development of a country can be determined by its fiscal constraints and the current account balance. Countries that are experiencing a current account balance deficit have difficulty attracting new foreign investments. Such countries must offer higher interest rates to attract foreign capital.

The effects of financial deficits become even more important when economic integration is involved. Choosing economic integration with other countries affects the country's macroeconomic variables such as imports, exports, price and investment levels, wage rate, and population. Since all these issues are closely related to budgetary and fiscal independence of a

country, pre-evaluation of such policy decisions should be carefully made. Appropriate forecasting of such policy results will improve the current and future policy making capabilities of the countries. These decisions are also important characteristics in terms of achieving a fair inter-generational resource allocation problem.

Research Objectives

General Objective

The main objective of this study is to quantify the financial effects of Turkey's trade liberalization efforts, and evaluate the policy decisions made during the transition period toward full membership in the EU. In addition, trade relations between the enlarged EU and the rest of the world (ROW) will be modeled to obtain complete general equilibrium results of Turkey-EU integration.

Specific Objectives

The specific objectives to accomplish these goals are to:

1) Identify and review relevant literature concerning economic integration, and relevant trade policies for the EU, Turkey, and the rest of the world.

2) Formulate a theoretical model for integration, and use the model to hypothesize the financial impact of integration for each sector individually, and for the economy as a whole.

3) Specify and estimate an empirical model to determine the budgetary impacts of Turkey's full membership in the EU and other intermediate policy scenarios by using a computable general equilibrium approach.

4) Develop recommendations for country officials as mentioned earlier, and provide implications for future economic integration and multilateral trade agreements.

Research Procedures

Objective One

The first objective of the research will be accomplished through the development of a comprehensive review of relevant literature to aid in the development of the appropriate theoretical model. Literature reviewed will include research regarding European integration as well as other regional economic integration, such as NAFTA. The intuitions and implications of liberalization will be reviewed as well as different policies concerning the European Union and Turkey.

Objective Two

In order to accomplish the second objective, a single-country, multi-sectore computable general equilibrium (CGE) model will be developed. The sectors to be evaluated are agriculture, manufacturing, and services. In order to get the best results, the Turkish economy is divided into 22 sectors: 2 agricultural, 18 manufacturing and 2 services sectors. Even though the general equilibrium procedure is similar to the Ichioka and Tachibanaki (1989) model developed for Japan, some of the assumptions will be different. First, this study will consider the differentiation of import and exports as EU and ROW. This differentiation makes the computation of net gains due to integration much easier and more detailed. Second, Turkey will be considered as a small country. Unlike Japan, the policy decisions of Turkey don't significantly affect the rest of the world. Because the change in Turkish policies will not effect the world prices. Third, the budgetary impacts and various accounts of macroeconomic balances will be evaluated.

A CGE model should include a set of utility and production functions, a vector of endowments to consumers, and a set of equilibrium conditions. When examining economic integration there should also be a foreign sector in the model. Such a model was specified by Diao, Roe, and Yeldan (1998). Different scenarios were used to explain the effect of Turkey's possible entry into the EC. They aggregated production activities into six sectors (agriculture, consumer manufacturing, producer manufacturing, intermediates, private services, and public services).

The combinations of the models explained by Kose (1996) and Yeldan (1997) are used in this study with the following modification. First of all, both exports and imports are divided into two different sources: EU and ROW. Kose's model used a single specification of the export account, and did not consider the origin of the exports. This specification of exports and imports gives a better opportunity for analyzing the integration process in terms of net gains from full membership into the EU. Secondly, the data used in this model is expanded. Turkish Input Output data is used along with Kose's (1996) SAM and de Santis' (1996) disaggregated SAM. This combination of data gives more flexibility in terms of policy alternatives and provides more accurate results. The third modification of the model is in the sectoral aggregation of the economy. Too much aggregation in this type of model might cause unrealistic results, and very small accounts appear as if they are more important in the economy. In order to prevent this, some sectors are aggregated. Another modification is to extend the model by including the full membership instead of customs union, and include some fiscal policies into the model. Also, the scenarios of the model in the policy analysis are different and more comprehensive.

The decision processes of the model are differentiated as public and private, and the Armington specification and small country perspectives are recognized throughout the model. The Armington assumption assures that same products produced by different origins are imperfect substitutes. The import demand for each sector is determined in two stages. In the first stage, domestic production and sectoral import demands are solved in terms of relative prices and exchange rates. In the second stage, the import and export demands explained in the first stage are differentiated into two origins: EU and non-EU. This differentiation in the imports in terms of origin makes the analysis of full accession of Turkey into the EU much easier. Because, Turkey has to remove all import duties levied on the EU commodities and not on non-EU commodities, the custom taxes collected from the EU countries and non-EU countries will be put into different categories in order to capture the impacts of the accession to the EU.

There are three agents in this model: producers, consumers, and the government. The production technology consists of labor, capital, and intermediate inputs. The movement of the capital from one sector to another takes time. So, in the static model, a restriction must be put on the capital mobility among sectors. Also, the production technology is assumed to have multi-level constant elasticity of substitution (MLCES). This technology can be formulated as:

$$Q_i = A_i(\alpha_i V_i^{-\beta_i} + (1-\alpha_i)N_i^{-\beta_i})^{-1/\beta_i} \qquad (1.1)$$

where A_i represents the scale parameter showing the returns to scale, V_i represents value added factors (capital and labor), N_i represents composite intermediate commodities, α_i represents the

distribution parameter, β_i represents substitution parameter, and $\xi_i = 1/(1+\beta_i)$ represents the elasticity of substitution between factors and intermediates.

The value added factors in equation (1.1) can be expressed as follow:

$$V_i = AV_i\{\sum_s d_{i,s} L_{i,s}^{-r_i} + (1-\sum_s d_{i,s}) K_i^{-r_i}\}^{-1/r_i} \quad (1.2)$$

where AV_i represents the scale parameter, $L_{i,s}$ represents labor categories, K_i represents capital, $\delta_{i,s}$ represents share parameter, and $\varphi_i = 1/(1+r)_i$ represents the elasticity of substitution between primal production factors (capital and labor).

The intermediate input demand is defined as Leontieff technology, where inputs should be used in a constant proportional way to produce certain amount of output. This technology can be defined as follow:

$$N_i = \sum_j a_{ij} Q_i \quad (1.3)$$

where a_{ij} is a constant, and cannot be changed in short term.

The producers try to choose optimal level of physical and intermediate inputs in order to minimize their production cost. With this regard, the optimum level of input choice of producers can be formulated as:

$$MinPQ_i QS_i(1-tax) = PVA_i V_i + PN_i N_i \quad (1.4)$$

subject to

$$V_i = AV_i\{\sum_s \delta_{i,s} L_{i,s}^{-\rho_i} + (1-\sum_s \delta_{i,s}) K_i^{-\rho_i}\}^{-1/\rho_i} \quad (1.5)$$

where PQ_i represents price of good i, PVA_i represents price of primary inputs, and PN_i represents price of intermediate inputs.

The subsequent step of the model is to determine the optimal factor use. The model considers four types of inputs: non-mobile capital, Leontieff technology intermediate input, marginal labor, and organized (formal) labor. Labor supply is assumed constant for both labor categories. Wages in the organized labor market are very elastic (it can be assumed infinitely elastic). If the wage rate in this sector is sufficiently high with respect to the equilibrium level, the remaining excess supply of labor enters the marginal labor market and creates unemployment in this sector. As a result, wage rate in the marginal labor market decreases (Kose, 1996).This characteristic of the labor market will be explained in chapter three.Another important characteristic of the model is to consider the monopolistic structure of some industrial sectors. In other words, along with perfectly competitive pricing strategy, monopolistic pricing strategy is used for the sectors that have this kind of structure.

Consumers try to minimize their cost, and this minimization process can be formulated as:

$$MinPC_i CC_i = PD_i DC_i + PM_i M_i \quad (1.6)$$

subject to:

$$CC_i = C_i[\phi_i M_i^{-\phi_i} + (1-\phi_i) DC_i^{-\phi}]^{-1/\phi_i} \quad (1.7)$$

where CC_i, M_i and DC_i represent domestic composite commodity, imported commodity, and domestically produced commodity, respectively; C_i represents shift parameter, ϕ_i represents share parameter and $1/(1+\phi_i)=\sigma_i$ represents elasticity of substitutions between domestic and imported goods. PD and PM represent domestic and imported good prices, respectively.

Determining the sectoral imports and exports are the next step of the model. As mentioned earlier, exports and imports are distinguished in terms of their source, and assumed that they are limited substitutes for each other. The formulation of this process for imported goods is:

$$M_i = \Omega_i\left[\gamma_i MEU_i^{-\tau_i} + (1-\gamma_i) MRW_i^{-\tau_i}\right]^{-1/\tau_i} \quad (1.8)$$

where MEU and MRW represents imports from the EU and imports from ROW, respectively; and γ_i represents share parameter, Ω_i represents shift parameter, and $\varepsilon_i = 1/(1+\tau_i)$ represents elasticity of substitution between different origin imported goods.

Given different origin imported good prices and degree of elasticity of substitution, the optimization problem of the consumers:

$$MinPM_i M_i = PMEU_i MEU_i + PMRW_i MRW_i \quad (1.9)$$

subject to:

$$M_i = \Omega_i \left[\gamma_i MEU_i^{-\tau_i} + (1-\gamma_i) MRW_i^{-\tau_i} \right]^{-1/\tau_i} \quad (1.10)$$

where PMRW, and PMEU represent the import price of rest of the world and the import price of the EU, respectively.

The export supply side of the model can be formulated similar to the import supply function explained above:

$$QS_i = D_i [\mu_i E_i^{-v_i} + (1-\mu_i) DC_i^{-v_i}]^{-1/v_i} \quad (1.11)$$

where D_i shift parameter, and μ_i represents share parameter.

The maximization problem become:

$$\text{Max } PQ_i.\ QS_i = PD_i\ DC_i + PE_i.\ E_i \quad (1.12)$$

subject to:

$$QS_i = D_i [\mu_i E_i^{-v_i} + (1-\mu_i) DC_i^{-v_i}]^{-1/v_i} \quad (1.13)$$

where D_i represents shift parameter, E_i represents commodity exported, μ_i represents share parameter, and $\varsigma_i = 1/1+v_i$ represents the transformation elasticity.

Following the specification of the maximization problem, the origin of the exports should be determined. Since we have specified two different origins as exports to the EU and exports to the ROW, the Armington function for this problem can be formulated as:

$$E_i = \psi_i [a_i EEU_i^{-\eta_i} + (1-a_i) ERW_i^{-\eta_i}]^{-1/\eta_i} \quad (1.14)$$

where EEU_i and ERW_i represent exports to the EU and ROW, respectively.

The private income (YH) consists of gains from value added production of private sector, transfers from government and the rest of the world, and factor incomes. The private sector value added can be obtained by subtracting government factor income and corporation tax.

$$YH = [(PVA\ V) - FI_G - TAX_{CAP}] + \underline{T} + (\underline{FI_P} - \underline{PT_{ROW}})\ ER \quad (1.15)$$

where FI_G, and FI_P represents factor income of the government and private sector, respectively, TAX_{CAP} represents corporation tax ratio, T represents transfers to the private sector, PT_{ROW} represents private income transfers to the ROW.

The public sector is another independent component of the economy. That is why the public sector should be considered carefully in order to make a model complete. Misspecification of the public sector income creates serious drawbacks in the model. The following equation shows that the public income consists of tariffs, indirect taxes, direct taxes, corporation tax, factor income of the government, and government's foreign factor incomes:

$$GREV = TARIFF + TAX_{IND} + TAX_{HH} + TAX_{CAP} + FI_G + \underline{GFI_{ROW}}.\ ER \quad (1.16)$$

where GREV represents government revenue; TAX_{IND}, TAX_{HH}, and TAX_{CAP} represent indirect tax, income tax, and corporation tax, respectively; and GFI_{ROW} represents government's factor income from the rest of the world.

The balance requirement in the goods market assumes further that demand and supply of composite commodity (CC) in each sector must be in the equilibrium:

$$CC = INT + CD + GD + ID + (DST^{p} + DST^{g}) \quad (1.17)$$

where INT, CD, GD and ID represent intermediate demand, private consumption demand, government consumption demand, and investment demand, respectively; and DST^{p} and DST^{g} represent private and public inventory investment, respectively.

The basic framework of the model explained above is the key formulation of this study. The details of the model are analyzed in Chapter 3. The analytical model here is the static representation of the TRCGE model, and dynamic affects of the full membership of Turkey into the EU will not be analyzed. The model represents a single country, multi-sectoral framework with implicit inclusion of the EU and ROW. With this framework, it is easier to investigate the financial impacts of full membership into the EU.

This research will model three agents for each sector: consumers, producers, and the government. Consumers represent households, and have constant elasticity of substitution (CES) utility functions between imported goods and domestic goods. They buy government bonds, and maximize their utility in terms of the Armington specification. The Armington assumption implies that the products produced in each country are differentiated on the basis of geographic area of production and by their physical characteristics (i.e., products are heterogeneous across countries as in the Heckscher-Ohlin model). The level of foreign savings are assumed to be exogenous. Producers represent the firms. The firms in each sector try to maximize the value of the firm. Production and investment decisions are made accordingly. The government represents the fiscal

authority. The fiscal authority has the right to collect taxes (income, import, and other direct and indirect taxes) in order to finance public expenditures such as public investments, public services, and social security payments. The deficit between revenue and expenditure is financed by issuing public bonds.

Objective Three

In order to achieve the third objective, an empirical model will be developed to determine the budgetary effects of Turkish integration using various scenarios. The data concerning production, consumption, prices, wages, and protection rates will be collected for a representative base year. Also, comparative static analyses of production, consumption, tariff rates, and the budget relations will be conducted.

Regional CGE models usually simulate an economy in which prices adjust to clear markets. All transactions among economic actors in the circular flow of income within a regional economy are captured. Each region in the model traces the flow of income from producers to households, government, and investors. Also, a CGE model is a numeric specification of a country's overall equilibrium that is useful for policy evaluation. Such models should take into account a set of utility and production functions, a vector of endowments to consumers, and a set of equilibrium conditions (Rutstrom, 1991).

To accomplish this objective, a social accounting matrix (SAM) of the Turkish economy will be constructed. The SAM provides a snapshot for an economy regarding commodity and money flows for a specific period. Since the SAM provides a general picture of an economy, the CGE model will be adopted after evaluation of the SAM for the Turkish economy. The model

will use base year data to simulate different policy scenarios assuming the world economy is in a steady state.

Using the specified empirical model as a base, welfare changes due to various levels of integration will be analyzed. As explained earlier, there are various potential integration scenarios that can be adopted by the Turkish government. Each of these scenarios will result in different levels of producer surplus, consumer surplus, and net government revenues. Hence, the change in social welfare will be different for each scenario. Using a framework of this type, these scenarios will be evaluated in order to determine the optimal integration policy for Turkey.

Objective Four

In order to achieve the fourth objective, the simulation and calibration results from the CGE model will be reviewed, discussed, and interpreted, and policy recommendations will be made accordingly. Since the fiscal balance of a country is crucially important to a country's welfare, the policies must be made correctly, and results must be observed very carefully. Also, the "crowding out" impacts of government interventions will have financial and budgetary impacts on the economy. As Yeldan (1997) explains, financing the public deficit by issuing government bonds or monetization will have significant diverse effects on real output, employment, the interest rate, and the exchange rate. Also, trade liberalization might harm both member country and world welfare. So, preferential trade agreements could be trade diverting or trade creating (Bhagwati, 1996). In order to avoid any negative impacts of Turkey's accession into the EU, the CGE results attained by calibration and simulation techniques will be discussed, and government officials will be informed of any impacts. The policy recommendations will be useful not only for

Turkey but also for other countries involved in the process of integration. In addition, other countries that do not belong to the EU can benefit from the results.

Outline of the Dissertation

This research will be organized into six chapters. The introduction, research problem, identification of research objectives, and a description of research procedures will be included in Chapter One. Chapter Two will include a broad review of previous literature. Chapter Three will present the theoretical and the empirical application of the model developed. Basic ideas and stages about a SAM will be explained, and a SAM will be constructed for the Turkish economy in Chapter Four. Numerical results from different scenarios, and policy implications of integration into the EU will be presented in Chapter Five. A summary, conclusion, and suggestions for future study will be contained in Chapter Six.

CHAPTER 2

LITERATURE REVIEW

In this section of the dissertation, previous studies concerning the economic liberalization efforts of Turkey and possible accession into the EU will be reviewed, analyzed and discussed as well as the integration experiences of other countries. The first section of the literature review will consider the Turkish liberalization efforts during the nineties to join the EU. The second section will consider a historical overview of the political economy of Turkish-EU relationship. Finally, the third section will consider previously used integration models and other countries' integration experiences.

Liberalization Efforts of the Turkish Economy

Harrison et al. (1993) defined three types of liberalization options for the Turkish government: across-the-board liberalization, sectoral liberalization, and tariff harmonization to the EU's common external tariff policy. Since Turkey and the EU were interpreting harmonization differently, their analyses gave different results regarding tariff harmonization. In Turkey's interpretation, harmonization reduces tariffs to zero but still puts some import surcharges on EU products. However, the EU's interpretation is to reduce the tariffs and import surcharges to zero. In this case, the harmonization of tariffs is welfare enhancing for Turkey if it's interpretation is followed, but welfare-reducing if the EU's interpretation is followed (Harrison et al., 1993).

The acceptance of Turkey to the Customs Union in 1995 opened another discussion regarding tariff harmonization. By reducing tariff rates, Turkey will be losing its tariff revenues, but gaining the trust of the EU countries. The question must be asked, is this really beneficial for

Turkey? Yeldan (1997) used two types of analyses to capture the welfare implication of a customs union: (i) the implementation of a tariff harmonization program for a customs union, and (ii) the impact of joining the single European market. When Turkey joins the EU, non-tariff barriers will automatically be removed as well as tariff barriers. This will prevent import and export arbitrages, and the firms will be forced to use a single price. This price will be a mutual price for firms of both countries. In that case, the price will have a unique role to determine the welfare effects of integration. Harrison et al. (1993) claimed that the harmonization of tariffs will have very little beneficial effect on Turkey's economy. In order to be successful in liberalization policy, it is important for Turkey to use an export subsidy reduction policy combined with tariff harmonization policy. We might generalize this result and say that the success of the trade policy reforms depends crucially on reductions in both tariffs and export subsidies. The main conclusion that Harrison et al. (1993), and Panchamukhi (1994) pointed out was the fragility of the first-best rule. In other words, it is not the case that any partial movement toward the first-best trade policy for Turkey will result in some fraction of the welfare gains from that first-best package. Of course this is a restatement of well-known second-best results (Harrison et al., 1993).

Structural adjustment policies of Turkey in the eighties and early nineties were analyzed by Boratav et al. (1996). They divide Turkish liberalization into three sub-periods: 1980-1983, 1984-1988, and 1989-1992. The first sub-period was the military phase which is characterized by military forced income policies. The second sub-period was characterized as the golden years of the Motherland Party. Steps were taken in terms of trade and financial liberalization in this sub-period. Also, the idea of a small government, and a huge private sector was born in this period

and was reflected in the privatization of some government assets. The third sub-period was the external financial liberalization years. Due to fluctuations in exchange and interest rates, a large number of foreign accounts were created in Turkish banks.

In order to determine the changes in Turkey's welfare by joining the EU, Yeldan (1997) used six different regions, and nine sectors of production. Assuming the economy is in the steady-state in the base year, he used Mercenier and Michel's (1994) results in the temporal aggregation. The welfare gains and losses due to the customs union were analyzed. The inter-temporal General Equilibrium model results showed that the best policy for international integration is to remove non-tariff barriers as well as tariff barriers.

Despite the optimism of previous researchers, Peers (1996) drew a pessimistic picture. He chose the title "Living in the Sin" for his article, implying that the customs union between Turkey and EU is formed without an organized and formal constitution. He suggests that before their relationship becomes more complicated, it would be best for them to collect all constitutional records into one document. With this unorganized and complex constitution, the customs union is not complete. He also argues that pre-accession strategy is an appropriate decision because gradual accession is always less harmful than direct accession. However, this strategy is not appropriate for a long-term relationship. The institutional structure's deficiency would still remain, and the legislative gap between Turkey and the European courts would make the decision-making process much harder and slower.

A complete analysis which utilizes a multi-sector general equilibrium model of Turkey's fiscal harmonization process is conducted by Diao et al. (1998). The study focuses on the effects

of fiscal debt and trade liberalization on foreign trade, capital accumulation, and the growth rate of Turkey. They use three different experiments. The first evaluates perfectly coordinated fiscal and trade policies, which means that all tariffs will be eliminated and income tax rates adjusted in order to compensate for tariff revenue losses. Thus, government revenue will be the same. Also, trade reform has no effect on government expenditure. The second experiment considers the reduction of tariff rates, and increased wage rates, but delays revenue enhancing policies, such as an increase in the income tax rate for 20 years. The third experiment is the same as the second except the delay in the revenue enhancing policies is 40 years. The results indicate that the longer the delay in fiscal policy adjustment, the more harmful the tariff liberalization will be. Under the first experiment, tax adjustment neutralizes the effects of tariff liberalization, but investment and imports are stimulated, due to decreases in tariff rates. As a result, the level of consumption increases. This expands the trade deficit and, thus, foreign capital inflows increase. Since Turkey has comparative advantage in the manufacturing and service sectors, the net exports of Turkey in these two sectors tend to increase. This growth in exports will be faster than its imports after the eighteenth period. As a result, under the first experiment, the economy as a whole will enjoy welfare gains from liberalization. The steady state capital stock increases by 14.5%, and consumption by 2.2% with respect to the pre-reform equilibrium. The welfare gain in the first 10 periods is 0.16%, and reaches 0.71% by the end of the thirtieth period. However, in the second and the third experiments, the results differ. Turkey suffers from fiscal problems due to the absence of compensating revenue sources. In the second experiment welfare losses will be seen in the first ten periods, but these losses disappear over time. However, in the third experiment,

the welfare losses resulting from tariff harmonization become worse over time. One shortcoming of the study is that it did not capture the spillover effects of investment and public consumption on the macroeconomic balances of the economy.

The Political Economy of Turkey-EU Relations

This section will evaluate the political-economy of Turkish-EU relations. First, a historical review of Turkish development will be discussed in the context of integration with the European Union. Next, the application process and potential reasons for rejection will be discussed. Finally, full membership and the effects of a customs union and effects of customs union will be discussed.

A Historical Overview

Turkey's relationship with the Europe has a long history of diplomacy, international trade, and culture. This relationship started before the modern Turkish Republic was formed. The Sultans of the Ottoman Empire used diplomatic relations with Europe to help balance its power. The importance of the geographical location of the Ottoman Empire was very important for other countries, because its territories were a link between the continents of Asia and Europe. The Silk Road was very important for the Russian economy; they had to pass thorough the Turkish territories in order to go to warm seas. The Ottoman Empire's efforts to maintain good relations required restrictions of Russian expansion in terms of using the Silk Road. Thus, Russia and Turkey became enemies. As a result of Turkish deterrence policies with respect to the Russians, the Western security organizations accepted Turkish membership as a reward for Turkey's participation in efforts against Russia. Thus, Turkish willingness to accede into the EU is linked

with these events of 1856. After the collapse of the Ottoman Empire, a new Turkish Republic was formed in 1923. Turkey's foreign policy, since then, has been based on four principles: (i) non-interference in the Middle East (ii) acceptance of European security systems, (iii) non-interference in the disputes among other countries, and (iv) good relationship with other nations (Muftuler, 1997).

The World War II years were very difficult for Turkey, given that the Soviet Union was demanding a portion of the Turkish territories. Turkish officials had to find a way to deter the Soviet Union from this decision. One strategy was to have a closer relationship with Europe. Turkey's membership in regarding NATO began at this time. NATO accepted Turkey as a member, given its geographic location bordering the Soviet Union and in close proximity to the Middle East. This crucial position was very important for NATO, not only for defense of the Eastern Mediterranean, but also to prevent the Soviet Unions's plan to invade Iranian Azerbaijan. However, Turkey's relationship with the U.S. started to deteriorate, and the relationship with the U.S.S.R. showed improvements during late 1960s and early 1970s. This deterioration in U.S.-Turkey relationship could be seen by the declaration of an arms embargo against Turkey in 1975, in addition to President Johnson's warnings to Turkish officials regarding involvement with the Cyprus issue. Disagreement over the Cyprus issue worsened the Turkish-Greek relationship and the Greeks used this issue in the international arena as if it was a Turkish-EU problem (Muftuler, 1997).

The military takeover in 1980 changed Turkey's relationship with other nations. Turkey become closer to Middle Eastern countries, especially Iran and Iraq. The trade relations with

these countries improved while the relationship with the Europe begun to deteriorate. The basic reason was the European countries' and the Council of Europe's disapproval of the undemocratic military takeover. The disappointment of Europe led Turkey to look for alternative trade partnerships with more convenient and closer regions, such as the Middle East.

After 1982, the situation become somewhat better in Turkey. However, the attitude of the Turkish government in the Gulf crisis in 1990 changed the relationship with the Middle East. This occurred because of the Turkish government support of the NATO attack and economic embargo against Iraq. In this sense Turkey was a very strategic country for both Iraq and the United Nations (UN). Because Iraqi oil pipelines pass through Turkish territories, without Turkey's help the embargo would certainly fail. After negotiations with UN officials, Turkish president Turgut Ozal declared the closing of Iraqi oil pipelines. Through this decision, Turkey was actively involved in the UN embargo against Iraq, and expected losses within the Turkish economy would be compensated by UN. However, the results turned out to the contrary. Turkey suffered economic losses due to the imposition of the embargo. These losses were estimated at sixteen billion dollars in 1990, nine billion dollars in 1991, and twenty billion dollars in 1992 (Muftuler, 1997).

Turkey and the European Union

The westernization efforts of Turkey reached a critical point in the late 1950s. According to Turkish policymakers, an association agreement with Europe was the best policy. Also, there were other interest groups, such as the Istanbul Chamber of Commerce and government sub-sectors in the ministry of foreign affairs, that support the association idea. These groups stressed

not only the trade benefits, but also the civilizing mission of the association. However, EC officials were cautious about the inclusion of Turkey due to the poor economic development of Turkey. Instead of an association, the EC initially offered Turkey economic assistance. But when the EC signed a treaty of association with Greece, just an assistance offer, instead of an association to Turkey become too weak for the EC to defend (Balkir and Williams, 1993). To maintain a good relationship with both countries, the EC needed to treat both countries equally. When Turkey applied for associate membership after Greece, the EC accepted both applications. With this "associate membership" the EC was offering a long-run full membership. After the approval of the Turkish application, the negotiations between the EC and Turkey officially started on September 29, 1959. At the first meeting, both country officials agreed on a customs union to be realized within twenty-two years, with the final goal being full membership.

The Association Agreement: "The Ankara Treaty"

The Ankara Treaty was signed in 1963. Unfortunately, both Turkey and the EC signed the agreement for political reasons, not economic reasons. From the Turkish point of view, it was an opportunity to open EC markets; for the EC, it was maintaining the balance between Greece and Turkey (Muftuler, 1997). The Ankara agreement specified three main stages: i) the preparatory stage ii) the transitional stage, and iii) the final stage. The preparatory stage was to last not less than five years, and not more than eleven years. It was designed as a transition for the Turkish economy without putting any obligation on Turkey. During this period, the EC was to assist Turkey to improve its economic development under the agreement conditions. To do that, Community members decreased the custom duties for certain import commodities. This

process caused a significant increase of Turkish trade with the EC in 1968; Turkey was exporting more than half of its exported goods to the EC. In addition, the Community contributed about 175 million ECU for the development of Turkey (Yalcintas, 1990).

The second stage was a transitional period which aimed at the development of a customs union. It involved the harmonization of policies and liberalization of labor and capital movements. This period was designed to last between twelve and twenty-two years. According to the agreement, this stage was the most important stage of the Ankara Treaty, because both sides had to prepare for full membership and adopt a Common External Tariff (CET).

The third and final stage was designed to establish a full customs union between the EC and Turkey. This required Turkey to harmonize its tax structure and to accept the Common Agricultural Policy (CAP). Moving from one stage to another was not automatic, but depended upon completions of requirements and new negotiations.

According to the Ankara Treaty, the preparatory stage might have been completed as early as 1967. However, due to disagreements and misunderstandings, it did not end by this date. In 1970, both sides signed an additional protocol to establish a customs union by the end of 1995. Under this protocol, Turkey's duty was to reduce tariffs on European imports. For tariff reductions, EC and Turkey officials established two lists of goods for Turkish imports from the EC. The duties reduct from the first group of goods were to be implemented within 12 years, while the second group of goods was to be implemented in 22 years. In 1973 and 1976, Turkey reduced its duties on EC goods by 10 percent. However, the third reduction was rejected by Turkish officials, as it felt that the EC was not fulfilling its obligations. After this rejection, the EC

accepted free accession of Turkish industrial products to the European markets, excluding textile and petroleum products. They also granted Turkey a zero tariff for thirty seven percent of its agricultural exports to the EC. However, a number of problems arose when the protocol was put into practice. Among these problems was about the meaning of agricultural policy harmonization. The Community interpreted this as trade liberalization, but Turkey interpreted it as joining the CAP. This issue was an ambiguous question regarding the validity of the agreement. Even though Turkish officials announced that Turkey would apply for full membership in 1980, the military takeover on September 12, 1980 froze the full membership application process (Muftuler, 1997).

Afer the 1983 elections, the military returned the government to the civilians, and the situation in Turkey became more normal. This was the first step toward the establishment of a democratic regime. Under this normalization process, the government officially applied for full EC membership on April 14, 1987. After two years of evaluation, the EC gave a negative response. The Community's official reason involved ongoing internal integration of the Community. Also, the Community's rejection included a number of reasons that made Turkey's full membership impossible at that time. The first concern involved the necessity of political pluralism and improvement of human rights; the second involved the dispute with Greece; and the final concern involved the lack of viable solution on the Cyprus issue (Muftuler, 1997). Although the Community explained the official reasons for the rejection, the actual reasons may be different. As explained by Barchard (1985), Turkish land area was almost equivalent to that of the original Community of Nine, but it was considerably poorer than any other Mediterranean country that

had joined the Community. In terms of population, Turkey was the fifth largest populated country in the Community, but in the near future it was predicted that Turkey would have the largest population in the Community. Another reason was the difference in cultural norms and religion between the EC and Turkey.

The European Commission adopted policy in 1990 to develop Turkey-EC relationships. This policy package proposed a customs union with Turkey by December 31, 1995. At the thirty-forth Association Council meeting in 1993, Turkey and the EC came to an agreement on a cooperation package. This package involved the free circulation of goods, adaptation of the CAP, application for the Common External Tariff, and cooperation in trade related services. Finally, on March 6, 1995, Turkey and the EC signed a customs union agreement in Brussels, which was put into operation on January 1, 1996. With this major development in relations, the second stage of the Ankara Treaty officially ended and the final stage had begun.

Joining the Customs Union

The customs union agreement between the EU and Turkey was signed on March 6, 1995, and came into effect on January 1, 1996. As explained earlier, even before the customs union agreement, Turkey had a very close relationship with the EU countries. Although 52 percent of Turkish external trade is conducted with the EU, and more than 60 percent of foreign investments in Turkey came from the EU countries, there are still major problems with complete integration. The inflation rate, increasing unemployment, large government and large internal and external debt are major problems to be dealt with by Turkish officials. Also, there are non-economic problems, such as human rights and freedom of speech, that must be changed in the

Turkish constitution. In addition to these problems, the custom union agreement placed a number of obligations on the Turkish economy. These were that, (i) the Turkish parliament must adopt new laws concerning copyright issues, (ii) import and export duties must be removed completely, and (iii) the tax system should be revised, i.e, indirect taxes, such as sales tax, should be removed and direct taxation should be adopted. The success of the Turkish government in dealing with these mandates will determine the success of the customs union. Without the harmonization of policies between Turkey and the EU, the customs union cannot succeed (Muftuler, 1997).

Turkish officials adopted series of new laws in order to harmonize foreign trade with the EU in joining the customs union. Through this new legislation, Turkey adopted the EU's external trade policies. The new laws lowered the average protection level from 10.97% to 5.8%, while all custom duties imposed on industrial products for the EU and European Free Trade Area (E.F.T.A) were abolished. For agricultural goods, trade laws were modified according to GATT regulations. The tariff reductions on agricultural imports are scheduled to be completed by the year 2001, and the adoption of copyrights and patent laws were accelerated according to the Uruguay Round regulations. Considering these economic changes, the customs union helped Turkish society in terms of moving toward democracy. Although some laws concerning human rights were modified, there are still many steps Turkish democracy must take. Even though the customs union caused a new phase in EU-Turkey relations, whether or not this will lead to eventual full membership remains a question. For the future, there are three potential scenarios for the EU-Turkish relationship: (i) implementation of the agreement and eventual membership, (ii) limiting Turkey to preferential agreements with more concessions on trade issues subject to

review, but without the guarantee of a fully developed relationship, and (iii) a two-tiered agreement in which Turkey can be accepted for a full membership for certain policy areas, but not other policies (Muftuler, 1997).

Previously Used Integration Models

There is a significant amount of literature discussing integration models. One reason for the popularity of integration in economic literature is that integration has, and continuous to have, considerable effects on welfare. Prices, employment rate, balance of payments, internal and external debts of government, private investment and the exchange rate will be affected by integration. In short, a country will be affected in nearly every aspect of its economy. It is for these reasons that governments and economists exert so much effort in determining the effects of economic integration. Several examples are discussed in the following paragraphs.

Ichioka and Tachibanaki (1989) investigated the effects of removing tariff and non-tariff barriers for Japanese agriculture. The model they used provides some information about efficiency and distributional effects of the agricultural protection policy changes on the Japanese economy. The model consists of four parts: (i) 24 producer good industries, (ii) 18 consumer goods, (iii) household groups classified by income level, and (iv) government. The production function is described by:

$$Q_j = \min[VA_j | a_{0j}, X_{ij} | a_{1j}, \ldots\ldots, X_{nj} | a_{nj}] \qquad (2.1)$$

where j= 1, ...,24; Q_j represents the amount of j^{th} producer good; X_{ij} represents intermediate consumption; a_{ij} represents the coefficient of production (j=i); and a_{0j} represents the value added ratio. They chose value added, VA, as a constant elasticity of substitution (CES) function. The

price of consumer goods, PC_j, is described as: $[PC_1,.....,PC_{18}] = [P_1,.....,P_{24}]CV$, where CV is a conversion matrix which shows the amount of producer goods necessary to produce a unit of each consumer good.

The utility function is expressed as:

$$U = U[\alpha^{1/a_2} H^{v} + (1-\alpha)^{1/a_2} C_F^{v}]^{1/v} \tag{2.2}$$

where $v = (a_2-1)/a_2$, and a_2 = elasticity of substitution between present consumption H, and future consumption C_F.

The final applied general equilibrium model, which includes non-tariff barriers is expressed as follows:

$$M_j = c_j M_j^{*} [P_j/(1+t_{Mj})(1+z_j)PF_j e]^{g_j} (Y/Y^{*})^{h_j} \tag{2.3}$$

$$E_j = E_j^{*} (P_j/PF_j e)^{w_j} \tag{2.4}$$

where M_j represents import of the j^{th} good, E_j represents export of the j^{th} good, P_j represents the domestic price of the j^{th} good, PF_j represents the world price of the j^{th} good, e represents the exchange rate, Y represents the net domestic product, t_{Mj} represents the rate of import tax, g_j represents price elasticity of imported good, h_j represents the income elasticity of imported good, w_j represents price elasticity of exported good, z_j represents rate of non tariff protection from import competition, and $c_j = [(1+t_{Mj})(1+z_j)^{gj}]$. One drawback of the model is that it is static. The total supply of capital is assumed to be fixed, but the supply of labor is variable depending on the labor-leisure choice of households (Ichioka and Tachibanaki, 1989).

Another general equilibrium analysis investigating Japanese welfare changes resulting from joining the economic integration is modeled by Hadri (1997). He set up his model based on the assumptions that Japanese tariffs and non-tariff barriers on EU countries are too high, and need to be lowered. In his research, he used four trade regions; Japan, the US, the EU, and the rest of the world. One of the difference between his model and the one which will be used in this research is the fact that Japan is a large country. The trade policy of Japan significantly affects the US and the rest of the world. On the other hand, Turkey is a small country, and the trade policies of Turkey do not significantly affect the rest of the world. Even though the methodologies are similar in some sense, the implications of the general equilibrium model will be quite different.

Hadri(1997) used concepts of game theory, including the Cournot and Bertrand strategies in the model. The consumer utility function is expressed as:

$$U^{-\rho}=\sum_{k}^{G} f_g^{1+\rho} C_g^{-\rho} \tag{2.5}$$

where $\rho = \sigma - 1/\sigma$, C_g is the consumer demand for composite good g including both foreign and domestic goods, f_g is a share parameter, and sigma is the elasticity of substitution between any pair of goods.

The consumer demand for the composite good is given by:

$$C_g^{-\rho 1}=a_D^{1+\rho 1} D_D^{-\rho 1}+a_0^{1+\rho 1} D_0^{-\rho 1} \tag{2.6}$$

where D_D and D_0 are, consumer demand of Japanese and non-Japanese commodities respectively, and a_D and a_0 are share parameters of countries.

In the model, extended European Community (EEC) and non-EEC goods are assumed to be imperfect substitutes. The demand function for non-Japanese goods is given by:

$$D_0^{-\rho 2} = b_{EC}^{1+\rho 2} D_{EC}^{-\rho 2} + b_{NEC}^{1+\rho 2} D_{NEC}^{-\rho 2} \qquad (2.7)$$

where D_{EC} and D_{NEC} are consumer demand for EU and non-EU goods, respectively, and b_{EC}, b_{NEC} are share parameters. Given the prices of goods and disposal income, the optimum consumer demand for composite good C_g will be: $C_g = f_g (P_g^{a} / P^{a-1}) Y$, where P is the price index.

A similar study was done for the Spanish economy by Viaene (1982). He used an ex ante analysis of long-run effects of the probable entry of Spain to the EC by using a general equilibrium framework. The results before and after entry are compared. The model is expressed as follows:

$$M_{ij} = M_j(Y_i, P_{i1}, P_{i2}, \ldots\ldots P_{ip}) \qquad (2.8)$$

where j=1,2, ...p, $j \neq i$, and

$$X_{ij} = X_j(Y_j, P_{j1}, P_{j2}, \ldots\ldots, P_{ji}, \ldots\ldots P_{jp}) \qquad (2.9)$$

where j= 1,2,....., $j \neq i$; and i represents Spain, j represents Spain's trading partner, p represents the number of trading regions, M_{ij} represents Spain's import, X_{ij} represents region j's import from Spain, Y_i represents Spain's real income, Y_j represents region j's real income, P_{ij} represents region j's export price, and P_{jk} represents region j's export price.

Government tariff revenue due to trade is specified as the sum of tariff revenues received on individual country's nominal exports:

$$TR_i = \sum_{j=1, j \neq i}^{n} (t_j * MN_{ij}) \qquad (2.10)$$

where t_j is the average tariff rate applied on Spain's import by region j, and MN_{ij} is Spain's imports from region j. Economic integration is then examined assuming a linear relationship between imports and exports. Assuming interdependent flows, the model is shown as:

$$M_{ij} = \sum_{k=1}^{m} X_{it}^{k} \beta_{ij}^{k} + \sum_{h} \alpha_{ijh} M_{ijh} + v_{ijt} \qquad (2.11)$$

In this equation M_{ij} is not only dependent on X_{ij}, but also on trade flows from n-2 remaining regions to import market i. The model of bilateral import flows of countries has the following form:

$$M_{ijt} = \gamma_{ij}^{1} AV_{jt} + \gamma_{ij}^{2} CU_{jt} + \gamma_{ij}^{3} P_{it} + \gamma_{ij}^{4} M_{jit-1} + \alpha_{ij} \sum_{h \neq i, h \neq j} M_{jht} + v_{ijt} \qquad (2.12)$$

where jh represents the rest of the world, AV_j represents region j's aggregate demand, CU_j represents region j's rate of capacity utilization, and P_i represents Spain's export price. Unlike bilateral imports, this equation has lagged variables. Thus, it can take in to account the gradual adjustment of the trading pattern of price and activity. The author then used the three stage least squares (3SLS) method to estimate the parameters.

Another CGE model was developed by Harrison et al. (1993). This model is formulated as a system of nonlinear equations corresponding to the three classes of equilibrium conditions:

price-cost relations for producers, supply-demand balances for factor markets and commodities, and expenditure-revenue balances for domestic consumers and government. Domestic production consists of domestic and exported goods with a constant elasticity of transformation. The elasticity of transformation will be lower for highly differentiated goods, and higher for homogeneous goods.

The total supply function is expressed as:

$$S_i=\psi_i(D_i,\ M_i) \tag{2.13}$$

where S_i represents supply of good i, D_i represents domestic sales of good i, and M_i represents composite import of good i. The market clearing condition for domestic supply will be equal to output. This condition will be:

$$S_i=\sum_j a_{ij}Y_j+G_i+I_i+C_i \tag{2.14}$$

where Y_j represents the activity level of factor j, a_{ij} represents the input requirements for good i in sector j, and G_i, I_i, C_i represent final demand associated with government, investment, and final consumption, respectively.

Another component of this model was the income-expenditure balance, involving both consumer and government balance. Consumer's income consists of primary factor earnings plus foreign capital inflow less transfers. The budget constraint is shown as:

$$\sum_j \pi_i C_i=\sum w_k E_k+B-\tau_T T \tag{2.15}$$

where π represents the price of domestic import good i, w_k represents the market price of factor k, E_k represents endowment of factor k, B represents foreign exchange balance, and $\tau_r T$ represents the level of lump-sum transfer. However, they held the government demand constant

in all simulations. Their model assumes that government income consists of five components: lump-sum transfers from households, T; import tariffs, t_{ij}; value added tax (VAT) on factor inputs to production, v_i; production subsidies, s_i^P; and export subsidies, s_i^X. The government budget will be:

$$\sum_i \pi_i G_i = \tau_t T + \tau_t M_t + \tau_v V_i - \sum_i S_i^p (P_i D_i + p_i^x X_i) - \sum_i S_i^x p_i^x X_i \qquad (2.16)$$

where p_i represents price of domestic good i, p_i^x represents export price of good i, p_{ir}^M represents import price of good i from region r which is exogenous, τv represents replacement tax multiplier for factor taxes (VAT), τt represents replacement tax multiplier for tariffs, s_i^p represents the rate of production subsidy for good i, and s_i^x represents the export subsidy rate for good i.

The final identity in their model was price-cost balance. In the balance, price should equal marginal cost. This implies that the value of domestic supply should be equal to cost of domestic inputs plus import gross of tariffs and rents. The underlying equation is expressed as:

$$\pi_i S_i = p_i D_i + \sum_r (1 + \tau t_{ir}) p_{ij}^M m_{ir} \qquad (2.17)$$

where m_{ir} represents import of good i from region r, and t_{ir} represents import tariff rate on commodity i from region r.

Using this model a sensitivity analysis is performed. The procedures for this analysis were developed by Harrison and Vinod (1992). For each Monte Carlo run, they solved the counterfactual policy with the selected set of elasticities.

From this review of literature, it is shown that the theory of comparative advantage start with Ricardo and evolves into Heckscher and Ohlin's factor proportions model. The gains from trade are discussed in these models. Nations benefit from trade with each other, since they have different production and cost structures. The greater these differences, the greater their tendency to trade, and the greater will be the gains from trade. As Viaene (1981) explained, an integration analysis should be ex ante and general. Partial analyses cannot measure the whole economy, since modern economic theory considers that all sectors of an economy are linked. So, they should be considered together to obtain better results. By same token, the economies of countries will be affected as a whole from integration process. Integrations affect the economies' capital endowment, either through domestic capital formation or capital inflows from abroad (Viaene, 1981). One cannot properly measure the impacts of integration by simply using partial equilibrium models. Even though the implementation of general equilibrium models is very complex, integration analyses should be done using general equilibrium models to avoid the disadvantage of partial equilibrium.

CHAPTER 3

THEORETICAL FRAMEWORK AND METHODOLOGY

This chapter will present the theoretical framework of trade policies concerning economic integration and construct an empirical General Equilibrium Model that can be applied to the Turkish economy. As a tool to examine economic liberalization, the concept of General Equilibrium will first be discussed. Next, international trade theory will be reviewed and the theoretical implications of trade liberalization will be addressed. Finally, after stating the theoretical model to be used, implications for the empirical model will be explained in detail.

The Concept of General Equilibrium

A General Equilibrium model is a system of demand and supply functions in which all prices are determined jointly by the markets for a given policy specification, and a set of equilibrium conditions. The initial equilibrium is the base solution to the model. Computable General Equilibrium (CGE) models have been used to analyze a variety of economic and social issues such as policy changes; foreign shocks and forced reduction of foreign borrowing; and changes in the domestic social structure like human capital formation and asset reduction (Sadoulet and de Janvry, 1995). There is no money illusion in a CGE model. In other words, money is neutral, and decisions are made according to relative prices. In a General Equilibrium Model, the economy can be divided into three economic units: firms, which represent production side of the economy; households, which consume the commodities produced by firms; and government, which collects taxes and distributes monies according to social welfare By so doing, the government can influence resource allocation within the economy.

As mentioned earlier, the general equilibrium specification ensures equilibrium among demand and supply, and determines the price of goods and factors. To achieve this goal, the number of commodities and factors into which the economy is to be aggregated must be specified. This will require two considerations. First, the model adopted must be complex enough to capture underlying relationships between goods and factors, such as substitutability. Second, the model must be simple enough to be understood, yet powerful enough to satisfy the basic assumptions of the model (Krauss and Johnson, 1974).

The basic theory of the General Equilibrium approach is explained in Figure 3.1. Commodities and factors are summed for the sake of simplicity in this diagram. The direction of the arrow-head indicates sales while opposite directions indicate purchases. For example, two headed arrow between commodity market and government indicates that these two parties buy from and sell to each other. A further simplification is that there are just two exchange markets: commodity and factor markets. The existence of a money market is ignored for simplicity reasons. To successfully complete the general equilibrium analysis, the prices of the goods and factors that guarantee an equilibrium must be determined. The foreign sector must be included to show the impacts of imports and exports. The diagram also explains the relationship between the government and the other sectors. The dashed lines in the diagram indicate the possible impacts of government to influence the resource reallocation through the use of taxes and subsidies.

The Theoretical Model

In international trade, there are several theories explaining the various assumptions of free trade. Although each theory has its own shortcomings, the contribution of each on international

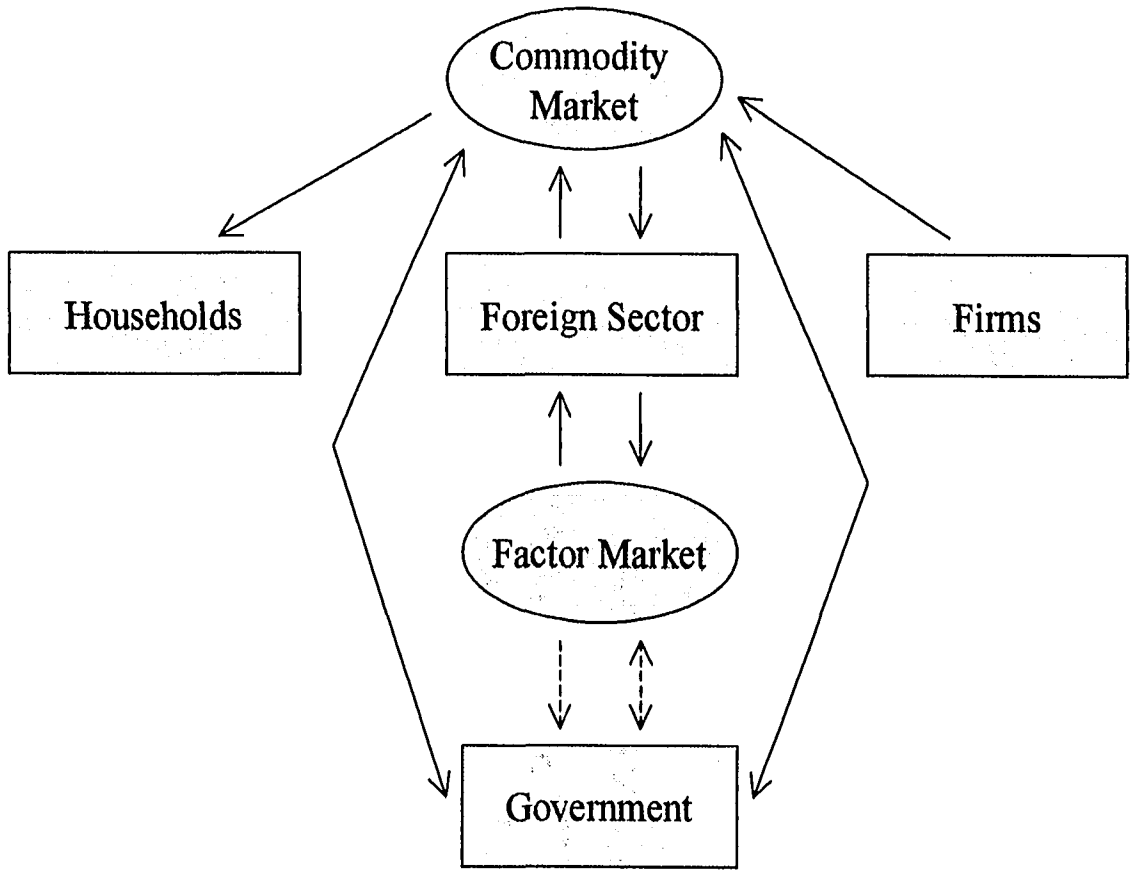

Figure 3.1: Concept of General Equilibrium (Adopted from Krauss and Johnson, 1974)

trade is significant. The analysis of the cost of protection is a mirror image of the gains from trade. In other words, moving from autarky to free trade affects income distribution in an opposite manner to that of the movement from free trade to autarky. One important difference, however, is the role of government. For example, the role of government is avoided in the analysis of gains from trade by modeling a tariff and its removal in a way that causes the tariff revenue of the government remain the same (Krauss and Johnson, 1975).

Additional divergences from free trade are non-tariff barriers, such as Voluntary Export Restrictions (VERs), and quotas. In perfect competition, the effect of tariffs and quotas is the same. However, in imperfect competition the effect of tariffs and quotas may diverge. Each of these trade barriers will be analyzed in this section, and the role of each tool for the whole economy will be discussed. Furthermore, the implications of the use of these tools for integration will be addressed in the following sub-sections. Without knowing the impact of trade barriers in the economies, the discussion of free trade or trade liberalization efforts will become a trivial discussion.

Tariffs

The reason for imposing trade barriers may be economic or non-economic. The economic reasons of imposing trade barriers involves the basic concept of protecting a specific industry or increasing tariff revenues. Non-economic objectives of restricting free trade can be specified as follow: (i) the output level in a specific sector might be considered critical, and might not be allowed to deviate from certain levels, (ii) a self-sufficiency problem may imply that the value of imports must remain at a certain level, (iii) the factor employment in certain sectors might

be considered important for defense or national independence, (iv) the domestic availability of certain commodities might be restricted in order to obtain a higher social welfare (e.g., luxury consumption). In order to maximize the social utility function, additional constraints are needed for each case. Also, for each constrained solution there will be an optimal second-best solution (Bhagwati and Srinivasan, 1969).

When determining the impact of a tariff in the international market, it is very important to determine the offer curves of the trading countries. Under free trade, the domestic prices and world prices are identical, and a single price is used for each export or import commodity. However, the imposition of a tariff changes this single price concept. Thus, different prices prevail in domestic markets and foreign markets for same commodity. The offer curve is the combination of all points representing possible price ratios. Each country has its own offer curve which explains its tactical moves. The offer curve for the home country can be defined as:

$$-\frac{\partial Y}{\partial X} = \frac{\partial U / \partial X}{\partial U / \partial Y} = \frac{\partial T / \partial X}{\partial T / \partial Y} = p_x / p_y = q_x / q_y \tag{3.1}$$

and for foreign country it is defined by:

$$-\frac{\partial X}{\partial Y} = \frac{\partial U / \partial Y}{\partial U / \partial X} = \frac{\partial T / \partial Y}{\partial T / \partial X} = \pi_y / \pi_x = q_y / q_x \tag{3.2}$$

where good X is exported by the domestic country in exchange for commodity Y which is exported by the foreign country; $T(X,Y)=0$ is the product transformation function; p_x, and p_y represent domestic prices of home country; π_x, and π_y represent domestic price of foreign country; and q_x, and q_y represent international prices for commodity X and Y, respectively.

The imposition of a tariff will cause a clockwise rotation in the offer curve of tariff imposing-country through the origin, and the volume of trade will decrease due to increase in domestic prices. This is shown in the Figure 3.2. The change in the home country's offer curve due to imposition of tariff can be expressed as follow:

and for foreign country it is defined by:

$$-\frac{\partial Y}{\partial X} = \frac{\partial U / \partial X}{\partial U / \partial Y} = \frac{\partial T / \partial X}{\partial T / \partial Y} = p_x / p_y = q_x / q_y(1 + t^D) \tag{3.3}$$

In similar way, a tariff distorted offer curve for the foreign country can be expressed as:

$$-\frac{\partial X}{\partial Y} = \frac{\partial U / \partial Y}{\partial U / \partial X} = \frac{\partial T / \partial Y}{\partial T / \partial X} = \pi_y / \pi_x = q_y / q_x(1 + t^F) \tag{3.4}$$

where t^D and t^F represent tariff rates in domestic and foreign countries, respectively.

In order to explain the implications of a tariff imposition, Figure 3.2 is adopted from Krauss and Johnson (1974) and modified. This shows that a tariff imposed by a small country causes different results than that of a large country. The horizontal axis shows the domestic country's imports while the vertical axis shows the foreign country's imports, or the domestic country's exports. OH and OF represent the home country and foreign country offer curves, respectively. Using the small country assumption, the shape of the foreign country offer curve will be a straight line through the origin and, hence, OF represents both the terms of trade and the foreign country offer curve.

Free trade situation will result in an equilibrium at point P_f. Point P_d is chosen arbitrarily to analyze the shift induced by tariff distortions, while P_t shows the export quantities supplied and

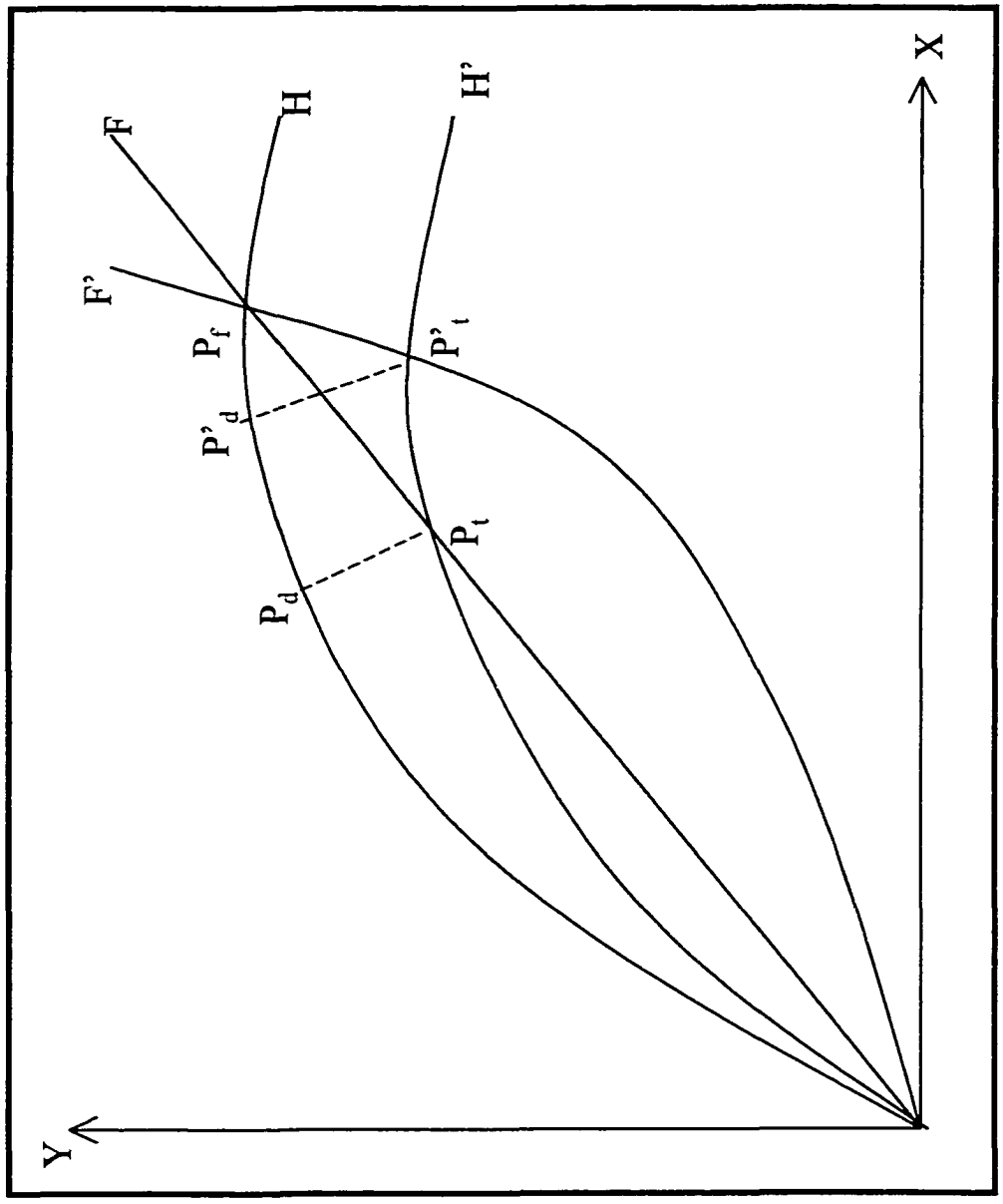

Figure 3.2: Effects of a Tariff on Trade (Krauss and Johnson, 1974)

imports demanded by the home country at the tariff-imposed price ratio. The offer curve of domestic country shifts to OH' as a result of the tariff imposition. Also, P_t shifts to P'_t and P_d shifts to P'_d. Notice that the slopes of the lines through P_d to P_t decreases from left to right. This implies that as the price of imports decreases, consumption of imported goods decrease as well. Under the small country assumption, the equilibrium shifts from P_f to P_t, the term of trade remains the same, and the volume of trade decreases. If the large country assumption is made, the foreign country offer curve will be represented by OF'. As a result, the equilibrium point shifts from P_f to P'_t, the terms of trade improves for the home country, and the volume of trade decreases.

Quotas

Quantity restrictions in international trade are called quotas. As with tariffs, the optimum quota level for a country is important in determining social welfare of that country. When one country imposes a quota for certain commodities, other countries often retaliates. This issue is a well-known concept of international trade: the quota war. Various scenarios of quota war have been discussed in the literature. For example, although a country may gain by imposing a tariff, even if other countries retaliate, Tower (1975) showed that a country can never gain through imposing a quota if other countries retaliate. The trade between countries approaches zero in the case where both countries use import quota retaliation.

The impact of an import quota is presented in Figure 3.3. The structure of the figure is parallel to Tower (1975) model. The horizontal and vertical lines represent country 2 exports and country 1 exports respectively; C_1 is the first country's offer curve, and C_2 is the second country's offer curve. Free trade occurs at the point f. Suppose country one is the first mover.

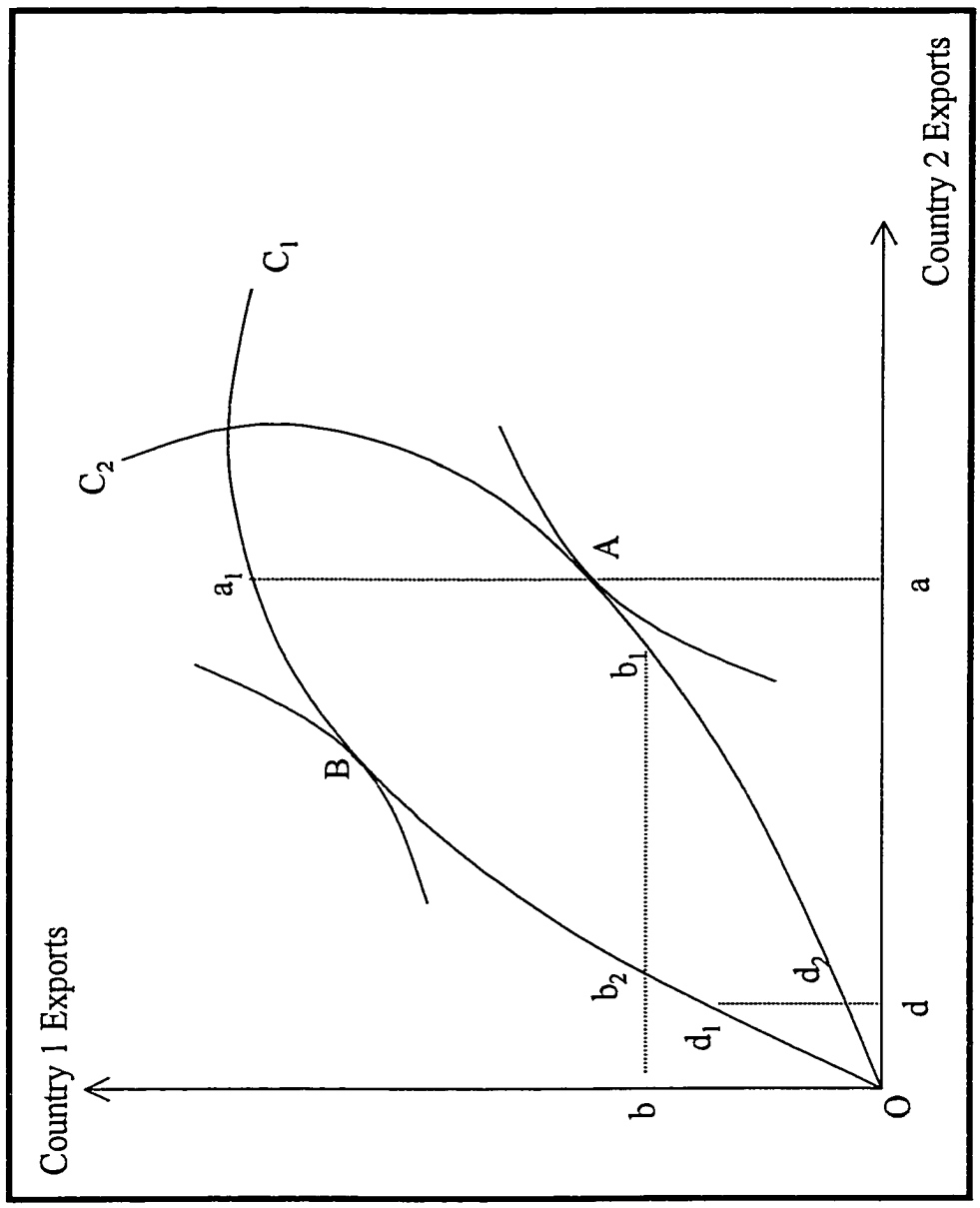

Figure 3.3: Effects of a Quota on Trade (Adopted from Tower, 1975)

The imposition of a quota by county 1 will restrict her offer curve to Oa'a, and the equilibrium will be at A. Country 2, then, selects a point on her offer curve just clockwise of A to retaliate the first country's quota, causing her offer curve move to Ob'b. The intersection of two offer curves at point B will give the new equilibrium point. Further retaliation by the first country will move the system to d_1, so on. This process continues until volume of trade asymptotically approaches to zero.

Voluntary Export Restrictions (VERs)

The Voluntary Export Restrictions (VERs) voluntarily imposed on a country's own exports. In other words, a country does not export more than a specific amount of a commodity to a specific country. As explained in Dinopoulos and Kreinin (1989), the main difference between quota and VERs relates to the country receiving the economic rent from international trade. In the case of quota, economic rent goes to imposing country; but in the case of VERs economic rent goes to exporting country. Although an import quota is levied on general commodities, a VER may be very discriminatory. This discrimination depends upon time, negotiation, and the country. In other words, a VER may be imposed on one country while leaving other countries free from restriction.

Implications of Integration

This part of the chapter will explain the situation in which Turkey and the EU integrate. In order to explain the impacts of integration and compare effects of different trade tools, a two stage game is assumed here. The first stage of the game determines the protection tools, and the

second stage determines the level of the protection. In the second stage bargaining take place, and if it fails the trade warfare starts.

Figure 3.4 shows the implications of Turkish-EU integration and explains the rationale behind this integration. The analysis begins with a three-country, two-commodity economy, which can be expanded to the n commodity case. The offer curves of the rest of the world, Turkey, and the EU are denoted by ROW, TR, and EU, respectively. The offer curve of the EU with inclusion of Turkey is also denoted by TR+EU. The trade indifference curves are denoted by U^{ROW}, and U^{TR+EU} for the rest of the world and the EU with Turkey, respectively. Since we are considering the implications of integration between Turkey and the EU, individual trade indifference curves are ignored for the sake of simplicity, and thus., the trade indifference curves of these countries are analyzed jointly. The free trade point will be f. If ROW imposes its optimal tariff and the Expanded EU (EEU) trades freely, q will be the equilibrium point; and if the EEU imposes its optimal tariff and ROW trades freely, the equilibrium point will be q_1.

If bargaining between ROW and the EEU fails in the second stage of the game, we need to determine the tariff reaction curves of each countries. These curves are R^{ROW} and R^{EEU}. The intersection of these curves, W, will be the equilibrium point for tariff warfare. The quota warfare equilibrium, as already explained before, will be no trade at all (point O).

In international trade, if there is no free trade agreement or integration, a protection imposed by a country is usually retaliated for with an equivalent protection by other trading partners. As a result, the tariff warfare equilibrium point between the ROW and the EEU will be point W.

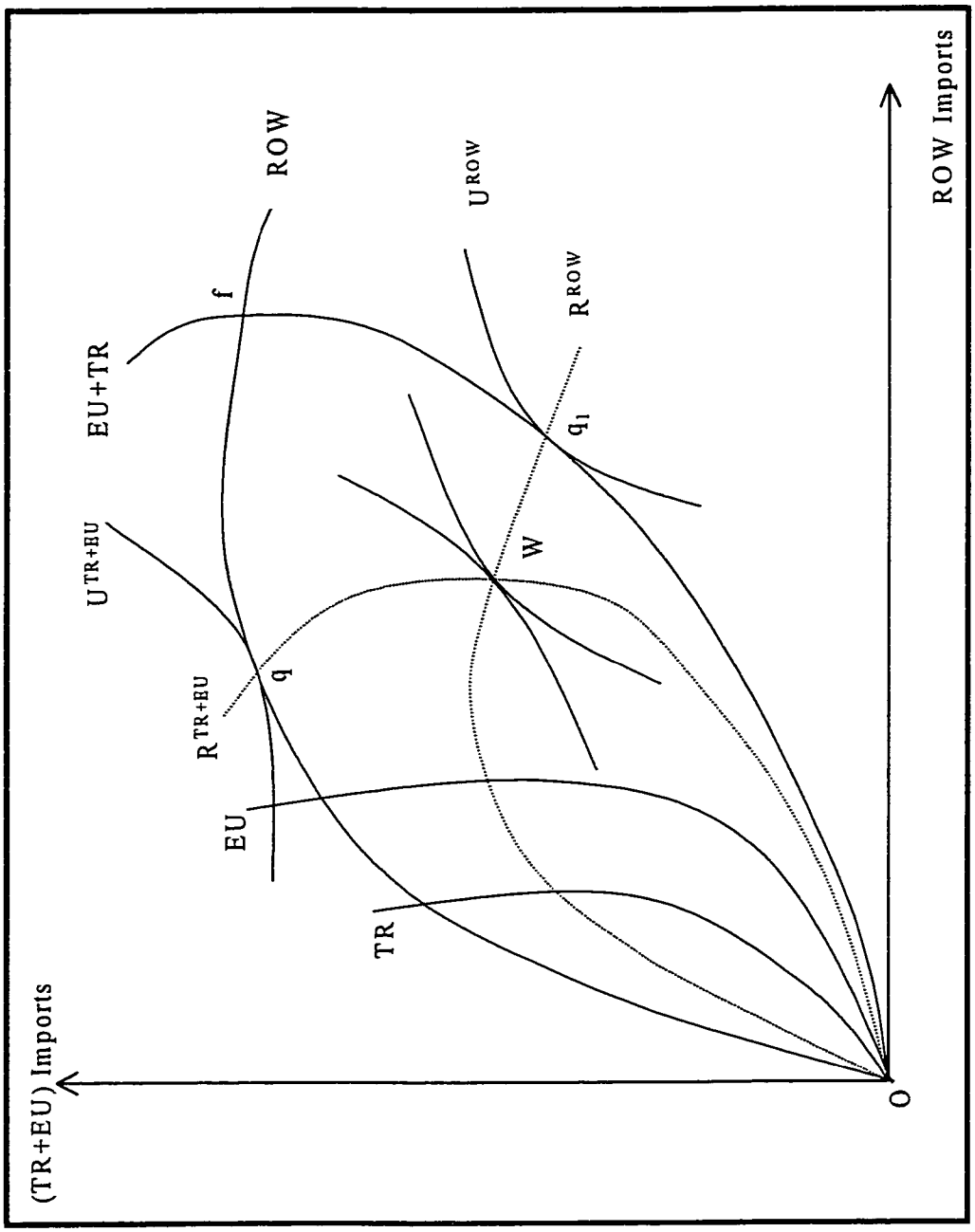

Figure 3.4: Effects of an Economic Integration on Trade

The integration between Turkey and the EU will allow us to combine their offer curves. Turkey and the EU will not use any trade protection tools against each other, but put restrictions for the other countries (ROW). As Gul (1989) mentioned, this situation can be called a partnership game. In other words, the EU and Turkey will act cooperatively regarding restrictions on others, but not on each other. The theoretical implication of this partnership game is an expectation of an increase in their welfare.

A General Equilibrium Model for the Turkish Economy

This part of the study aims to explain the analytical framework and mathematical construction of a computable general equilibrium model for the Turkish economy (TRCGE). This model explains the impacts of Turkey's full accession into the European Union. A CGE model selected for a specific economy should be as general as possible and must cover all sectors in the economy to get reasonably good results from calibration and simulation. With this framework, production, foreign trade, income and expenditure relations will be explained first, then calibration and simulation strategies will be explained in the next chapter.

The model used here is an extended version of Kose's (1996) model. The TRCGE model consists of three different sectors and a differentiated ROW account. The model has two important specifications. First of all, it considers imperfect competition in the Turkish manufacturing sector. With this important specification, we can differentiate the commodity market as perfect and imperfect competition, and highlight the policy implications in terms of these two criteria. Since the main objective of this study is to cover all impacts of full membership, the ROW account is differentiated into two sub accounts: EU countries and non-EU countries. The

second important specification of the model is to consider differentiated factors in the production process. As we know, capital and labor are used in the production process as primal factors. Labor is differentiated as "formal labor" and "marginal/informal labor" (Kose, 1996). With this specification we can analyze the basic characteristics of two different labor markets, and show the linkages between them. The criteria for this differentiation is explained in the Appendix 4.1. Labor market is divided into eight different categories, first three of which are considered as formal labor, and last five of which are considered as marginal labor. The production processes of the model are considered as multi-level constant elasticity of substitution.

The decision processes of the model are differentiated as public and private, and Armington assumption and small country perspectives are recognized throughout the model. The import demand for each sector is determined in two stages. In the first stage, domestic production and sectoral import demands are solved in terms of relative prices and exchange rates. In the second stage, the import demand found in the first stage is differentiated into two origins: EU and non-EU imports. This differentiation in the imports in terms of origin makes the analysis of full excess of Turkey into the EU much easier. Because, Turkey has to remove all import duties levied on the EU commodities and not on non-EU commodities, the custom taxes collected from the EU countries and non-EU countries will be put into different categories in order to capture the impacts of the accession to the EU.

The extension of the Kose's (1996) model made in this study will be in the following areas. First of all, export side of the economy will be differentiated into two categories as well as import side. Kose's model used a single specification of the export account, and did not consider

the origin of the exports. This differentiation lets us to analyze the sources of exports in the full accession as well as sources of imports. Secondly, the data used will be expended. Instead of Kose's (1996) aggregated SAM, de Santis' (1996) disaggregated SAM will be used to obtain the data needed. This disagregation in the data allow for more flexiblity and more accurate results. Third extension of the model will be in the agricultural sector. Kose's analysis considered the agricultural sector as a whole and no distinctions in the agricultural sector are made. However, our analysis here will separate the agricultural sector into two different categories: basic agriculture, and agribusiness. The last extension of the model concerns the full membership into the EU. Kose's model considers only customs union, not full membership. However, our model will extend the perspective of Kose's model to the full membership, and include some fiscal policies in the model. Also, scenarios of the TRCGE model of this study will be different and more comprehensive.

Production Technology and Factor Markets

The production technology consists of labor, capital and intermediate inputs. Labor is differentiated into two different categories as "formal labor" and "marginal labor", and total labor supply consists of the sum of these two categories. Sectoral intermediate input demand is assumed to show Leontieff technology characteristics.

Production technology is assumed to have multi-level constant elasticity of substitution (MLCES). Several advantages in working with this function can be mentioned. The main advantage of the CES function is that the elasticity of substitution is constant but not equal to unity. This condition is a desirable one, because the restriction of the unit elasticity of substitution

is relaxed making the function more flexible to work with. On the other hand, the CES function is homogenous of degree one. This technology can be expressed as:

$$Q_i = A_i(\alpha_i V_i^{-\beta_i} + (1-\alpha_i) N_i^{-\beta_i})^{-1/\beta_i} \quad (3.5)$$

where A_i represents the scale parameter showing the returns to scale, V_i represents value added factors (capital and labor), N_i represents composite intermediate commodities, α_i represents the distribution parameter, β_i represent the substitution parameter, and $\xi_i = 1/(1+\beta_i)$ represents elasticity of substitution between factors and intermediates.

The value added factors in the equation (3.5) can be expressed as follow:

$$V_i = AV_i\{\sum_s \delta_{i,s} L_{i,s}^{-\rho_i} + (1-\sum_s \delta_{i,s}) K_i^{-\rho_i}\}^{-1/\rho_i} \quad (3.6)$$

where AV_i represents the scale parameter, $L_{i,s}$ represents labor categories, K_i represents capital, $\delta_{i,s}$ represents the share parameter, and $\varphi_i = 1/(1+\rho)_i$ represents the elasticity of substitution between primal production factors (capital and labor).

The intermediate input demand is defined as Leontieff technology, where inputs should be used in a constant proportional way to produce certain amount of output. This technology can be defined as follow:

$$N_i = \sum_j a_{ij} Q_i \quad (3.7)$$

where a_{ij} is a constant, and cannot be changed in short term.

This kind of production technology assumes the producers' choice of physical and intermediate commodity demand is optimal and minimizes the cost of production. If the prices and technological constraints are given, the choices of producers can be mathematically expressed as follow:

$$MinPQ_iQS_i(1 - tax) = PVA_iV_i + PN_iN_i \tag{3.8}$$

subject to

$$V_i = AV_i\{\sum_s \delta_{i,s} L_{i,s}^{-\rho_i} + (1 - \sum_s \delta_{i,s}) K_i^{-\rho_i}\}^{-1/\rho_i} \tag{3.9}$$

where PQ_i represents price of good i, PVA_i represents the price of primary inputs, and PN_i represents price of intermediate inputs. The first order condition of this relationship gives the optimal level of primary and intermediate input use. This relationship is given as follows:

$$\frac{V_i}{N_i} = \left[\frac{PN_i}{PVA_i}\frac{\theta_i}{1-\theta_i}\right]^{\xi} \tag{3.10}$$

In the model, the value added price of a commodity gives the amount of factor needed to create one unit of net value added output. Also, the composite price of intermediate inputs can be calculated using a weighted average price of all intermediate commodities.

$$PVA_i = [PQ_iQS_i(1 - tax_i) - PN_iN_i] / V_i \tag{3.11}$$

$$PN_i = \sum_j a_{ji} PC_i . PN_i \tag{3.12}$$

where PC_i represents price of the composite good.

The next step of the model is to determine the optimal factor combination in the production process. The producers' basic problem here is to maximize profits. The following equation implies this basic assumption of the profit maximization criteria:

$$Max\pi_i = PVA_i V_i - \sum_s W_s L_{i,s} \tag{3.13}$$

where W_s represents wage rates in the two labor categories. When the first order condition for this problem is solved, we obtain labor demand for each category, shown as:

$$\frac{L_{i,s}}{V_i} = \left[\frac{\delta_{i,s}}{AV_i^{\rho_i}} \frac{PVA_i}{W_k \lambda_{i,s}} \right]^{\varphi_i} \tag{3.14}$$

where $\lambda_{i,s}$ represents wage differences between sectors for the same kind of labor force, and shows the distortions in the labor markets. This distortion can be defined as ratio of wage rate in each sector and average wage in the economy, and calculated as a parameter in the model. With this specification, the model leaves the traditional assumption of the neoclassical framework in terms of equal wage rates in all sectors, and considers the rigidity of wages in these markets. Because the labor market in this sector so qualified so that they don't work for below a certain wage rate.Labor supply is assumed constant for both labor categories (Kose, 1996).

Wage and employment rate in the formal labor market:

$$W_f = \underline{W_f} \tag{3.15}$$

$$\underline{LS_f} = LD_f + Unemp \tag{3.16}$$

Wage and employment rate in the marginal labor market:

$$\lambda_{i,M} . W_M = PVA_i (\partial V_i / \partial LD_M) \tag{3.17}$$

$$LD_M = LS_M + Unemp \quad (3.18)$$

where LD represents labor demand and LS represents labor supply.

The balance in the labor market is:

$$LS_f + LS_M = LD_f + LD_M \quad (3.19)$$

In order to understand the explained conditions about the labor markets, following diagrams are also adopted from Kose (1996). The first diagram represents the formal labor market, and the second diagram represents the marginal labor market. The formal labor supply is infinitely elastic on the wage rate of $\underline{W}_f$. If this infinitely elastic wage rate is higher than the actual wage rate in the formal labor market, demand for the formal labor will decrease. Thus, there will be unemployment in this market ($\underline{LS}_f - LD_f$). This excess supply in the formal labor market will go to marginal labor market. This flow in labor from formal market to marginal market will increase the unemployment rate in the marginal sector and, due to the increase in the level of unemployment in the marginal labor sector, the wage rate in this sector will decrease. This issue is presented in Figure 3.5.

The model assumes that capital accumulation in each sector is constant. These kinds of assumptions are made in most static CGE models in order to analyze the heterogenous capital stocks in different sectors. Kose (1996), Yeldan (1996) and Roe at. all (1988) are some examples for this kind of assumption. This heterogeneity assumption makes the problem easier in terms of capturing the impacts of different rate of returns for each sectors (Kose, 1996). The rate of return for capital in each sector can be easily calculated within this framework as follow:

$$P_i = PVA_i \underline{QS}_i - \sum_s L_{i,s} \lambda_{i,s} W_s \quad (3.20)$$

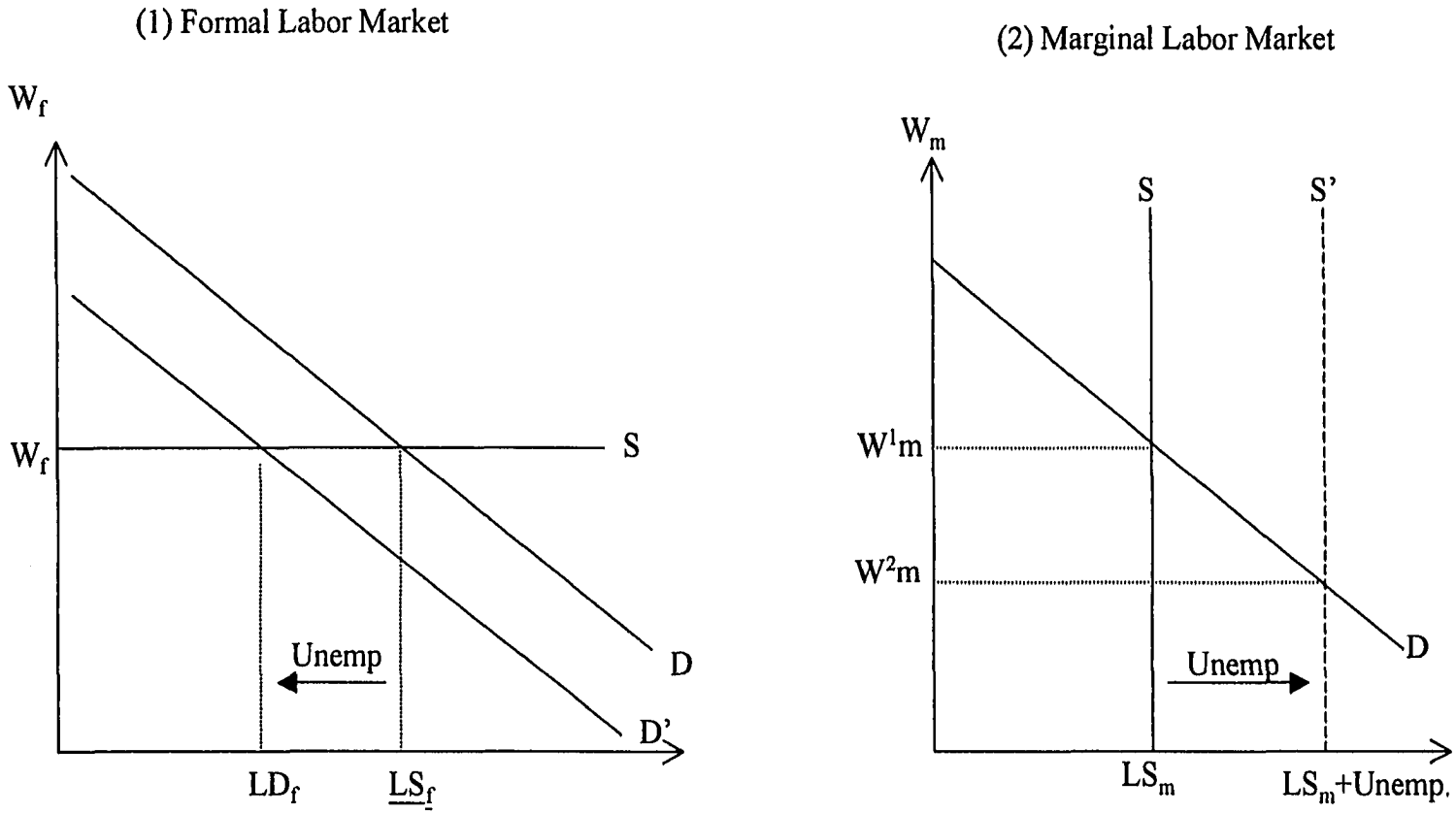

Figure 3.5: Equilibrium in the Labor Market

where P_i represents sectoral returns of capital. Equation (3.20) explains the rate of return for each sector can be calculated by subtracting labor payments from sectoral value added production income.

The main feature of the model in terms of pricing strategy is that it considers the monopolistic structure of the Turkish manufacturing sector. These types of models let our analysis capture excess profits due to the monopolistic structure of some sectors, and makes it more realistic in terms of explaining the policy alternatives. In order to explain the monopolistic structure of the Turkish manufacturing sectors, different kinds of concentration ratio (CR) have been used. Concentration ratio is an index that shows the monopolistic structure of sectors. Sectoral concentration ratios for the Turkish economy is given in Table 3.1.

Within this perspective, the supply in the market is determined using price and demand relationships in the monopolistic sectors. In other words, the companies determine the price, where their marginal costs are equal to marginal revenue. In this case, prices become higher than the average cost of the companies, and excess profits exist in these sectors. New entries into these markets are nearly impossible due to structural features or capital composition. However, agricultural and service sectors are assumed to be perfectly competitive. In these sectors, prices are determined where marginal cost is equal to average cost. Within this framework the prices in the monopolistic sectors can be formed in this way:

$$PQ_i = (1 + m_i).AVC_i \tag{3.21}$$

$$TVC_i = (\sum W_s \lambda_{ik} L_{i,s}) + PN_i N_i \tag{3.22}$$

$$AVC_i = TVC / QS_i(1 - tax_i) \tag{3.23}$$

Table 3.1: Concentration Ratios for Manufacturing Sector

Sectors	Number of Producers	Concentration Ratio (2)	Concentration Ratio (4)	Concentration Ratio (8)
Processed Food Industry	1746	5.99	10.11	15.48
Beverage *	97	22.58	33.28	49.73
Tobacco *	62	32.64	56.71	73.66
Textiles	1012	3.33	5.74	10.02
Wearing Apparel	1100	4.43	8.88	15.65
Leather and Fur Products	221	12.65	19.82	30.73
Wood & Furniture	315	21.77	34.39	45.74
Paper and Publishing	341	9.93	18.20	31.82
Chemical Products	336	19.05	27.70	37.46
Petroleum Products *	38	52.75	76.17	95.00
Class Products *	54	30.56	49.61	76.50
Non-Metallic Products	1222	14.27	24.11	34.43
Iron/Steel Main Industry *	260	25.83	38.76	53.16
Non-Iron Metal Industry *	125	35.29	53.02	65.64
Metallic Products Industry	698	11.01	16.19	22.99
Electrical Machinery	370	22.66	31.48	43.77
Non-electrical Machinery *	563	18.31	43.22	56.16
Transport Equipment *	311	28.79	46.26	61.78

(*): Monopolistic sectors

Source: Gunes (1996)

where AVC and TVC represent average and total variable costs, respectively, and m represents a constant that implies higher prices. This constant m implies that monopolistic sectors do not produce under their full capacity and transmits the higher costs directly to consumers if the demand curve is sufficiently inelastic. This higher price alters the income distribution and encourages the "rent economics" against labor (Kose, 1996).

Value added produced in the monopolistic sector (V_i) is assumed as a function of "capacity used ratio" (U_i). The capacity can be interpreted as the relationship between the changes in the market demands and value added produced in the market. This relationship can be expressed as:

$$V_i = U_i . f(K, L_F, L_M) \tag{3.24}$$

where U_i = Capacity used / Full capacity.

Foreign Trade and Balance of Payments

The model assumes five different commodities: (i) domestic, (ii) exported to the EU (iii) exported to the ROW, (iv) imported from the EU, and (v) imported from ROW. The differences in these types of commodities are specified using CES functions which are frequently used in CGE models. This structure determines the component of sectoral exports in the domestic production, and imports in the domestic demand.

Unlike traditional trade models, commodities are differentiated as tradable goods and non-tradable goods. This feature of the model gives more flexibility concerning analysis of Turkish membership into the EU. Also, the model follows the traditional Armington assumption.

This assumption distinguishes the commodities in terms of their origin as well as their types. In other words, the Armington assumption allows for the fact that the same type of commodities might be both exported and imported at the same time (intra-sectoral trade). However, in traditional trade models, intra-industry trade is omitted from the analysis and only inter-industry trade is considered. This assumption causes "extreme specialization" in trade, which makes domestic prices and resource allocation more sensitive to foreign policies. The model, in this context, determines the production process in two different stages. In the first stage, the composition of the domestic demand must be determined as domestic and imports. In the second stage, imports are differentiated as the EU imports and ROW imports (Kose, 1996). This specification allows for the different policy scenarios in the process of full membership.

According to the specifications above, the domestic sectoral commodities (DC_i) and composite import commodities (M_i) together produce a composite commodity such that:

$$CC_i = C_i[\phi_i M_i^{-\phi_i} + (1-\phi_i) DC_i^{-\phi}]^{-1/\phi_i} \tag{3.25}$$

where CC_i, M_i and DC_i represent composite commodity, imported commodity, and domestically produced commodity, respectively; C_i represents the shift parameter; ϕ_i represents the share parameter; and $1/(1+\phi_i)=\sigma_i$ represents the elasticity of substitution between domestic and imported goods.

The problem in this process for consumers is to minimize the cost of commodities consumed. This problem can be expressed as:

$$MinPC_i CC_i = PD_i DC_i + PM_i M_i \tag{3.26}$$

subject to:

$$CC_i = C_i[\phi_i M_i^{-\phi_i} + (1-\phi_i)DC_i^{-\phi}]^{-1/\phi_i} \tag{3.27}$$

In this optimization problem, import and domestic commodity demands can be found by solutions of the first order conditions. That is:

$$\frac{M_i}{DC_i} = [\frac{PD_i}{PM_i}\frac{\phi_i}{1-\phi_i}]^{\sigma_i} \tag{3.28}$$

The next step of the model is to identify the imported commodities with respect to their origins. As explained earlier, the sectoral imports are obtained from two sources: the EU and the ROW. The imported goods from different origins are assumed to be limited substitutes for each other and are expressed as an Armington function:

$$M_i = \Omega_i\left[\gamma_i MEU_i^{-\tau_i} + (1-\gamma_i)MRW_i^{-\tau_i}\right]^{-1/\tau_i} \tag{3.29}$$

where MEU and MRW represent imports from the EU and imports from ROW, respectively; γ_i and Ω_i represent the share and the shift parameters, respectively; and $e_i = 1/(1+t_i)$ represents the elasticity of substitution between imported goods from different origins.

Given different origined imported good prices and the degree of elasticity of substitution, the optimization problem of the consumers becomes:

$$MinPM_iM_i = PMEU_iMEU_i + PMRW_iMRW_i \tag{3.30}$$

subject to:

$$M_i = \Omega_i \left[\gamma_i MEU_i^{-\tau_i} + (1-\gamma_i) MRW_i^{-\tau_i} \right]^{-1/\tau_i} \tag{3.31}$$

The first order condition for this problem becomes:

$$\frac{MEU_i}{MRW_i} = \left[\frac{PMRW_i}{PMEU_i} \frac{\gamma_i}{1-\gamma_i} \right]^{\varsigma} \tag{3.32}$$

where PMRW, and PMEU represents the price of rest of the world and price of the EU, respectively.

In the import side of the model, small country assumption and infinitely elastic EU and non-EU import supply assumptions are made. If the exchange rate (ER) and foreign trade taxes are known, the domestic market price of the commodities can be determined as follow:

$$PMEU_i = PW_{MEU_i}(1 + tmeu_i + tfeu_i)ER \tag{3.33}$$

$$PMRW_i = PW_{MRW_i}(1 + tmrw_i + tfrw_i)ER \tag{3.34}$$

where PMEU, PMRW and PW indicate domestic price of EU imports and domestic price of ROW imports, and the world price, respectively; tmeu, tfeu and tmrw, tfrw represent the EU and non- EU custom taxes and funds, respectively. Fund rates in the model indicate non-tariff barriers on imports. These ratios are considered as exogenous and used as policy parameters in the model scenarios. The export supply equation is expressed as follow:

$$QS_i = D_i[\mu_i E_i^{-\nu_i} + (1-\mu_i) DC_i^{-\nu_i}]^{-1/\nu_i} \tag{3.35}$$

where D_i represents the shift parameter, and μ_i represents the share parameter.

The maximization problem becomes:

$$\text{Max } PQ_i.\ QS_i = PD_i\ DC_i + PE_i.\ E_i \tag{3.36}$$

subject to:

$$QS_i = D_i[\mu_i E_i^{-\nu_i} + (1-\mu_i)DC_i^{-\nu_i}]^{-1/\nu_i} \tag{3.37}$$

where D_i represents the shift parameter, E_i represents commodity exported, μ_i represents the share parameter, and $\varsigma_i = 1/1+\nu_i$ represents the transformation elasticity.

The optimal market combinations between domestic and exported commodities can be found by solving the first order conditon:

$$\frac{E_i}{DC_i} = \left[\frac{PE_i}{PDC_i}\frac{1-\mu_i}{\mu_i}\right]^{\varsigma_i} \tag{3.38}$$

The next step of the model is to identify the exported commodities in terms of their origins. The sectoral exports (E_i) are sent to the EU and the ROW. Exports to the different origins are assumed to be limited substitutes for each other and expressed as an Armington function:

$$E_i = \psi_i[a_i EEU_i^{-\eta_i} + (1-a_i)ERW_i^{-\eta_i}]^{-1/\eta_i} \tag{3.39}$$

where EEU and ERW represent exports to the EU and exports to the ROW, respectively; a_i represents the share parameter; ψ_i represents the shift parameter, and $\omega_i = 1/(1+\eta_i)$ represents the elasticity of substitution between exported good to different origins.

The traditional small-country assumption is not considered for the export side of the economy, because Turkey's economic policies effect the price level of EU countries. The price relationship in the model can be expressed as follow:

$$PE_i = \underline{PWE_i} \,.\, ER \qquad (3.40)$$

where PE, PWE and ER represent domestic price of exported goods, world price of exported goods, and exchange rate, respectively.

Domestic average prices can be calculated as the weighted average of domestic and exported commodity prices:

$$PQ_i = [PD_i.DC_i + PE_i.E_i] / \underline{QS_i} \qquad (3.41)$$

The foreign trade equations of the model are explained above. The balance of payments equations must be explained in order to complete the model. Flexible exchange rates are assumed rather than fixed exchange rates. The balance of payments can be shown in the following way:

$$(\underline{PM_W}\ M) + \underline{PT_{ROW}} + \underline{GT_{ROW}} = (\underline{PE_W}\ E + \underline{REMIT} + \underline{PF_{ROW}} + \underline{GF_{ROW}} + \underline{FSAV} \qquad (3.42)$$

where PM_w and PE_w represent world price of imports and exports, respectively; PT_{ROW} and GT_{ROW} represent private and government income transfers (profit transfers and interest payments) to the ROW, respectively; PF_{ROW} and GF_{ROW} represent private and government factor incomes from ROW respectivrely; REMIT represents private capital income (investment, interest incomes, etc.); and FSAV represents foreign savings in Turkey.

Income and Demand Equations

The TRCGE model differentiates the agents of the economy as private sector, government sector, and the rest of the world which is also differentiated as the EU and non-EU. The private income (YH) consists of gains from value added production of private sector, transfers from government and the rest of the world, and factor incomes. The private sector value added can be obtained by subtracting government factor income and corporate tax.

$$YH = [(PVA \,.\, V) - FI_G - TAX_{CAP}] + \underline{T} + (\underline{FI_P} - \underline{PT_{ROW}}) \,.\, ER \quad (3.43)$$

where FI_G, and FI_P represents factor income of government and private sector, respectively; TAX_{CAP} represents corporate tax; T represents transfers to the private sector; and PT_{ROW} represents private income transfers to the ROW. FI_G and TAX_{CAP} are determined as follows:

$$FI_G = rfg \,.GDP \quad (3.44)$$

$$TAX_{CAP} = ctx \sum_i RP_i \quad (3.45)$$

where rfg represents a fixed proportion, ctx represents corporate tax rate in the current economy, and RP represents sectoral profits.

Household savings, consumption and tax are determined as follow:

$$TAX_{HH} = tax_h \,.\, YH \quad (3.46)$$

$$SAV_{HH} = s_h \,[YH \,(\, 1\text{-}tax_h)] \quad (3.47)$$

$$CON_{HH} = (1\text{-}s_h) \,[YH \,(1\text{-}tax_h)] \quad (3.48)$$

where TAX_{HH}, SAV_{HH}, and CON_{HH} represent income tax, household savings, and household consumption, respectively; tax_h represents income tax rate; and s_h represents the marginal saving rate of the households. Another thing to be considered in the model is the question of how much of the total domestic production is consumed by the private sector. This question can be answered by using a classical linear expenditure system equation:

$$PC_i \,.\, CD_i = cles_i \,.\, CON_{HH} \quad (3.49)$$

where CD_i represents sectoral distribution of private total consumption, and $cles_i$ represents a distribution parameter.

Another participant in the model is the public sector. The following equation shows that the public income consists of tariffs, indirect taxes, direct taxes, corporation tax, factor income of the government, and government's foreign factor incomes:

$$GREV = TARIFF + TAX_{IND} + TAX_{HH} + TAX_{CAP} + FI_G + \underline{GFI_{ROW}}.\ ER \qquad (3.50)$$

where GREV represents government revenue, TAX_{IND}, TAX_{HH}, and TAX_{CAP} represent indirect tax, income tax, and corporation tax, respectively; and GFI_{ROW} represents government's factor income from the rest of the world.

Since the rest of the world is differentiated as EU and non-EU countries, the tariff incomes to the Turkish economy can be expressed as follow:

$$TTR = CT_{EU} + CT_{ROW} + FUN_{EU} + FUN_{ROW} \qquad (3.51)$$

where TTR, CT, and FUN represent total tariff revenue, total customs tax collected, and funds collected, respectively. The subscripts show the origin of tariff revenue.

The gross domestic production (GDP) and government expenditure (GEXP) equations can be written as follow:

$$GDP = (\sum_i PVAi\ \ Vi) + TAX_{IND} + TTR \qquad (3.52)$$

$$GEXP = \underline{INV_G} + CON_G + \underline{T} + \underline{GT_{ROW}}.\ ER \qquad (3.53)$$

where INV_G, and CON_G represent government investment and government consumption.

In addition to these equations, government savings (GSAV) and government consumption sectoral distribution can be specified as follow:

$$GSAV = \vartheta\ GDP \tag{3.54}$$

$$PC_i \,.\, GD_i = gles_i \,.\, INV_G \tag{3.55}$$

where $gles_i$ represents a sectoral share parameter, and $\sum gles_i = 1$.

Investments in the economy are in one of two different categories: (i) changes in stocks, and (ii) physical capital investments.

Total investment is converted into the investment by sector of origin by using the capital composition matrix. This relationship can be explained as follow:

$$SI_i = \Sigma\ b_{ij} TPI_i \tag{3.56}$$

where SI represents sectoral investment, TPI represents total private investment in each sector, and b_{ij} is a constant coming from the capital composition matrix and represents investments from sector i to sector j.

The balance requirement in the goods market assumes further that demand and supply of composite commodity (CC) in each sector must be in the equilibrium:

$$CC = INT + CD + GD + ID + (DST^p + DST^g) \tag{3.57}$$

where INT, CD, GD and ID represent intermediate demand, private consumption demand, government consumption demand, and investment demand, respectively. DST^p and DST^g represent private inventory investment and government inventory investment, respectively.

The TRCGE model includes three macroeconomic balances: the government deficit, savings-investment balance of the private sector, and the trade balance. These balances are not

independent of one another (Kose, 1996). Considering this, investment, and savings can be expressed as follow:

$$INVEST = INV_P + INV_G \tag{3.58}$$

$$SAVING = SAV_{HH} + GSAV + \underline{FSAV}\,.\,ER \tag{3.59}$$

where FSAV represents foreign savings.

The model is a single country, multi-commodity model with implicit inclusion of the EU and ROW. In this model, the budgetary impacts and implications of the full membership will be analyzed using different integration scenarios. There are three agents for each sector in the model: consumers (households), producers (firms), and the government (fiscal authority). Consumers have constant elasticity of substitution (CES) utility functions between imported and domestic goods. The utility maximization of the consumers is determined according to the Armington criteria. The firms representing the producer side of the economy maximize the value of their profits. Thus, the main goal of the firms is to make production and investment decisions that allow them to maximize the value of the firm. The government represents the fiscal authority, and collects taxes to finance public expenditures such as social security payments, public investments and public services. The difference between public revenue and public expenditure is financed by issuing public bonds.

CHAPTER 4

DATA COLLECTION AND CALIBRATION

This chapter consists of two basic sections. In the first section, the idea of a social accounting matrix (SAM) and stages involved in a CGE model will be explained. In the second section, an aggregate SAM for the Turkish economy will be constructed and the rationale behind it will be discussed.

The Idea of a Social Accounting Matrix

A CGE model requires a variety of data in order to analyze the economic structure of a country. The most important part of this data set is obtained by constructing a SAM for that economy. The development of social accounting matrix became more popular with the increased use of economic planning as well as providing data for constructing applied general equilibrium models. In this sense, the SAM makes the raw data more organized and easy to understand. A SAM has two objectives. The first is to organize the information about a country's social and economic structure for a specific year. The second objective is to construct a statistical basis for the model chosen. Once the data for a country is presented in the form of SAM, they represent just a static image of that country (King, 1985). In order to make this snapshot more meaningful, we need to use different scenarios concerning the policy interventions. However, a huge policy of literature can be seen based on just SAM such as De Santis and Ozhan (1995), Ozhan (1989), King (1985), and Pyatt et. al. (1985).

The basic idea of the SAM is same as the double entry bookkeeping in accounting, which means that the income and expenditure of an entity must balance. In this point, a SAM resembles

traditional national accounts in which income in one account must be the expenditure of another account. Considering this fact, we can say that a SAM embodies all information in a national account and much more.

Each account in a SAM consists of one row and one column, both of which are numbered identically and the double entries are achieved by only one entry in a matrix. The volume of the matrix depends on data availability and the aim of the model (King, 1985). The column in a SAM indicates expenditures, and the row indicates income receipts. In other words, the label on a column shows who made an expenditure, and the label on a row shows who receives it (Kehoe, 1996). For this reason, in a SAM the sum of the rows should be always equal to the sum of columns.

A SAM usually consists of five different accounts: (i) factors of production, (ii) institutions, (iii) activities, (iv) capital account, and (v) the rest of the world account. Each account might be separated into different categories. For example, factors of production can be differentiated as capital and labor; institutions can be differentiated as households, companies and government; activities can be differentiated in terms of sectors such as agriculture, agribusiness, manufacture, private services and public services; activities can be differentiated in terms of the origin of production; the capital account can be differentiated in terms of public or private sources; and the rest of the world can be differentiated as current and capital accounts. However, there is not only one type of SAM, it can be constructed in variety of ways for different purposes depending on the policy scenarios to be examined. In other words, some sectors can be desegregated in a detailed way while other sectors are highly aggregated. In this sense, there is

no limitation in explaining the details in a SAM, but in practice, collecting the data for a SAM gives the most problematic part of the analysis and imposes limitations (King, 1985).

Concerning the use of the SAM, there could be some analytical implications. First, a SAM has a higher position in economics rather than just being an upgrade of statistics, because it provides necessary data for CGE models and explains current situation of the economy. In this sense, the concept of a SAM does more than just the improvement of statistics. For example, a SAM gives a much clearer idea about the structure of an economy for a certain period of time. Second, a SAM should not be assumed an ultimate truth for an economy, but it should be known as a system that forces inconsistencies to make them closer to the truth. In order to achieve this "closer truth", we may use our judgements, but our judgements should be consistent with the model we are using and the adjustments should be kept within plausible limits(King, 1985).

Stages of the General Equilibrium Model and Calibration

The number of stages concerning CGE models vary according to the researcher's perspective and goals of the study. However, there are five main steps that need to be taken in the solution process. The first step is to collect raw data from different sources, such as statistical institutions and government agencies. The second step is to adjust the data in terms of the proposed research. Typically, institutions have inconsistent data sources or the data itself is not meaningful without certain adjustments. The researcher must take this raw data and adjust it according to the analysis to be done. This step also includes construction of a SAM for a specific economy. The third step is the most important step in terms of the results. This is the calibration process in which the basic structure of the model is constructed and parameter values of the

model are estimated. The fourth stage involves base year solutions and determination of the policy scenarios to be used. The last stage of a CGE model includes interpretation of the different scenarios. This process is important for obtaining "after-shock" results and policy recommendations. In addition to these five main steps, one additional step involving sensitivity analysis can be added to the process. Although this is not a required part of CGE models, it is recommended to prove the validity of results obtained. Sensitivity analysis requires to try different values of elasticities for the same commodity and compare the results. Sensitivity analysis is performed after obtaining the results of policy scenarios. The data of this nature is very hard to find. Thus, the true values of elasticities are never known. Researchers who estimate these values also cannot give a point estimation. The only thing they give is interval estimation and these intervals show big differences in different studies. That is why researchers use sensitivity analysis to test their model to make sure that they are using "close to truth" elasticities. If a model is too sensitive to changes in elasticities, internal validity of the model disappear and new assumptions about elasticities should be made. These steps involved in the application of a CGE model are shown in Figure 4.1.

Since the data used for the base year does not include quantities, only monetary data are used in the process. For that reason the most common method used is to assume that all prices are equal to one. In other words, physical quantities in the base solution are obtained by assuming the price level for each category is equal to unity. After determining the functional forms to be used in the model, the calibration process begins. Although there are different techniques to determine parameter values, the calibration method is the most appropriate technique, because

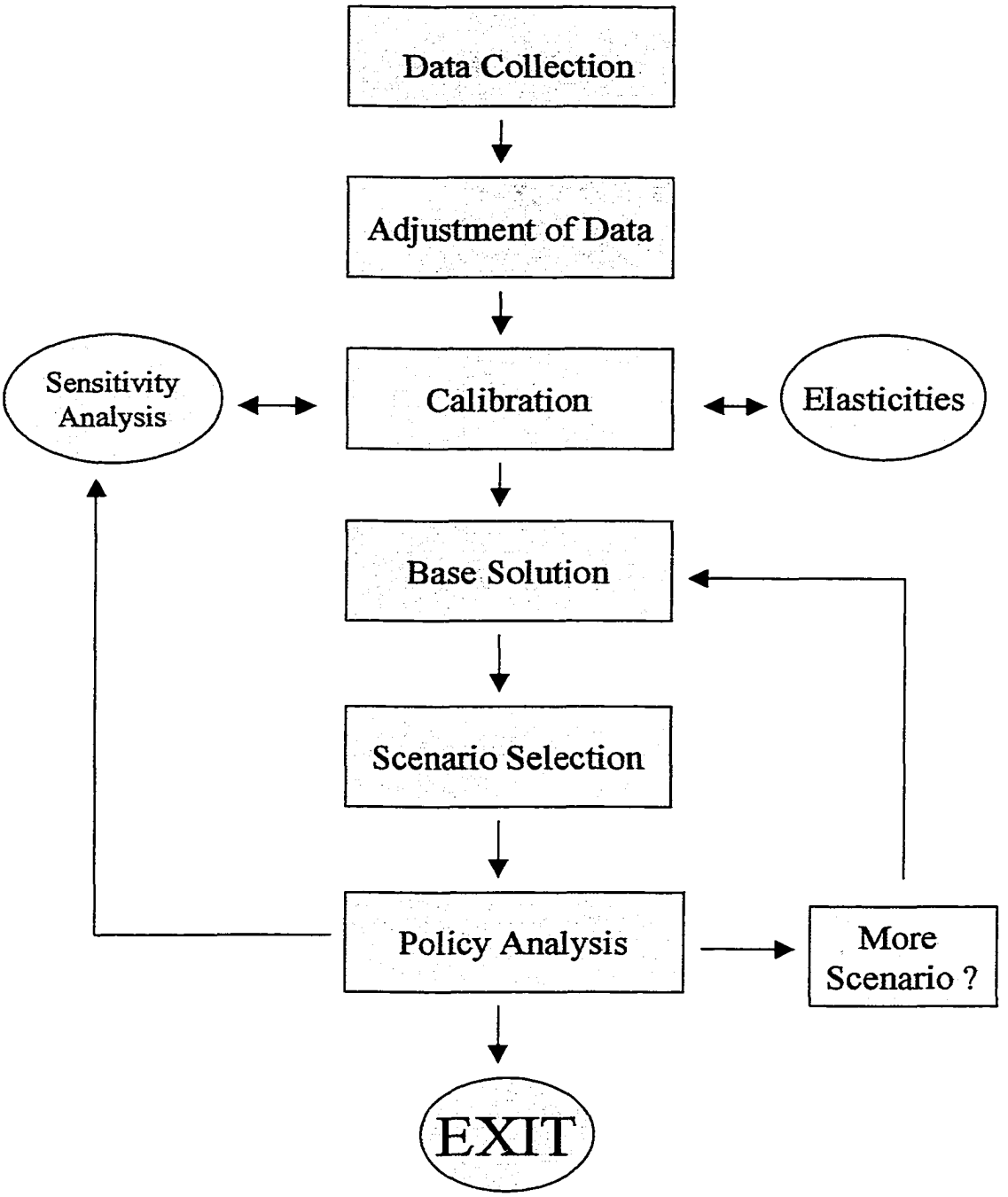

Figure 4.1: Stages of a CGE Model

it is much simpler and does not require econometric knowledge. The calibration process is not a statistical process; it is a deterministic (mathematical) way of calculating the parameter values (Kose, 1996). The results obtained are then tested for reliability. This is sensitivity analysis process. After calibration and sensitivity analysis, different policy scenarios are combined to find optimal values of the objective function and/or other macroeconomic indicators in the economy.

The calibration process is a numerical process rather than a statistical process. Known parameters in a CGE model is directly put into the model, however not all parameters are known. The usual approach is to calculate those unknown parameters or get them from the literature. Given this process and the data obtained from SAM, the calibration procedure is straightforward. Only thing that matters in this process is the relative prices. In GCE models prices are considered unity at the beginning, and following process are performed accordingly. This is the procedure followed in this study as well. One important thing must be known is that the numerical calibration does not involve any kind of econometric testing procedure (de Santis, 1999).

Data Collection and a Social Accounting Matrix for Turkey

As explained earlier, a SAM is an economy-wide data collection procedure, which describes data in terms of production and income in one side, and the expenditures or flows from one account to another on the other side. Flows or incomes are a snapshot of the economy at a specific point of time. The construction of the SAM has two main features: (i) the payments for one transaction by one account is considered a receipt for the same transaction by another account; and (ii) total incomes of each account in a SAM is always equal to total expenditures of the same account (de Santis and Ozhan, 1996). This balance in expenditures and incomes in

each sector makes a SAM internally consistent, because a sector or an account cannot earn more than the other sectors' expenditure, and with the same logic, a sector cannot spend more than its income. These basic accounting criteria provide a useful statistical framework for a SAM, and help to address impacts of different scenarios in a CGE model.

Even though the Turkish economy has a very long planning history, none of the government institutions has made constructed an official SAM for Turkey. That is why other studies of this issue have disagreements in some cases, and results vary depends on what kind of data they used. Some are not even accurate to describe the Turkish economy. Dervis et al. (1982) constructed a 1973 SAM for Turkey, which was designed to reflect an open economy general equilibrium model for Turkey. However there was no income distribution dimension of this study.

Another study on this issue was done by Ozhan (1988 and 1989), which is very useful for the analysis of income distribution of stabilization policies employed in the 1980s. However, the SAM constructed by Ozhan (1989) classifies imports and indirect taxes by users, not by type. This classification may not be consistent with the idea of the SAM (de Santis and Ozhan, 1996), because the classification of imports and indirect taxes by users does not give researchers the ability to analyze different policy scenarios. In addition to these studies, some of data sets have been constructed by other modelers (i.e., Harrison et al., 1993; Yeldan, 1989; Kose, 1996) to analyze specific topics for the Turkish economy.

Since the disaggregated SAM is beyond the scope of this study, an aggregated SAM for Turkey is presented in this part of the study. The disaggregated data in this section is obtained

from de Santis and Ozhan (1996), which represents the first comprehensive and detailed 1990 SAM for Turkey. In order to construct a SAM to be used in a CGE model, a distinction is made between "activities" and "commodities" in the production accounts. This classification is done to allow researchers to distinguish secondary products. This classification also enables the adoption of the Armington specification in CGE modeling literature. The Armington specification assumes that commodities produced in the different countries in the same market are imperfect substitutes (de Santis and Ozhan, 1996). In other words, the consumers are not indifferent between the domestically produced goods and imported goods. This imperfect substitutability between the imported commodities and domestic commodities allows researchers to use constant elasticity of transformation specification in the CGE model.

The main published statistical data sources in Turkey are Input-Output (I-O) table for 1990, the Statistical Yearbook of Turkey, the Balance of Payment Statistics, the Annual Program published by the State Planning Organization and Household Income and Consumption and Expenditure Surveys for 1987. Using these data available, de Santis and Ozhan (1996) constructed a highly disaggregated SAM for 1990 containing of 226 accounts. In their disaggregated SAM, the production factors (labor and capital) were separated into 8 different types of labor categories and 5 different types of capital. Households were disaggregated by their income level and their geographical regions. Companies were disaggregated a state enterprise and three private enterprises (non-agricultural production, trade and services). Activities and commodities were disaggregated according to the most recent I-O table, which was for the year of 1990 (54 accounts in each case). The capital account was disaggregated into three categories

(private gross fixed capital formation, public gross fixed capital formation and changes in the stocks). This categorization of the accounts in the disaggregated SAM of the Turkish economy is obtained from de Santis and Ozhan (1996), and presented in the Appendix 1. As explained in de Santis and Ozhan (1996), although most of the data required were obtained from published documentation, there were major area of difficulties in terms of collecting data. Their first major area of difficulty in terms of data was the disaggregation of the household consumption matrix. Since the private consumption vector in the 1990 I-O table was obtained residually, the household consumption survey for 1987 was used to disaggregate private expenditures among households, but the coverage of the commodity groups was not the same as the I-O classification. In order to prevent this problem they reduced the 64 production sectors of the 1990 I-O table to 54 sectors. The second area of difficulty was the disaggregation of net indirect taxes by type of domestically produced commodities. The I-O tables usually consider net indirect taxes obtained from domestic sectors. Indirect taxes indicate the taxes that completely paid by the consumers at the time of purchase, not by the producers. Hence, they used classification by type of commodities, which is obtained from unpublished documents of the Turkish Ministry of Finance and Custom. The third area of difficulty was allocation of the value added to the eight different labor categories. However, this difficulty they experienced does not effect our analysis in this study, because different categories capital will not be used in this analysis. The fourth area of difficulty was computation of dividends and retained earnings of the private enterprises, because the data on this issue are not easy to find. The fifth area of difficulty concerned household savings, because most of economists and statisticians do not agree with the official estimates.

The analytical framework of 1990 aggregated SAM for Turkey is provided in Table 4.1 which is taken from de Santis and Ozhan (1996). Each row represents the receipts of a specific account from other accounts while each column represents the payments of a specific account to other accounts.

For example, consider the households account. If Table 1 is read by row, it gives household earnings and if it is read by column, it gives household expenditures. More specifically, households earn money from factor income by supplying their labor, profits distributed by companies, government transfers, and remittances from the rest of the world current account. However, they pay direct taxes to the government and consume commodities. The remainder of their income (if any) is saved in the capital account. Empty boxes imply that there are no flows between the corresponding accounts. Other accounts can also be interpreted using the same logic.

Table 4.2 gives numerical results for the 1990 SAM of the Turkish economy. It consists of 6 different accounts; each account was disaggregated into several sub-accounts. For example, the factors account is disaggregated into two different accounts: capital and labor; the institutions account is disaggregated into three sub-accounts: households, companies, and government; the activities account is disaggregated into three different sub-accounts: agriculture, manufacturing, and services; the commodities account is disaggregated into two different sub-accounts: domestic and imported commodities, each of which is separated into three categories: agriculture, manufacturing and services; and the last account, the rest of the world, is disaggregated into two categories: current and capital accounts.

Table 4.1: Analytical Framework of the Turkish SAM

	Factors	Household	Companies	Gov.	Activities	Composite	Imported	Cap. Acc.	Row-Cur.	Row-Cap.	Total
Factors					Gross Value Added						Gross Factor Income
Household	Factor Income		Distributed Profits	Transfers					Remittances		Household Income
Companies	Factor Income			Transfers					Profit Remittances		Enterprise Income
Gov.		Direct Taxes	Direct taxes			Indirect taxes	Import Duties				Government Income
Activities											Production Revenues
Composite		Consumption		Consumption	Intermediate Inputs			Investment			Total Income
Imported						Imports					Expenditure on Imports
Cap. Acc.	Depreciation	Savings	Retained Earnings	Budget Surplus						Net Capital Activities	Aggregate Savings
Row-Curr.			Profit Remittances	Transfers			Net Imports				Current Payments
Row-Cap.								Reserve Activities	Current Account		Capital Payments
Total	Factor Payments	Household Expenditure	Enterprise Expenditure	Government Expenditure	Production Costs	Total Absorption	Supply of Imports	Aggregate Investment	Net Foreign Exchange	Capital Receipts	

Adopted from de Santis (1996)

Table 4.2: Aggregate SAM for the Turkish Economy (billion TL)

			1		2			3	4			5						6		7
												A			B					
			A	B	A	B	C		A	B	C	a	b	c	a	b	c	A	B	
1	A								58645	69556	121710									249911
	B								6613	38748	61741									107102
2	A		67383	107102		146866	4699											8786		334836
	B		156287				18247											4381		178915
	C				18609	7829						167	12559	7788	469	12928				60349
3			26241		54022	21445	-11955												16311	106064
4	A											93760						2514		96274
	B												272255					26822		299077
	C													230183				22726		252909
5	A	a			53618		514	2814	14926	22180	2954									97006
		b			98710		6064	87548	8653	126498	32606									360079
		c			109877		36505	12246	7437	42095	33898									242058
	B	a										3079								3079
		b											75265							75265
		c												4087						4087
6	A					2775	6275								2610	62337	4087			78084
	B							3456										12855		16311
7			249911	107102	334836	178915	60349	106064	96274	299077	252909	97006	360079	242058	3079	75265	4087	78084	16311	

Table 4.3: Key for the Turkish 1990 SAM

1) FACTORS: A) Capital B) Labor **2) INSTITUTIONS**: A) Households B) Companies C) Government **3) CAPITAL:** **4) ACTIVITIES**: A) Agriculture B) Manufacturing C) Services	**5) COMMODITIES**: A) Composite Commodities a) Agriculture b) Manufacturing c) Services B) Imported Commodities a) Agriculture b) Manufacturing c) Services **6) REST OF THE WORLD (ROW):** A) ROW Current B) ROW Capital **7) TOTAL:**

Three sectors are considered in Table 4.2: agriculture, manufacturing and services. Agriculture and animal husbandry, forestry, and fisheries are considered as Basic Agriculture; 43 non-agricultural commodities are considered as Manufacturing; and 7 other activities are considered as services (This classification is obtained from De Santis and Ozhan (1996), and presented in Appendix 1).

The numerical implications of Table 4.2 can be explained as follow: total factor income is 357,013 billion Turkish Lira (TL) is allocated into two factors: capital and labor. Total capital income is 24,991 billions TL while total labor income is 107,102 billion TL. Capital income comes from following activities: 58,645 billion TL from agriculture, 69,556 billion TL from manufacturing, and 121,710 billion TL from the services sector. Also, total labor income comes from the following activities: 66,313 billions TL from agriculture, 38,748 billion TL from manufacturing, and 61,741 billion TL from the services sector.

The second account in the SAM represents institutions (households, companies and government). The factor income to households (174,484 billion TL) consists of 107,102 billion TL labor and 67,383 billion TL capital income. The dividends distributed to households by companies are 146,866 billion TL; the government transfers to households are 4,699 billion TL; and the transfers to households from the rest of the world current account are 8,786 billion TL. The factor income to companies is 156,287 billion TL; government transfers to companies are 18,247 billion TL; and the transfers from the ROW to private companies are 4,381 billion TL. Government receives money from households, companies, and domestic and imported commodities. The taxes paid by households to government are 18,609 billion TL; the corporation

tax is 7,829 billion TL; the indirect taxes on domestic commodities are 20,514 billions of TL (167 billion TL from agricultural commodities, 12,559 billion TL from manufacturing, and 7,788 billions of TL from services); and import duties are 13,397 billion TL (469 billion TL from agricultural commodities and 12,928 billion TL from the manufacturing). The consumption of fixed capital is 26,241 billions TL, while household savings are 54,022 billion TL; retained earnings are 21,445 billions TL; the government budget deficit is 11,955 billion TL; and capital transfers are 16,311 billion TL. The income that activities receive from domestic commodities (domestic sales) is 596,198 billion TL. The income that activities recieve from the ROW current account is 52,062 billions TL. The Agriculture sector receives 96,274 billion TL (93,760 billion TL from domestic consumers and 2,514 billion TL from foreign consumers). The Manufacturing sector receives 299,077 billion TL; and the services sector receives 252,909 billion TL from both domestic and foreign consumers.

The intersection of row 5A and column 4 represents demand for intermediate goods. Domestic commodities are consumed by households, government, other sectors and inventors. The Agricultural sector receives a total of 97,006 billion TL; the Manufacturing sector receives a total of 360,079 billion TL; and the services sector receives a total of 242,058 billion TL. Also, the value of imports is a total of 82,431 billion TL. (3,079 billion TL goes to agricultural commodities, 75,265 billion TL goes to manufacturing commodities, and 4,087 billion TL goes to service goods.

The ROW account implies money flows to the foreign countries. Domestic companies paid 2,775 billion TL profit remittance to foreign shareholders. Government transfers to the

foreigners are 6,275 billion TL, and foreign exporters earned a total of 69,034 billion TL. Total capital flows to foreigners are 16,311 billion TL.

The remaining portion of Table 4.2 can be interpreted in the same context. However, when calculating the expenditures for any specific account, the corresponding columns should be used.

CHAPTER 5

POLICY SCENARIOS AND RESULTS

As explained before, Turkish accession to the EU will have considerable impacts on both the Turkish and European Union economies. However, the model presented previously does not give a full picture of results occurring due to integration. In order to see a snapshot of the economy in a specific time period, the SAM may be useful, but it still does not cover the full picture of the economy. Various potential scenarios must be implemented and analyzed to obtain a complete picture.

The customs union with the EU implies that Turkey must remove a certain proportion of tariffs levied on manufacturing products imported from the EU. Also, Turkey has to adopt a Common External Tariff with the EU on imports from non-EU countries. Application of the Common External Tariff involves a substantial reduction in tariff rates on third countries as well. This means that Turkey is obligated to provide preferential agreements with the EU's "most favored nations" (MFN) by 2001. Most of these countries have tariff rates of 6-7 percent on average. Thus, Turkey has to reduce tariff rates not only on EU imports, but also on MFN imports. By 2001, it is Turkey's responsibility to negotiate preferential trade agreements with the countries with which the EU has preferential agreements (Harrison et al., 1996).

Turkey is also a member of World Trade Organization (WTO) and thus, has certain obligations according to the WTO rules. In this case, Turkey will become an open economy in the non-agricultural sectors. This tariff reduction on both EU and non-EU countries reduces the trade diversion cost of the customs union, and results in extra gains from trade. In addition,

preferential agreements with the third countries will improve the trade balance of Turkey by increasing access to the market of those countries. This improved access to the third country markets causes extra gains from trade for Turkey (Harrison et al., 1996).

Other potential scenarios are full membership to the EU and free trade. These two will be made under the assumption that both Turkey and the EU complete their obligations concerning liberalization policies. In light of the reasons explained above, the following four scenarios will be used to examine the integration of the Turkish economy into the EU.

1) Customs Union with the EU: This scenario considers the obligations that Turkey and the EU have made, and assumes both sides fulfill their obligations. These obligations are determined by the European Council and Common External Tariff rules.

2) Full Membership to the EU: This scenario considers Turkey's full accession into the EU. According to the agreement between Turkey and the EU, Turkey will lower tariff rates for EU imports, but continue to impose higher tariff rate for the non-EU countries. This reduction in tariff rates causes the Turkish government to lose tariff revenues coming from the EU. However, the EU will compensate the Turkish government for a portion of these losses.

3) Full Membership plus Replacement Tax: This scenario will analyze the impacts of full membership with the assumption of an increase in the domestic indirect tax rate. Under this scenario, government losses due to tariff reduction will be compensated by increasing the rate of indirect tax. By increasing indirect tax rate, government can finance the budget deficit.

4) Free Trade: This scenario will analyze the option of free trade. Under this scenario, Turkey will reduce tariff rates for all countries. This reduction in tariff rates does not necessarily

mean that tariff rates for all countries should be zero. Tariff rates on average should be asymptotically zero. The reductions will be made not only in the tariff rates but also non-tariff barriers such as funds should be eliminated completely under this scenario.

Table 5.1: Percentage Tariff Reductions

	Custom Union		Full Membership		Free Trade	
Sectors	EU	ROW	EU	ROW	EU	ROW
Agriculture	0%	25%	100%	50%	100%	100%
Manufacturing	100%	40%	100%	50%	100%	100%
Services	0%	40%	100%	50%	100%	100%

EU: The European Union
ROW: The Rest of the World

Table 5.2: Percentage Fund Reductions

	Customs Union		Full Membership		Free Trade	
Sectors	EU	ROW	EU	ROW	EU	ROW
Agriculture	70%	60%	100%	70%	100%	100%
Manufacturing	70%	60%	100%	70%	100%	100%
Services	70%	60%	100%	70%	100%	100%

EU: The European Union
ROW: The Rest of the World

Table 5.1 and 5.2 explain the reductions in tariff and fund rates in terms of each scenario. The replacement tax scenario is not shown in the tables, because it has the same assumptions with the full membership scenario in terms of tariff and fund reductions. The only difference it has is an increase in the domestic indirect tax rate, which does not effect the rate of trade protections.

Under the customs union scenario, import tariff rates on EU manufacturing goods will be reduced completely, and no change is made on the manufacturing and services sectors. However, import tariffs on non-EU goods will be reduced by 30% in the agricultural sector and

40% in the manufacturing and services sectors. The full membership scenario requires complete elimination of tariffs on EU goods for all sectors. However, only 50% of tariffs will be reduced on non-EU goods. As can be expected, all tariffs are removed under the free trade scenario.

The fund rate reductions are presented in Table 5.2. The rate of reductions are not the same as in the tariff rates. Under the customs union scenario, fund rates will be reduced by 70% on EU-imported goods, while 60% reductions will be made for non-EU goods. Under the full membership scenario, all funds will be eliminated on EU-imported goods, while 70% of reductions will be made for non-EU products. The free trade scenario removes all trade distorted protections for both EU and non-EU products.

The structure of the analysis will be based on these scenarios. The effects of each scenario on prices, trade volume, employment, production, domestic sales and cost structure will be obtained. Comparisons of these scenario results with the base year and among themselves will be reported in this chapter.

Impacts of the Scenarios on the Turkish Economy

According to the Input-Output (I-O) table calculations, the average nominal protection level in the Turkish economy is approximately 20%. If we consider the sectoral differentiation of the study, the most protected sectors are tobacco (105%), petroleum products (98%), glass and glass products (51%), transportation equipments (43%) and metal industry (37%); the least protected sectors are mining (0.01%) and the textile industry (0.02%) (Kose, 1996). This section discusses the impact of EU integration on the Turkish economy. After analyzing sectoral impacts of EU integration, changes in macroeconomic indicators will be presented.

Sectoral impacts will be divided into four sections. First, sectoral production and international trade impacts of the scenarios will be presented. In addition, changes in the price level, exports, imports, domestic production and demand will be analyzed. Secondly, labor demand and employment topics will be presented. Both the marginal and organized labor demand will be analyzed under different scenarios. Third, changes in sectoral profit rates will be presented. Two criteria will be used to measure the changes in profitability in each sector. One is the profit-capital ratio, and the other is changes in profit resulting from each policy scenario. The last one will be the cost structure analysis of the Turkish economy under different scenarios. Average variable cost will be used as a measurement tool for this analysis. After discussing these sectoral impacts, changes in the macroeconomic indicators on the whole economy and government budget will be presented.

Domestic Production and International Trade Impacts

In this section, changes in the price level, exports, imports, domestic production and demand will be analyzed under each individual scenario and policy implications concerning these scenarios will be discussed.

a) Customs Union Scenario

Under this scenario, Turkey is obligated to eliminate tariff rates on EU imports for the manufacturing sector. However, tariff rates on agricultural and services sectors will not be eliminated. Impacts of this scenario on the prices are explained in Table 5.3. The first implication of this tariff rate reduction will be a decrease in domestic prices. The decrease in the domestic prices of EU imported goods will affect the domestic production and consumption of the Turkish

Table 5.3: Price Changes for the Custom Union Scenario

SECTORS	PQ	PC	PN	PD	PE	PMEU	PMRW
Basic Agriculture	1.0048	1.0026	0.9948	1.0027	1.0810	0.9979	0.9996
Agribusiness	1.0036	0.9964	0.9985	0.9944	1.0658	1.0105	1.0221
Mining	1.0348	1.0776	0.9924	1.0314	1.0825	1.0900	1.1096
Beverage Industry	0.9963	0.9865	0.9905	0.9892	1.0499	0.9434	0.9448
Tobacco Industry	0.9396	0.8585	0.9974	0.9363	1.0692	0.6064	0.7311
Wearing Apparel	1.0185	0.9869	0.9903	1.0072	1.0567	0.9983	1.0161
Textile	1.0151	0.9931	0.9925	0.9843	1.0517	1.1011	1.1013
Leather & Fur Products	1.0212	1.0210	1.0020	1.0157	1.0615	1.0558	1.0599
Wood & Furniture	1.0011	0.9975	0.9983	0.9998	1.0609	0.8934	0.9028
Paper & Publishing ind.	0.9823	0.9729	0.9825	0.9806	1.0599	0.8997	0.9364
Chemical Products	0.9909	0.9725	0.9836	0.9843	1.0579	0.9500	0.9583
Petroleum Products	1.0328	0.9848	1.0613	1.0305	1.1017	0.7265	0.7292
Glass & Glass Products	0.9989	0.9666	0.9907	0.9835	1.0695	0.8435	0.8609
Non-Metalic Products	1.0083	0.9933	1.0109	1.0049	1.0764	0.9167	0.9384
Metal Industry	1.0291	1.0320	1.0277	1.0245	1.0758	1.0196	1.0238
Non-elect. Machinery	1.0105	1.0093	1.0021	1.0075	1.0714	1.0087	1.0148
Electrical Machinery	1.0014	0.9708	1.0110	0.9925	1.0899	0.9296	0.9492
Transport. Equipment	0.9683	0.9296	0.9736	0.9608	1.1125	0.8754	0.8931
Electricity-Gas-Water	1.0055	1.0050	1.0225	1.0050	1.0612	1.0603	1.0602
Construction	1.0025	1.0025	1.0009	1.0025	-	-	-
Transport-Commun.	1.0112	1.0032	0.9843	1.0002	1.0724	1.1163	1.1163
Other Services	0.9888	0.9840	0.9893	0.9828	1.0851	1.1163	1.1163

PQ: Producer Prices, PC: Composite Commodity Price, PN: Intermediate Good Prices, PD: Domestic Good Price, PE: Domestic Price of Imported Goods, PMEU: Domestic Price of EU-imported Goods, and PMRW: Domestic Price of non-EU imported Goods.

economy. The decrease in the price of imports will be more severe for the EU imported goods, because Turkey removes a portion of import tariffs on the EU countries, but not for the ROW. If EU imported goods are considered, the decrease in prices will be noticeably higher in the monopolistic sectors such as the beverage industry (5.7%), tobacco industry (39%), petroleum (27.7%), glass industry (15.6%), and transportation equipments (12.5%). As can be seen in Table 5.4, the decrease in price levels in the monopolistic sectors causes a decrease in domestic production. Domestic production decreases by 6.6% in the tobacco industry, by 2.3% in petroleum industry, and by 5.2% in transportation equipments. In addition, some of the competitive sectors also experience a decrease in price and domestic production levels. This is because the EU has a comparative advantage in those sectors such as the paper and publishing industry, electrical machinery, energy and services sectors.

Table 5.5 shows changes in domestic demand. The composition of domestic demand will change as well as domestic production, because PMEU/PMRW will change in favor of EU imported goods. The change in relative price of EU imported good and non-EU imported goods will cause a trade creating affect between the EU and Turkey. However, it doesn't mean that the trade volume between Turkey and the rest of the world will decrease. Trade volume with the ROW will also increase in some sectors, because accepting the Common External Tariffs of the EU brings some obligation to Turkey such as decreasing the tariff and fund rates for the third countries according to the preferential trade agreement. Trade volume increases in all manufacturing sectors except mining, wearing apparel and leather and fur products. Changes in imports from the EU and from the ROW are presented in Table 5.6 and Table 5.7, respectively.

Table 5.4: Domestic Production

Sectors	Base Value	CU	EU	EU+Tax	Free Trade
Basic Agriculture	96,401.465	1.0089	1.0120	1.0058	1.0148
Agribusiness	36,437.061	1.0213	1.0260	1.0199	1.0348
Mining	7,941.361	1.0388	1.0485	1.0257	1.0608
Beverage Industry	3,583.340	1.0022	1.0013	0.9863	1.0045
Tobacco Industry	5,021.099	0.9341	0.9335	0.9094	0.8839
Textile	28,286.741	1.0515	1.0651	1.0492	1.0845
Wearing Apparel	10,850.426	1.0711	1.0873	1.0762	1.1121
Leather & Fur Products	4,133.510	1.0532	1.0656	1.0561	1.0854
Wood & Furniture	10,637.313	1.0056	1.0062	0.9980	1.0074
Paper & Publishing ind.	8,180.177	0.9870	0.9856	0.9714	0.9814
Chemical Products	18,364.551	1.0038	1.0039	0.9929	1.0074
Petroleum Products	24,225.297	0.9774	0.9726	0.9481	0.9636
Glass & Glass Products	2,336.291	1.0038	1.0026	0.9949	1.0060
Non-Metalic Products	21,236.513	0.9969	0.9954	0.9831	0.9950
Metal Industry	30,621.899	1.0129	1.0152	1.0031	1.0200
Non-electrical Machinery	9,484.122	1.0070	1.0078	1.0022	1.0112
Electrical Machinery	9,277.276	0.9854	0.9820	0.9696	0.9789
Transport. Equipment	11,964.610	0.9485	0.9314	0.9004	0.9249
Electricity-Gas-Water	12,062.940	0.9948	0.9928	0.9856	0.9913
Construction	57,543.041	1.0159	1.0204	1.0121	1.0220
Transportation-Commun.	83,389.046	1.0131	1.0156	1.0068	1.0240
Other Services	177,335.475	0.9783	0.9715	0.9775	0.9636

CU: Percentage Change Under Customs Union
EU: Percentage Change Under Full Membership
EU+Tax: Percentage Change Under Revenue Replacement Tax
Free Trade: Percentage Change Under Free Trade
Base Value: Billion TL

Table 5.5: Domestic Sales

	Base Value	CU	EU	EU+Tax	Free Trade
Basic Agriculture	93,890.688	1.0064	1.0088	1.0026	1.0105
Agribusiness	31,878.619	1.0100	1.0119	1.0062	1.0164
Mining	7,431.617	1.0347	1.0435	1.0203	1.0541
Beverage Industry	3,171.054	0.9956	0.9930	0.9779	0.9942
Tobacco Industry	4,907.615	0.9303	0.9291	0.9052	0.8771
Textile	22,006.508	1.0361	1.0462	1.0304	1.0601
Wearing Apparel	5,991.661	1.0330	1.0394	1.0308	1.0494
Leather & Fur Products	3,647.055	1.0461	1.0568	1.0474	1.0740
Wood & Furniture	10,511.101	1.0046	1.0052	0.9969	1.0060
Paper & Publishing ind.	8,011.229	0.9849	0.9830	0.9689	0.9780
Chemical Products	16,772.635	0.9999	0.9989	0.9877	1.0012
Petroleum Products	23,462.312	0.9761	0.9711	0.9471	0.9615
Glass & Glass Products	1,926.279	0.9932	0.9891	0.9807	0.9986
Non-Metallic Products	20,233.790	0.9945	0.9924	0.9801	0.9911
Metal Industry	26,926.644	1.0102	1.0121	0.9997	1.0161
Non-electrical Machinery	9,050.644	1.0060	1.0066	1.0011	1.0098
Electrical Machinery	8,445.781	0.9819	0.9776	0.9652	0.9735
Transport. Equipment	11,391.406	0.9456	0.9276	0.8964	0.9204
Electricity-Gas-Water	11,948.447	0.9942	0.9920	0.9849	0.9902
Construction	57,543.041	1.0159	1.0204	1.0121	1.0220
Transportation-Commun.	70,856.526	1.0065	1.0069	0.9986	1.0094
Other Services	167,143.644	0.9747	0.9669	0.9735	0.9577

CU: Percentage Change Under Customs Union
EU: Percentage Change Under Full Membership
EU+Tax: Percentage Change Under Revenue Replacement Tax
Free Trade: Percentage Change Under Free Trade
Base Value: Billion TL

The increase in imports will be mostly in the monopolistic sectors with the exception of the metal industry, which uses the marginal labor more extensively. This is why cheap labor will be used from Turkish labor markets even after a customs union is in place, since a customs union does not allow free mobility of labor between Turkey and the EU. Changes in imports from the EU will be very high in tobacco (519.2%), wood and furniture (31%), petroleum products (29%), glass products (27%), and transportation equipment (16.3%). Imports from the ROW also increase in these sectors because of a decrease in tariff rates according to the preferential agreement with the rest of the world. The increase in ROW imports in these sectors will not be as high as EU imported goods, but considerably high nonetheless. Tobacco imports rise by 71%, petroleum products rise by 29%, wood and furniture rise by 23%, glass products rise by 21.4% and transportation equipments rise by 11% from the base value.

Service sectors will be affected negatively in terms of imports because, with the customs union, import price of services will increase in the domestic market. This will lead to a decrease in demand for imported service goods. Effects on agricultural sectors will be relatively small, because no tariff regulation is necessary for the Turkish agricultural sector in the customs union.

The same logical explanation can be applied for Turkish exports by origin. Price change tables show that domestic prices of exports increase under all scenario assumptions. This indicates an increase in exports. Table 5.8 and 5.9 show sectoral changes in Turkish exports to the EU and to the ROW, respectively. Under the customs union scenario, exports to the EU increase in all sectors, but the magnitude of changes are different. The highest increases will be in wearing apparel, with a rate of 16.6%, in the textile sector, with a rate of 15%, in leather and

Table 5.6: Imports from the European Union

Sectors	Base Value	CU	EU	EU+Tax	Free Trade
Basic Agriculture	814.151	1.0228	1.1674	1.1631	1.0131
Agribusiness	1,516.627	0.9808	1.0174	1.0236	0.9367
Mining	73.487	0.9817	0.9741	0.9536	0.9510
Beverage Industry	153.739	1.2337	1.4004	1.4656	1.2087
Tobacco Industry	80.867	5.1918	9.2239	9.3341	6.9243
Textile	874.893	1.0753	1.1769	1.1876	1.0492
Wearing Apparel	405.466	0.7132	0.6615	0.6790	0.5811
Leather & Fur Products	363.790	0.9118	0.9096	0.9211	0.8288
Wood & Furniture	125.215	1.3119	1.5848	1.5828	1.4029
Paper & Publishing ind.	415.235	1.0117	1.3541	1.3717	1.2046
Chemical Products	5,906.747	1.0431	1.0934	1.0886	1.0484
Petroleum Products	931.395	1.2934	1.7816	1.8246	1.5103
Glass & Glass Products	161.178	1.2777	1.5408	1.5405	1.3834
Non-Metallic Products	2,336.369	1.1189	1.2377	1.2382	1.1310
Metal Industry	5,844.326	1.0055	1.0205	1.0098	1.0017
Non-electrical Machinery	7,165.980	1.0045	1.0237	1.0209	0.9935
Electrical Machinery	2,813.837	1.0708	1.1626	1.1615	1.0740
Transport. Equipment	3,966.462	1.1629	1.3421	1.3562	1.1961
Electricity-Gas-Water	6.134	0.867	0.8669	0.9044	0.7877
Construction	-	-	-	-	-
Transportation-Commun.	5.180	0.7647	0,7181	0.7281	0.6562
Other Services	431.744	0.7078	0.6504	0.6872	0.5787

CU: Percentage Change Under Customs Union
EU: Percentage Change Under Full Membership
EU+Tax: Percentage Change Under Revenue Replacement Tax
Free Trade: Percentage Change Under Free Trade
Base Value: Billion TL

Table 5.7: Imports from the Rest of the World

Sectors	Base Value	CU	EU	EU+Tax	Free Trade
Basic Agriculture	2,272.458	1.0161	0.9256	0.9122	0.9932
Agribusiness	1,745.869	0.9532	0.8989	0.9044	0.9222
Mining	11,204.821	0.9474	0.9355	0.9156	0.9181
Beverage Industry	24.448	1.2256	1.1296	1.1822	1.7848
Tobacco Industry	1,807.391	1.7077	1.5933	1.6105	2.4823
Textile	1,577.796	1.0022	0.9320	0.9404	1.0009
Wearing Apparel	173.833	0.7125	0.6516	0.6689	0.5927
Leather & Fur Products	206.493	0.8876	0.8432	0.8539	0.8784
Wood & Furniture	94.387	1.2293	1.1172	1.1128	1.4295
Paper & Publishing ind.	739.536	1.0720	0.9982	1.0112	1.1178
Chemical Products	4,615.860	1.0324	0.9974	0.9930	1.0543
Petroleum Products	2,720.024	1.2864	1.2034	1.2324	1.5039
Glass & Glass Products	86.422	1.2139	1.0745	1.0744	1.4353
Non-Metallic Products	1,818.813	1.0761	0.9932	0.9944	1.1404
Metal Industry	5,889.159	0.9928	0.9812	0.9695	0.9917
Non-electrical Machinery	3,629.034	0.9972	0.9694	0.9667	0.9989
Electrical Machinery	2,892.596	1.0047	0.9419	0.9410	1.0337
Transport. Equipment	2,961.585	1.1061	0.9872	0.9976	1.2216
Electricity-Gas-Water	8.854	0.8368	0.7810	0.8148	0.7612
Construction	-	-	-	-	-
Transportation-Commun.	2,200.094	0.7647	0.7181	0.7281	0.6561
Other Services	1,453.123	0.7078	0.6504	0.6872	0.5787

CU: Percentage Change Under Customs Union
EU: Percentage Change Under Full Membership
EU+Tax: Percentage Change Under Revenue Replacement Tax
Free Trade: Percentage Change Under Free Trade
Base Value: Billion TL

fur products with a rate of 15%, and agricultural-related sectors, with a rate of 13% of the base year values. The smallest increases will be in transportation equipments with a rate of 0.5%, electrical machinery, with a rate of 3%, and the service sector, with a rate of 5% of the base value. The remaining sectors will increase between 6% to 12% of the base value.

Turkish exports to the ROW also tend to increase in the customs union with the exception of metal industry, machinery, and transportation equipments sectors. The increase, however, will be less than exports to the EU. The reason for this is because tariff reduction will be more in the EU countries. The highest increase in exports to the ROW will be in mining and basic agricultural sectors, with a rate of 7%, in textiles and wearing apparel, with a rate of 6%, and in the tobacco industry, with a rate of 5% of the base value. Metal and non-electrical machinery industries will experience a very small decrease in exports to the ROW.

b) European Union Scenario (Full Accession)

As discussed earlier, tariff rates for EU-imported goods will be completely eliminated for all sectors under this scenario. In addition, a certain portion of tariff rates imposed on non-EU imported goods will be reduced.

The full accession scenario will have similar impacts on the Turkish economy, but with greater magnitude in most sectors because, tariff reduction will be larger and more comprehensive. Agricultural and service sectors will also be included in the tariff harmonization process. With the full membership into the EU, all tariffs and non-tariff barriers will be removed from EU imported products.

Table 5.8: Exports to the European Union

Sectors	Base Value	CU	EU	EU+Tax	Free Trade
Basic Agriculture	705.989	1.1309	1.1638	1.0036	1.2119
Agribusiness	2,547.672	1.1391	1.1732	1.0027	1.2257
Mining	224.219	1.1242	1.1544	0.9882	1.1995
Beverage Industry	147.838	1.1032	1.1302	0.9840	1.1639
Tobacco Industry	28.755	1.1287	1.1593	0.9756	1.2033
Textile	4,485.767	1.1489	1.1860	1.0267	1.2414
Wearing Apparel	3,828.228	1.1665	1.2074	1.0112	1.2390
Leather & Fur Products	274.221	1.1498	1.1851	1.0023	1.2122
Wood & Furniture	32.959	1.1238	1.1539	0.9976	1.1989
Paper & Publishing ind.	19.592	1.1271	1.1582	0.9835	1.2038
Chemical Products	575.947	1.0899	1.1114	0.9896	1.1429
Petroleum Products	520.279	1.0269	1.0322	0.9371	1.0405
Glass & Glass Products	228.987	1.0894	1.1115	1.0124	1.1421
Non-Metallic Products	464.678	1.0753	1.0928	0.9853	1.1185
Metal Industry	953.609	1.0662	1.0812	0.9829	1.1043
Non-electrical Machinery	211.283	1.0590	1.0730	0.9945	1.0926
Electrical Machinery	552.569	1.0397	1.0482	0.9802	1.0614
Transport. Equipment	239.964	1.0056	1.0008	0.9426	1.0124
Electricity-Gas-Water	0.100	1.1060	1.1320	0.9820	1.1700
Construction	-	-	-	-	-
Transportation-Commun.	0.101	1.0733	1.1030	0.9900	1.1330
Other Services	9,696.408	1.0585	1.0708	0.9990	1.0902

CU: Percentage Change Under Customs Union
EU: Percentage Change Under Full Membership
EU+Tax: Percentage Change Under Revenue Replacement Tax
Free Trade: Percentage Change Under Free Trade
Base Value: Billion TL

Table 5.9: Exports to the Rest of the World

Sectors	Base	CU	EU	EU+Tax	Free Trade
Basic Agriculture	1,806.691	1.0738	1.0920	1.0021	1.1177
Agribusiness	2,011.809	1.0574	1.0709	0.9996	1.0911
Mining	285.920	1.0701	1.0868	0.9931	1.1112
Beverage Industry	264.534	1.0000	1.0002	1.0000	1.0005
Tobacco Industry	84.950	1.0532	1.0659	0.9894	1.0825
Textile	1,794.280	1.0609	1.0759	0.9962	1.0972
Wearing Apparel	1,035.082	1.0682	1.0841	0.9983	1.1072
Leather & Fur Products	212.225	1.0616	1.0763	0.9985	1.0974
Wood & Furniture	93.459	1.0346	1.0423	0.9977	1.0548
Paper & Publishing ind.	149.552	1.0371	1.0458	0.9946	1.0581
Chemical Products	1,016.093	1.0000	1.0002	1.0000	1.0000
Petroleum Products	242.841	1.0053	1.0064	0.9872	1.0080
Glass & Glass Products	181.169	1.0173	1.0213	0.9988	1.0268
Non-Metallic Products	538.809	1.0127	1.0160	0.9953	1.0204
Metal Industry	2,741.855	0.9914	0.9895	1.0023	0.9867
Non-electrical Machinery	222.615	0.9918	0.9900	1.0008	0.9874
Electrical Machinery	278.969	1.0000	0.9987	0.9998	1.0000
Transport. Equipment	333.292	1.0000	0.9990	1.0000	1.0000
Electricity-Gas-Water	114.461	1.0204	1.0251	0.9965	1.0319
Construction	-	-	-	-	-
Transportation-Commun.	12,533.645	1.0162	1.0199	0.9981	1.0254
Other Services	494.911	1.0114	1.0138	0.9998	1.0171

CU: Percentage Change Under Customs Union
EU: Percentage Change Under Full membership
EU+Tax: Percentage Change Under Revenue Replacement Tax
Free Trade: Percentage Change Under Free Trade
Base Value: Billion TL

Imposition of a new tariff rate will produce a trade creating effect on almost all manufacturing and agricultural goods imported from the EU, and a trade diverting effect in agriculture products imported from the ROW. Trade creation in manufacturing sectors will be smaller for the goods imported from the ROW. As is the case of customs union, the effect is expected to be greater in the monopolistic sectors, and smaller in the competitive sectors.

Table 5.10 demonstrates price changes under the full accession scenario. The domestic price of EU imported goods decreases for agricultural products and the agribusiness sector. Although producer prices will increase in agricultural sectors due to elimination of subsidies, domestic prices will not be significantly affected. This neutral impact takes place due to decreases in domestic prices of EU imports and an increase in the domestic agricultural production, because exports increase in all sectors with the full membership due to an increase in export prices.

The increase in export prices will be in the range of 4.9% and 11.2% in the customs union scenario; and between 6.5% and 14.4% in the full membership scenario. This increase in domestic prices of exported goods (PE) create an incentive for domestic producers to export more. Although there is a fluctuation in the price of intermediate goods, the change is not essential in all sectors for all scenarios. The fluctuations in domestic price of exports take place in the range from -2.6% to 3.1% in the CU scenario and from -3.5% to 7.7% in the full membership scenario.

Trade creating and trade diverting effects can be explained by considering the changes in the domestic prices, PMEU, and PMRW. These price changes determine the shifts of imports from ROW to the EU. Changes in the base values show that without full membership

Table 5.10: Prices for the European Union Scenario

SECTORS	PQ	PC	PN	PD	PE	PMEU	PMRW
Basic Agriculture	1.0062	1.0036	0.9938	1.0035	1.1003	0.9668	1.0246
Agribusiness	1.0046	0.9958	0.9983	0.9931	1.0815	0.9967	1.0473
Mining	1.0436	1.0974	0.9908	1.0394	1.1024	1.1150	1.1379
Beverage Industry	0.9920	0.9787	0.9873	0.9828	1.0605	0.9107	0.9553
Tobacco Industry	0.9388	0.8557	0.9971	0.9351	1.0860	0.4015	0.7462
Wearing Apparel	0.0242	0.9904	0.9907	1.0102	1.0714	0.9820	1.0410
Textile	1.0202	0.9922	0.9936	0.9818	1.0653	1.1242	1.1285
Leather & Fur Products	1.0256	1.0251	1.0022	1.0186	1.0762	1.0633	1.0836
Wood & Furniture	1.0010	0.9959	0.9976	0.9995	1.0755	0.8323	0.9175
Paper & Publishing ind.	0.9796	0.9692	0.9795	0.9775	1.0741	0.8486	0.9587
Chemical Products	0.9877	0.9638	0.9793	0.9795	1.0718	0.9083	0.9806
Petroleum Products	1.0423	0.9869	1.0772	1.0395	1.1268	0.5756	0.7477
Glass & Glass Products	0.9962	0.9528	0.9869	0.9764	1.0860	0.7600	0.8778
Non-Metalic Products	1.0096	0.9912	1.0134	1.0053	1.0950	0.8673	0.9593
Metal Industry	1.0358	1.0389	1.0343	1.0311	1.0945	1.0097	1.0472
Non-elect. Machinery	1.0108	1.0075	1.0010	1.0071	1.0886	0.9927	1.0389
Electrical Machinery	1.0017	0.9640	1.0136	0.9906	1.1117	0.8840	0.9714
Transport. Equipment	0.9572	0.9067	0.9643	0.9474	1.1443	0.8062	0.9116
Electricity-Gas-Water	1.0061	1.0055	1.0282	1.0054	1.0759	1.0627	1.0872
Construction	1.0026	1.0027	1.0002	1.0026	-	-	-
Transport-Commun.	1.0137	1.0036	0.9820	9.9998	1.0899	1.1448	1.1448
Other Services	0.9851	0.9789	0.9863	0.9774	1.1064	1.1448	1.1448

PQ: Producer Prices, PC: Composite Commodity Price, PN: Intermediate Good Prices, PD: Domestic Good Price, PE: Domestic Price of Imported Goods, PMEU: Domestic Price of EU-imported Goods, and PMRW: Domestic Prices of non-EU imported Goods.

the proportional imports from the ROW is higher than that of the customs union and full membership scenarios.

Table 5.4 shows that, under the full membership scenario, domestic production increases in all manufacturing sectors except tobacco, paper and publishing, petroleum, nonmetallic products, electrical machinery, and transportation equipment. Also, domestic demand for these sectors decreases along with domestic production. This implies that Turkish consumers' demand for imported products will be higher for these sectors with the EU membership. Table 5.6 and Table 5.7 illustrate this argument. The increase in imports from the EU will be greater than that of the ROW. This result is also consistent with the logical explanation of the integration, since the tariffs on EU products are completely eliminated, but tariff rates on ROW products decrease to a certain level, regulated by the Common External Tariff.

One very important result with full membership is the fact that in some sectors domestic production increases while domestic demand for those goods decreases. These sectors include the beverage industry, paper and publishing, and glass products. At first glance, this result may seem inconsistent with the theory of production. However, production in these sectors satisfies the export demands of Turkey.

The full membership scenario creates more increases in EU exports than the customs union scenario does in all sectors but transportation equipment. The increase in exports to the EU will be in wearing apparel (20.7%), the textile sector (18.6%), leather and fur products (18.5%), and agricultural-related sectors, with an average rate of 16.8% of the base value. The smallest increase will be in transportation equipments, with a rate of 0.08%, electrical machinery, with a

rate of 4.8%, and services sector, with a rate of 7% of the base value. Turkish exports to the EU in the remaining sectors will increase in the range of 7% to 15% of the base value.

Exports to the ROW results show more increases than that of customs union in all sectors except the metal industries, the machinery industry, and transportation equipments. The highest increase will be in basic agriculture, with a rate of 9.2%, the mining sector, with a rate of 8.6%, wearing apparel, with a rate of 8.4%, textile industry, with a rate of 7.6%, and fur and leather products, with a rate of 7.6% of the base value. However, Turkish exports to the ROW will decrease by 1% in metal, machinery, and transportation equipments sectors.

c) European Union plus Revenue Replacement Tax Scenario:

This scenario assumes that income loss in the government budget due to tariff reduction in the full membership will be compensated by imposing an indirect tax. With an increase in the level of indirect tax, government will be financing its losses resulting from the absence of the tariff revenue. The GDP will decrease by 2.7 percent of its base value with the full accession into the EU. Also, government revenue will decrease by 10.6 percent of its base value with the full membership. In order to compensate for the losses due to tariff reduction, government will increase the tax rate by 23% (e.g., if the base year tax rate is 10%, the new rate will be 12.3%).

Table 5.11 shows changes in prices for the replacement scenario. Domestic price of EU imports decreases in agricultural-related sectors and all manufacturing sectors, with the exception of mining, wearing apparel and leather products, because these sectors are very competitive and protection rates are very small (0.5% in mining, 0.6% in wearing apparel and 1.2% in leather products). Thus, elimination of tariffs will not affect the domestic price of EU imports much.

Instead, the cost of sectoral harmonization will increase domestic prices of these goods. However, even with this harmonization process the domestic prices for these sectors will decrease.

Under the assumptions of this scenario, the fluctuation in the intermediate good prices (PN) will be almost the same as in the second scenario. The fluctuation in intermediate good prices will be in the range of -3.5% and 7.1%. The free trade scenario will have a little more fluctuation concerning the price of intermediate goods. The range of fluctuation will be between -3.7% and 9.7%. In most cases this fluctuation is random, not in a specific order.

If the replacement scenario is compared with the base year values, domestic production increases by 7.6% in the textile industry; 5.6% in the leather and fur industry; and 4.9% in the wearing apparel industry. Domestic production decreases by 10% in transportation equipment; 9% in the tobacco industry; 5.2% in petroleum products; and 3% in the electrical machinery. However, if the comparison is made between the full membership and the replacement tax scenarios, both domestic production and domestic demand will decrease in the latter scenario due to an increase in indirect tax rate.

Although domestic prices of exports increase in all sectors under the replacement tax scenario, the rate of increase is smaller than other scenarios. Since there is a replacement tax to compensate revenue losses due to tariff reduction, the production and consumption levels in the domestic sector will be effected as well as the export level. An increase in tax rate results in an increase in variable cost of domestic production, and creates a relative disadvantage for Turkish exporters, because the world price in some sectors will be more attractive for the EU importers.

Table 5.11: Prices for Revenue Replacement Tax Scenario

Sectors	PQ	PC	PN	PD	PE	PMEU	PMRW
Basic Agriculture	0.9959	0.9933	0.9920	0.9932	1.0902	0.9563	1.0135
Agribusiness	0.9993	0.9902	0.9933	0.9880	1.0740	0.9859	1.0359
Mining	1.0334	1.0858	1.0010	1.0289	1.0965	1.1029	1.1255
Beverage Industry	0.9950	0.9804	0.9860	0.9854	1.0661	0.9009	0.9449
Tobacco Industry	0.9423	0.8543	0.9897	0.9386	1.0889	0.3972	0.7381
Wearing Apparel	1.0202	0.9858	0.9891	1.0061	1.0676	0.9713	1.0297
Textile	1.0173	0.9905	0.9929	0.9807	1.0604	1.1121	1.1162
Leather & Fur Products	1.0206	1.0194	0.9991	1.0137	1.0699	1.0518	1.0719
Wood & Furniture	0.9944	0.9895	0.9923	0.9931	1.0695	0.8238	0.9076
Paper & Publishing ind.	0.9823	0.9701	0.9820	0.9802	1.0747	0.8394	0.9483
Chemical Products	0.9830	0.9567	0.9828	0.9744	1.0714	0.8984	0.9700
Petroleum Products	1.0948	1.0296	1.0712	1.0929	1.1534	0.5693	0.7396
Glass & Glass Products	0.9907	0.9467	0.9893	0.9708	1.0810	0.7517	0.8683
Non-Metalic Products	1.0037	0.9883	1.0119	1.0041	1.0875	0.8579	0.9491
Metal Industry	1.0285	1.0300	1.0314	1.0213	1.0964	0.9977	1.0358
Non-elect. Machinery	1.0027	0.9978	0.9978	0.9887	1.0845	0.9820	1.0276
Electrical Machinery	1.0012	0.9592	1.0083	0.9897	1.1152	0.8744	0.9608
Transport. Equipment	0.9671	0.9076	0.9648	0.9564	1.1726	0.7975	0.9017
Electricity-Gas-Water	1.0151	1.01449	1.0282	1.0144	1.0780	1.0512	1.0754
Construction	1.0032	1.0032	0.9989	1.0023	1.0000	-	-
Transport-Commun.	1.0116	1.0015	1.0003	0.9980	1.0866	1.1324	1.1324
Other Services	0.9923	0.9870	0.9898	0.9856	1.0973	1.1324	1.1324

PQ: Producer Prices, PC: Composite Commodity Price, PN: Intermediate Good Prices, PD: Domestic Good Price, PE: Domestic Price of Imported Goods, PMEU: Domestic Price of EU-imported Goods, and PMRW: Domestic Prices of non-EU imported Goods.

However, some sectors such as wearing apparel, textiles, glass products, and agriculture-related sectors still experience an increase in exports to the EU. Remaining sectors will experience a decrease in EU exports.

Under the replacement tax scenario almost all sectors experience a decrease in the exports to the ROW. The only exceptions are basic agriculture and the metal industry, which show very small increases. As explained before, the reason for that is because levying a tax increases marginal cost of domestic products, and export prices. So, Turkish products will be much more expensive in the world market, and as a result, demand for Turkish products decreases.

d) The Free Trade Scenario

This scenario examines the elimination of all trade barriers. The assumption for this concept is that all countries gain from free trade. However, in reality, this is not always true. Free trade sometimes might be harmful for certain sectors, even though it is beneficial for the whole economy. Table 5.12 shows sectoral price movements under the free trade scenario. Domestic prices will increase in agriculture, mining, textiles, leather products, petroleum products, metal industry, non-electrical machinery, energy, and construction sectors. These increases will be considerably high in some sectors such as mining (4.9%), petroleum (4.8%) and the metal industry (4.0%), while other sectors experience a lower rate of increase in domestic prices. However, a domestic price decrease will be experienced in the tobacco industry (10.8%), the services sector (2.9%), paper and publishing sector (2.8%), and glass products (2.5%). The decreases in domestic price will be relatively smaller in the remaining sectors.

Table 5.12: Prices for the Free Trade Scenario

SECTORS	PQ	PC	PN	PD	PE	PMEU	PMRW
Basic Agriculture	1.0074	1.0040	0.9922	1.0039	1.1289	1.0025	1.0075
Agribusiness	1.0064	0.9955	0.9979	0.9914	1.1041	1.0335	1.0400
Mining	1.0547	1.1239	0.9885	1.0492	1.1317	1.1562	1.1768
Beverage Industry	0.9972	0.9828	0.9861	0.9860	1.0798	0.9444	0.8661
Tobacco Industry	0.8978	0.7646	0.9965	0.8922	1.1113	0.4164	0.5861
Wearing Apparel	1.0323	0.9945	0.9913	1.0140	1.0930	1.0183	1.0304
Textile	1.0281	0.9914	0.9954	0.9788	1.0853	1.1658	1.1601
Leather & Fur Products	1.0344	1.0342	1.0046	1.0256	1.0981	1.1026	1.0867
Wood & Furniture	1.0010	0.9958	0.9974	0.9992	1.0969	0.8634	0.8257
Paper & Publishing ind.	0.9748	0.9619	0.9750	0.9720	1.0953	0.8799	0.9067
Chemical Products	0.9890	0.9637	0.9774	0.9789	1.0921	0.9419	0.9375
Petroleum Products	1.0515	0.9750	1.0977	1.0477	1.1638	0.5969	0.5986
Glass & Glass Products	0.9998	0.9496	0.9867	0.9750	1.1109	0.7880	0.7765
Non-Metalic Products	1.0139	0.9924	1.0189	1.0084	1.1223	0.8994	0.9012
Metal Industry	1.0476	1.0536	1.0454	1.0404	1.1213	1.1302	1.1230
Non-elect. Machinery	1.0195	1.0219	1.0069	1.0149	1.1143	1.0294	1.0248
Electrical Machinery	1.0064	0.9628	1.0218	0.9924	1.1437	0.9167	0.9241
Transport. Equipment	0.9543	0.8975	0.9625	0.9425	1.1780	0.8360	0.8290
Electricity-Gas-Water	1.0082	1.0074	1.0367	1.0073	1.0974	1.1020	1.1018
Construction	1.0041	1.0041	1.0024	1.0041	-	-	-
Transport-Commun.	1.0172	1.0039	0.9758	0.9993	1.1151	1.1871	1.1871
Other Services	0.9810	0.9729	0.9832	0.9710	1.1370	1.1871	1.1871

PQ: Producer Prices, PC: Composite Commodity Price, PN: Intermediate Good Prices, PD: Domestic Good Price, PE: Domestic Price of Imported Goods, PMEU: Domestic Price of EU-imported Goods, and PMRW: Domestic Prices of non-EU imported Goods.

The PMEU/PMRW ratio determines Turkey's import preference between EU and non-EU goods. In other words, trade creating or trade diverting impacts will be determined according to this ratio. As is in the previous scenarios, the tobacco industry is the most affected sector under this scenario as well. The domestic price of EU imported goods decreases by 58.3% in the tobacco industry, 39.3% in the petroleum industry, 21.2% in the glass products, 13.6% in the wood and furniture industry, 12% in the paper and publishing industry, and 10% in the non-metallic products. However, the domestic price of EU imported goods increases by 17.3% in services, and transportation and communication, 16.5% in the textile industry, 15.6% in the mining sector, and 13% in the metal industry.

The free trade scenario will also affect domestic production and domestic demand. Domestic production decreases by 11.6% in the tobacco industry and by 7.5% in transportation equipment. However, the paper and publishing industry, petroleum products, electrical machinery, and service sectors experience relatively small decreases in production. Domestic production increases in the remaining sectors. Leading sectors in domestic production increases will be wearing apparel (11.2%), textiles (8.4%) and leather products (8.5%). These changes in domestic production are the result of domestic and import price changes.

Trade diverting and trade creating impacts of the free trade scenario will be relatively equal for the ROW and the EU, because complete elimination of the tariff barriers gives equal opportunity to Turkish consumers in terms of buying preferences. Tobacco imports from the EU will be six times greater than its base value, while imports from ROW will be two times greater than its base value.

Free trade scenario results, as expected, show higher increases in exports to ROW. Only the metal industry and the non-electrical machinery industry exports decrease by 2% due to trade diverting impacts of tariff reduction. This may be because of higher transportation costs of exports to the ROW.

Labor Demand and Employment Impacts

The relationship with the EU affects employment and labor demand of the Turkish economy. As explained in Chapter Three, production decisions are made according to changes in value added prices. This change in value added prices results in changes in production and factor demands by altering marginal revenue of production. Since capital stock is assumed unchanged in the TRCGE model, the changes in labor demand will determine sectoral distribution of the resources. According to this argument, a decrease in the value added price results in a decrease in production and organized labor demand, given organized labor wage. If this decrease is not compensated for by an increase in other sectors, unemployment exists in the economy. Excess labor in the organized labor market will move to the marginal labor market. Thus, marginal labor supply increases. This increase in marginal labor supply causes a decrease in the wage rate for marginal laborers (Kose, 1996).

a) Customs Union Scenario:

Table 5.13 and Table 5.14 explain the relationships between value added price, labor supply in each sector, and production. According to the assumptions of the customs union scenario, organized labor demand increases in most of the sectors with the exception of the tobacco industry, paper and publishing, petroleum products, electrical machinery, transportation

equipment and the service sectors. However, the decrease in organized labor demand in these sectors is greater than that of the marginal labor market. This is due to the increase in average wages in the marginal labor market. The decrease in organized labor demand is 13.3% in the tobacco industry, 9.9% in transportation equipments, 3.5% in the service sector, 2.9% in the paper and publishing sector, 2.5% in electrical machinery, and 2.1% in petroleum products. Although some sectors such as paper and publishing, electrical machinery, transportation equipment and the services sectors experience a decrease in marginal labor demand, in average, wage rate in the marginal labor market increases. If Tables 5.2, 5.11, and 5.12 are analyzed together, it is seen that for both the marginal and the organized labor markets experience a correlation with domestic production in general.

b) European Union Scenario (Full Access):

This scenario considers full membership into the EU. The decreases in labor demand will continue in the tobacco industry, transportation equipment, the paper and publishing sector, electrical machinery, and petroleum products. It is very easy to see from Table 5.14 that the decrease in formal labor demand under the full membership scenario assumptions will be greater than that of the customs union scenario. The decreases in marginal labor demand in these sectors under the full membership scenario will also be small. The remaining sectors experience a demand increase for both marginal and organized labor. The highest demand increase in organized labor will be 15.4% in wearing apparel, 13.5% in textiles, 12.4% in leather and 8.8% in the mining industry. Also, marginal labor demand increases by 14.9% in wearing apparel, 13% in the textile, 12% in leather products, and 8.5% in the mining sector.

Table 5.13: Marginal Labor Demand

Sectors	Base Value	CU	EU	EU+Tax	Free Trade
Basic Agriculture	9,119,161	1.0109	1.0152	1.0106	1.0187
Agribusiness	155,899	1.0279	1.0345	1.0350	1.0467
Mining	82,317	1.0666	1.0854	1.0563	1.1063
Beverage Industry	3,305	0.9999	0.9965	0.9765	1.0015
Tobacco Industry	-	-	-	-	-
Textile	81,488	1.1006	1.1298	1.1137	1.1708
Wearing Apparel	135,967	1.1179	1.1491	1.1445	1.1936
Leather & Fur Products	73,014	1.0959	1.1191	1.1135	1.1577
Wood & Furniture	188,716	1.0066	1.0071	1.0026	1.0087
Paper & Publishing ind.	36,715	0.9683	0.9638	0.9551	0.9543
Chemical Products	21,698	1.0012	0.9995	0.9871	1.0065
Petroleum Products	-	-	-	-	-
Glass & Glass Products	7,742	1.0040	1.0016	0.9941	1.0074
Non-Metallic Products	104,481	0.9957	0.9934	0.9822	0.9943
Metal Industry	180,020	1.0058	0.9992	0.9928	1.0011
Non-electrical Machinery	30,501	1.0128	1.0141	1.0094	1.0220
Electrical Machinery	22,987	0.9714	0.9650	0.9527	0.9611
Transport. Equipment	28,376	0.8976	0.8652	0.8301	0.8529
Electricity-Gas-Water	-	-	-	-	-
Construction	492,443	1.0159	1.0210	1.0375	1.0223
Transportation-Commun.	371,479	1.0350	1.0423	1.0383	1.0547
Other Services	3,722,374	0.9601	0.9484	0.9733	0.9347

CU: Percentage Change Under Customs Union
EU: Percentage Change Under Full Membership
EU+Tax: Percentage Change Under Revenue Replacement Tax
Free Trade: Percentage Change Under Free Trade
Base Value: Person

Table 5.14: Organized Labor Demand

Sectors	Base Value	CU	EU	EU+Tax	Free Trade
Basic Agriculture	147,208	1.0147	1.0194	0.9984	1.0239
Agribusiness	179,378	1.0309	1.0379	1.0252	1.0509
Mining	100,330	1.0702	1.0881	1.0456	1.1111
Beverage Industry	14,921	1.0009	0.9982	0.9715	1.0035
Tobacco Industry	32,107	0.8672	0.8659	0.8185	0.7754
Textile	230,315	1.1058	1.1351	1.0989	1.1774
Wearing Apparel	152,270	1.1248	1.1544	1.1293	1.2004
Leather & Fur Products	30,202	1.1008	1.1244	1.0987	1.1642
Wood & Furniture	61,760	1.0106	1.0120	0.9889	1.0144
Paper & Publishing ind.	46,363	0.9713	0.9677	0.9442	0.9590
Chemical Products	66,268	1.0043	1.0031	0.9771	1.0110
Petroleum Products	10,106	0.9794	0.9760	0.9237	0.9657
Glass & Glass Products	17,462	1.0064	1.0043	0.9885	1.0106
Non-Metallic Products	132,144	1.0013	1.0000	0.9751	1.0020
Metal Industry	172,720	1.0185	1.0254	1.0005	1.0293
Non-electrical Machinery	62,128	1.0146	1.0161	1.0036	1.0245
Electrical Machinery	54,526	0.9750	0.9690	0.9412	0.9660
Transport. Equipment	72,368	0.9017	0.8698	0.8175	0.8584
Electricity-Gas-Water	66,734	0.9895	0.9845	0.9640	0.9817
Construction	403,763	1.0234	1.0296	1.0126	1.0328
Transportation-Commun.	374,962	1.0399	1.0479	1.0225	1.0616
Other Services	2,435,343	0.9646	0.9531	0.9586	0.9408

CU: Percentage Change Under Customs Union
EU: Percentage Change Under Full Membership
EU+Tax: Percentage Change Under Revenue Replacement Tax
Free Trade: Percentage Change Under Free Trade
Base Value: Person

Another important point concerning the Turkish economy can be made by analyzing the relationship between Table 5.4 and Table 5.14. It can be seen that there is a correlation between labor demand and domestic production. This implies that as labor demand increases domestic production also increases.

c) European Union plus Revenue Replacement Tax Scenario:

This scenario involves imposing an indirect tax to compensate government losses due to decreases in tariff revenues. Under the assumptions of this scenario, increase in organized labor demand will be considerably high in wearing apparel (12.9%), textiles (9.9%), and mining (4.6%) sectors. The decreases in organized labor will be in the transportation equipment (18.3%), the tobacco industry (18.2%), the petroleum industry (7.7%), and the paper and publishing sector (5.6%). The marginal labor market also experiences similar impacts, but in lower amounts. For example, marginal labor demand decreases by 17% in transportation equipment, 5% in the paper and publishing industry, and 3% in services sector. The increases in the marginal labor market, however, will be in the wearing apparel (14.4%), in the textile industry (11.3%), and leather and fur industry (11.3%). The changes in other sectors in either direction will be small. A comparison of the results of Tables 5.4, 5.13 and 5.14 also show the relationship between changes in labor demand and changes in domestic production. There is a linear correlation between labor demand and domestic production.

d) The Free Trade Scenario:

The free trade scenario will produce similar results as in the full membership scenario. Demand for marginal labor will increase in all sectors with the exception of paper and publishing,

electrical machinery, transportation equipment, and service sectors. In the organized labor market, however, demand will decrease in the tobacco industry, petroleum products, and energy sector in addition to those sectors in the marginal labor market. The highest decreases in marginal labor demand will be seen in transportation equipment (15%), services sectors (6.6%), and electrical machinery (4%). The highest increases in marginal labor demand, however, will be seen in wearing apparel (19.3%), textiles industry (17%), and leather and fur products (15.7%). In the organized labor market, the direction is the same but the magnitude of changes are more severe. For example, the increases in organized labor demand is 20% in wearing apparel, 17.7% in textiles, 16.4% in leather and fur, and 11.1% in the mining sector. The highest decreases in this labor market, however, will be in the tobacco industry (22.5%),services (6%), and petroleum products (3.5%).

As can be seen from Tables 5.13 and 5.14, the demand for organized (formal) labor increases in most sectors under all scenarios. This indicates that the Turkish economy will experience an increase in the quality of labor when it is opened to the world. Marginal labor will be used mostly in the sectors in which no qualifications are necessary. In other words, under all scenarios, the quality of Turkish labor will improve.

Sectoral Profit Rate Impacts

In order to analyze the impacts of the scenarios on sectoral profits, two criteria will be used: profit-capital ratio for each individual sector and the change in sectoral profits with respect to base year. The reason profit-capital ratio is used along with the change in sectoral profits is because it is easier to analyze real changes in profits with this ratio.

a) Customs Union Scenario:

A customs union will have impacts on all sectors. The following sectors will experience a decrease in profits: tobacco (-17.3%), transportation equipment (-8.2%), petroleum products (-4.1%), paper and publishing (-3.2%), services (-3%), and electrical machinery (-2.6%). Profit rates decreased in these sectors due to the high current protection levels in these sectors. Elimination of tariffs in the manufacturing sector results in an increase in the demand for imported goods. The domestic price of EU imported goods will be relatively lower than that of domestic goods. This situation causes a shift from domestic products to EU products in these sectors. However, domestic sectors experience profit increases with respect to their base year values. These profit increases take place for two reasons: i) increase in domestic demand and ii) increase in exports. Exports in all sectors increase with the customs union. Also, Table 5.5 shows that domestic sales increase in these sectors. Among these sectors, the highest profit increase can be seen in wearing apparel (11.8%), textiles (10.1%), mining (8.8%), leather and fur products (9.6%), and the metal industry (4.9%). The remaining sectors also experience profit increases, but the magnitude will be smaller. Looking at these high profit increase sectors, they are very competitive in the international arena with the exception of the metal industry. The reason for an increase in profit in the metal industry is because there is a number of Turkish producers in kitchen products; this is a very competitive industry in the international arena.

b) European Union Scenario (Full Access):

Full membership into the EU has similar, but much stronger impacts on the Turkish economy, because protection levels will be completely eliminated on EU products, and

Common External Tariff will be adopted for the ROW. This results in trade creating impacts on the Turkish economy, but the impact will be stronger on EU products. With this reality, profit rates increase in the competitive sectors, and decrease in the highly protected sectors. Profit losses can be seen in tobacco (-17.5%), transportation equipment (-11%), petroleum (-4.7%), and paper and publishing (-3.2%). The highest profit increases will be experienced in wearing apparel (14.6%), textiles (12.8%), leather and fur products (11.8%), and mining (11.1%). Analyzing Tables 5.4 and 5.16 together shows that domestic production increases in the profit increasing sectors; similarly it decreases in the profit decreasing sectors.

Table 5.15 shows sectoral profit-capital ratio, and the results are consistent with Table 5.16, which represents sectoral profit rates. Profit rate increasing sectors experience profit-capital ratio increases and profit decreasing sectors experience profit-capital ratio decreases under all experiments. Thus, both tables indicate very similar results.

c) European Union plus Revenue Replacement Tax Scenario:

The revenue replacement tax scenario will create a reduction in both profit rates and profit-capital ratios for all sectors compared to full membership assumptions, but comparted to base year values, some sectors such as wearing apparel (12.2%), textiles (9.4%), mining (5.7%) and agribusiness (3.4%) still have profit increases. As can be seen, these sectors have highly competitive structure in the world market. It also shows that the profit rate is greater than the tax rate levied in these sectors. The remainders of the sectors experience profit decreases. The highest losses in profit will be in the tobacco industry, with a rate of 23.5%; transportation equipment, with a rate of 15.5%; petroleum products, with a rate of 14.7%; electrical machinery,

Table 5.15: Profit/Capital Ratio

Sectors	Base Value	CU	EU	EU+Tax	Free Trade
Basic Agriculture	0.2964	0.3010	0.3024	0.2959	0.3038
Agribusiness	0.1897	0.1974	0.1992	0.1960	0.2026
Mining	0.0715	0.0778	0.0794	0.0756	0.0815
Beverage Industry	0.3316	0.3323	0.3302	0.2839	0.3345
Tobacco Industry	1.5394	1.2713	1.2691	1.1769	0.0951
Textile	0.2311	0.2606	0.2671	0.2590	0.2766
Wearing Apparel	0.1868	0.2104	0.2161	0.2115	0.2242
Leather & Fur Products	0.6163	0.6780	0.6919	0.6768	0.7152
Wood & Furniture	0.3804	0.5697	0.5707	0.5575	0.5716
Paper & Publishing ind.	0.1098	0.1063	0.1058	0.1030	0.1048
Chemical Products	0.1032	0.1037	0.1035	0.1002	0.1045
Petroleum Products	0.2507	0.2404	0.2387	0.2138	0.2337
Glass & Glass Products	0.1574	0.1590	0.1586	0.1538	0.1601
Non-Metallic Products	0.1454	0.1471	0.1469	0.1430	0.1473
Metal Industry	0.1343	0.0934	0.0944	0.0909	0.0965
Non-electrical Machinery	0.2382	0.2460	0.2469	0.2401	0.2514
Electrical Machinery	0.2610	0.2541	0.2525	0.2449	0.2516
Transport. Equipment	0.1271	0.1166	0.1131	0.1074	0.1119
Electricity-Gas-Water	0.0582	0.0580	0.0578	0.0571	0.0577
Construction	0.2255	0.2284	0.2292	0.2272	0.2295
Transportation-Commun.	0.2530	0.2613	0.2630	0.2577	0.2659
Other Services	0.1371	0.1331	0.1314	0.1324	0.1303

CU: Customs Union
EU: Full Membership
EU+Tax: Revenue Replacement Tax

Table 5.16: Sectoral Profits

Sectors	Base Value	CU	EU	EU+Tax	Free Trade
Basic Agriculture	28,889.468	1.0155	1.0205	0.9983	1.0252
Agribusiness	4,274.203	1.0414	1.0509	1.0337	1.0685
Mining	3,148.340	1.0886	1.1111	1.0574	1.1408
Beverage Industry	1,353.201	1.0022	0.9958	0.9303	1.0085
Tobacco Industry	1,425.673	0.8274	0.8253	0.7656	0.7123
Textile	5,717.654	1.1007	1.1283	1.0940	1.1683
Wearing Apparel	1,755.569	1.1182	1.1463	1.1227	1.1900
Leather & Fur Products	817.402	1.0958	1.1181	1.0938	1.1564
Wood & Furniture	2,182.726	1.0111	1.0126	0.9703	1.0142
Paper & Publishing ind.	1,429.706	0.9678	0.9641	0.9382	0.9546
Chemical Products	4,575.218	1.0055	1.0038	0.9715	1.0138
Petroleum Products	4,605.712	0.9593	0.9527	0.8532	0.9325
Glass & Glass Products	776.360	1.0106	1.0071	0.9776	1.0177
Non-Metallic Products	4,728.282	1.0024	1.0011	0.9740	1.0035
Metal Industry	4,354.458	1.0491	1.0594	1.0202	1.0793
Non-electrical Machinery	2,579.889	1.0330	1.0362	1.0080	1.0552
Electrical Machinery	1,956.396	0.9739	0.9676	0.9382	0.9642
Transport. Equipment	1,723.231	0.9176	0.8903	0.8454	0.8806
Electricity-Gas-Water	5,148.688	0.9942	0.9913	0.9798	0.9898
Construction	7,562.068	1.0123	1.0155	1.0066	1.0171
Transportation-Commun.	42,688.840	1.0331	1.0397	1.0187	1.0510
Other Services	54,850.245	0.9704	0.9610	0.9650	0.9504

CU: Percentage Change Under Customs Union
EU: Percentage Change Under Full Membership
EU+Tax: Percentage Change Under Revenue Replacement Tax
Free Trade: Percentage Change Under Free Trade
Base Value: Billion TL

and paper, with a rate of 6.2%, and chemical products, with a rate of 3%. Other sectors experience small decreases in their profit rates.

d) The Free Trade Scenario:

The free trade scenario will create an increase in profit rates and profit-capital ratio for most of the sectors. However, due to elimination of all trade barriers, previously protected sectors will have profit losses. Higher profit losses will be seen in tobacco (28.8%), transportation equipment (11.9%), petroleum products (6.7%), services (5.0%), and paper and publishing (4.6%). Also, domestic production for these sectors decreases due to the higher standards of the EU products and lower prices of imported goods. The profit increasing sectors will be wearing apparel (19%), the textile industry (16.8%), leather and fur products (15.6%), mining (14.1%), and agribusiness (6.8). The changes in the remaining sectors will be relatively small.

Sectoral Cost Structure Impact

Average variable cost structure of all sectors are analyzed to determine the impacts of each scenario on the Turkish economy. Domestic production is analyzed because, the changes in cost structure of a sector will change the distribution of trade and affect domestic levels of production.

a) Customs Union Scenario:

Under the customs union scenario, there will be a decrease in average variable cost (AVC) in a few sectors. However, this decrease is very small and can be ignored in most of the sectors. The highest decrease in the AVC is in the tobacco industry with 3.3% of its base value.

The remainder sectors will experience either a very small decrease or increase in the average variable cost. The TRCGE model considers capital as fixed so that the only variable cost for the producers is the labor payments. As can be seen in the Table 5.17, marginal labor using sectors such as mining (2.5%), metal (2.5%), and agriculture (3.4%) will have increases in the average variable cost due to wage rate increases in the marginal labor market. In addition, the cost structure of the same sectors that rely extensively on organized labor will change in a negative way. Although the average wage rate does not change in the organized labor market, the increases in the average costs of some sectors such as leather and fur products (5.5%) can be explained by an increased demand for marginal labor (see Table 5.13). The wage rate in the marginal labor market will increase with the custom union scenario. This will also be one of the reasons for increased cost structure. Since, some of marginal labor will be trained and move to the higher wage organized labor market. Moreover, due to an increased demand for organized labor in some sectors, producers might provide additional non-wage opportunities such as less and more flexible working hours, vacation opportunities and better environment for qualified laborers. This may also be one of the reasons for increases in the average variable cost.

b) European Union Scenario (Full Access):

The full accession scenario implies that no trade barriers exist between Turkey and the EU. The average variable cost under this scenario will increase in many sectors. The reason for this is explained in the customs union scenario. Changes in the labor demand and wage rate affect the cost structure of the sectors. Under the full accession scenario, the average variable cost (AVC) will increase in all competitive sectors. However, previously monopolistic sectors

Table 5.17: Sectoral Average Variable Cost Structure

Sectors	Base Value	CU	EU	EU+Tax	Free Trade
Basic Agriculture	702.775	1.0034	1.0045	0.9952	1.0055
Agribusiness	882.045	1.0015	1.0021	0.9973	1.0029
Mining	583.327	1.0253	1.0317	1.0274	1.0398
Beverage Industry	560.112	0.9941	0.9908	1.0113	0.9924
Tobacco Industry	672.389	0.9664	0.9659	0.9788	0.9430
Textile	792.230	1.0131	1.0170	1.0152	1.0225
Wearing Apparel	830.7442	1.0163	1.0204	1.0187	1.0268
Leather & Fur Products	799.909	1.0558	1.0190	1.0154	1.0262
Wood & Furniture	1,719.796	1.0000	0.9996	0.9945	0.9998
Paper & Publishing ind.	819.579	0.9827	0.9800	0.9846	0.9753
Chemical Products	748.958	0.9874	0.9837	0.9842	0.9833
Petroleum Products	736.930	1.0513	1.0650	1.1379	1.0815
Glass & Glass Products	661.079	0.9953	0.9926	0.9933	0.9940
Non-Metallic Products	1,500.123	1.0093	1.0111	1.0130	1.0162
Metal Industry	2,491.001	1.0251	1.0311	1.0282	1.0413
Non-electrical Machinery	725.727	1.0044	1.0039	1.0000	1.0101
Electrical Machinery	778.821	1.0052	1.0064	1.0080	1.0124
Transport. Equipment	842.934	0.9684	0.9574	0.9691	0.9547
Electricity-Gas-Water	544.211	1.0091	1.0108	1.0190	1.0146
Construction	866.571	1.0031	1.0034	1.0037	1.0051
Transportation-Commun.	482.231	1.0024	1.0033	1.0091	1.0034
Other Services	679.959	0.9868	0.9826	0.9906	0.9780

CU: Percentage Change Under Customs Union
EU: Percentage Change Under Full Membership
EU+Tax: Percentage Change Under Revenue Replacement Tax
Free Trade: Percentage Change Under Free Trade
Base Value: Billion TL

(beverage, tobacco, glass products, and transportation equipment) experience a decrease in average variable cost, but decreases are very small. The highest AVC increase is seen in petroleum, with a rate of 6.5%; mining, and metal, with a rate of 3.1%; and metal, with a rate of 2.5%. The reason for the increase in average variable cost in the monopolistic sectors is because they don't operate at their optimal point. Thus, when full membership exists, these sectors must become competitive in order to enter European markets.

c)European Union plus Revenue Replacement Tax:

Under this scenario, the average variable cost increases by 13.8% in the petroleum industry; 2.8% in the metal industry; 2.7% in the mining industry, 1.9% in the energy sector, 1.8% in wearing apparel, and 1.5% in the textile industry. Some of the sectors also experience a decrease in the average variable cost. This shows that tax burden imposed by the government is transmitted to the consumers in some sectors such as in the transportation equipment, tobacco, chemical products, and paper and publishing.

d) The Free Trade Scenario:

The free trade scenario and the full access scenario provide similar logical information for average variable cost structure of the Turkish economy. Fluctuations in the average variable cost is in the same direction with the full membership scenario. However, the free trade scenario will have the greatest impacts on the cost structure of the Turkish economy.

Macroeconomic Indicators and Government Balance

The Turkish economy continuously suffered from the beginning of the 1990s from macroeconomic problems. One of the main reasons for this problem was the government sector

deficit, which was increasing every year. The ratio of government deficit to GDP was 3.5% in 1987. However, this ratio increased to 5.3% in 1991, 6.7% in 1994, and continued to increase in the following years. During these years, the Turkish economy experienced a decrease in government revenue and import duties became a major component of government revenue. In 1990, for example, 15% of the total budget revenue was from these taxes. Although this rate continued to decrease in the following years, it is still high compared to European countries. After the customs union, this ratio showed a dramatic decrease due to Common External Tariff of the EU, and the Turkish economy experienced problems concerning finance of government expenditures (Kose, 1996). In this section, the comparison of the scenarios is discussed in detail rather than analyzing each scenario individually. The reason for this is because seeing the resemblance and differences between the scenarios is more appropriate. The macroeconomic indicators are need to be compared in order to see the picture of the whole economy. The impact of the customs union and full EU membership on the Turkish economy with different policy assumptions are presented in Table 5.18 and Table 5.19. Also, Figures 5.1 and 5.2 show the similar results concerning macroeconomic and foreign trade balances of the Turkish economy. The Turkish economy experiences a 2% decrease in GDP under the customs union scenario. This decrease becomes nearly 2.7% under the full access scenario, and 3.4% under the free trade scenario. However, the loss in GDP will disappear in the replacement tax scenario. Government revenue also decreases under all scenarios. The reason for this decrease is the elimination of tariffs and tariff-related taxes on imports. The losses in import taxes by origin are shown in Table 5.19. Under the customs union scenario, almost 98% of tariff revenues from the

EU and 62% of fund revenue from the EU will be lost. Also, 25% of tariff revenues from the ROW and 60% of the fund revenues from the ROW will be lost. As explained in the earlier chapters, however, tariff and fund rate on EU imports will be completely eliminated under the other scenarios, and 40% of tariff revenue, and 43% of fund revenue from the ROW will be lost under the second and third scenarios. All revenues due to tariff and fund, of course, will be lost under the free trade scenario. Public consumption also decreases under the all scenarios. This decrease reaches a tremendous level under the free trade scenario (34%). Government savings also decrease under all scenario assumptions between 2.7% and 3.4% of the base year value.

Private income increases 0.5% under the customs union scenario, 1.5% under full membership scenario, and 0.7% under the free trade scenario. However, it decreases by 0.8% of the base value under the third scenario in which a replacement tax is levied. Private consumption also increases in the range of 1.6% to 2.6% of its base value under the customs union, full membership, and free trade scenarios. However, it decreases by 1.2% of the base value under the replacement tax scenario. Private savings increase under the all scenarios. This increase is 2.1% under the customs union scenario, 2.6% under the full membership scenario, 1.2% under the replacement tax scenario, and 3.4% under the free trade scenario.

The comparison of revenue, consumption, savings, and investment changes in government and private sectors indicates that the causes of economic crisis in the Turkish economy is the result of unbalanced structure of the government sector. For that reason, cutting government expenditures will be a good policy to eliminate the negative impact of the public sector on the economy.

Table 5.18: Macroeconomic Balances (Billion TL)

	Base Value	CU	%	EU	%	EU + Tax	%	FT	%
GDP	390,796.6	382,818.3	0.979	380,302.91	0.973	389,819.5	0.997	377,536.9	0.966
Public Consumption	43,127.6	34,227.36	0.793	31,758.36	0.736	36,032.47	0.835	28,698.45	0.665
Private Consumption	262,140.5	266,366.7	1.016	267,112.16	1.019	259,045.4	0.988	268,872.4	1.025
Public Savings	13,692.7	13,413.2	0.979	13,325.14	0.973	13,315.14	0.972	13,228.14	0.966
Private Savings	76,141.1	76,520.6	1.005	76,556.43	1.005				
Public Investment	34,228.8	34,228.8	1.000	34,228.78	1.000	34,228.78	1.000	34,228.78	1.000
Private Investment	68,458.6	70,055.0	1.023	70,368.85	1.027	69,163.79	1.010	70,942.94	1.036
Exports to the EU	24,706.6	27,448.3	1.110	27,851.62	1.137	25,606.32	1.036	28,466.64	1.152
Exports to the ROW	27,457.4	28,060.0	1.022	28,436.53	1.035	26,306.42	0.958	29,002.23	1.056
Imports from the EU	34,392.8	36,421.6	1.059	39,439.12	1.146	35,013.79	1.018	37,656.72	1.094
Imports from the ROW	48,095.3	49,196.8	1.022	47,419.99	0.985	46,122.28	0.959	50,031.31	1.040
Exchange Rate (TL/$)	2630.0	2936.8	1.116	3010.65	1.144	2978.10	1.13	3122.00	1.187

CU: Customs Union
EU: European Union
EU+Tax: Revenue Replacement Tax in the EU
FT: Free Trade
%: Percentage Change with respect to the Base Value

Table 5.19: Changes in Government Balance

	Base	CU	%	EU	%	EU+Tax	%	FT	%
Incomes:									
Indirect taxes	20,525.805	20,350.938	0.9915	20,314.473	0.9897	25,205.970	1.2280	20,229.970	0.9856
Corporate taxes	5,093.022	5,120.939	1.0055	5,122.600	1.0057	5,035.946	0.9886	5,133.584	1.0080
Income taxes	26,486.100	26,617.778	1.0050	26,630.225	1.0054	26,270.000	0.9918	26,674.482	1.0071
Tariff income:									
From EU	582.002	5.163	0.0089	0.000	-	-	-	-	-
From ROW	515.501	386.798	0.7503	308.875	0..5992	306.593	0.5947	-	-
Funds:									
From EU	5,673.611	2,114.256	0.3726	0.000	-	-	-	-	-
From ROW	6,630.828	2,608.226	0.3934	2,504.716	0.3778	2,496.481	0.3756	-	-
Factor incomes	13,462.894	13,188.044	0.9796	13,101.386	0.9731	13,091.641	0.9724	13,006.100	0.9660
Expenses:									
Consumption	43,127.656	34,227.365	0.7364	31,758.359	0.7364	36,932.471	0.8563	28,698.448	0.6645
Transfers	16,980.748	16,980.748	1.0000	16,980.748	1.0000	16,980.748	1.0000	16,980.748	1.0000
Interest payments	9,023.531	10,105.529	1.1199	10,279.15	1.1391	10.,250.276	1.1359	10.742.82	1.1904
Savings	13,692.731	13,413.189	0.9796	13,325.052	0.9732	13,315.140	0.9725	13,228.139	0.9661
Investment	34,228.780	34,228.780	1.0000	34,228.780	1.0000	34,228.780	1.0000	34,228.780	1.0000

CU: Customs Union

EU: European Union

EU+Tax: Revenue Replacement Tax in the EU

FT: Free Trade

%: Percentage Change with respect to the Base Value

Turkey's accession into the EU will have a trade creating impact between the EU and Turkey under the all scenarios. Although there is a slight increase in the wage rate, elimination of tariff and tariff-related taxes will decrease the domestic price level. The decreases in the price level and changes in the exchange rate in favor of the EU cause an increase in exports between the EU and Turkey.

Since there will be a reciprocal decrease in tariff rates, Turkish imports from the EU will also increase. This result can be seen from Table 5.18. Turkish exports to the EU increase by 11% under the customs union scenario, 13.7% under the full membership scenario, 15.2% under the free trade scenario, and 3.6% under the replacement tax scenario. Turkish imports from the EU also increase by 5.9% under the customs union scenario, 14.7% under the full membership scenario, 9.5% under the free trade scenario, and 1.8% under the replacement tax scenario.

Exports to the ROW increase due to reciprocal elimination of tariffs and changes in the exchange rate in favor of the ROW. According to Common External Tariff, Turkey is required to decrease import taxes on the third countries as well. This preferential agreement results in an increase in trade volume between Turkey and the ROW. Exports to the ROW increase by 2.2% under the customs union scenario, 3.5% under the full membership scenario and 5.6% under the free trade scenario. However, ROW exports decrease by 4.2% of the base value under the replacement tax scenario. Imports from the ROW increase by 2.3% under the customs union scenario, and 4% under the free trade scenario. However, there will be a trade diverting impact of full membership and replacement scenarios. Thus, Turkish imports from the ROW decrease by 1.4% under the full membership, and 4.1% under the replacement tax scenario.

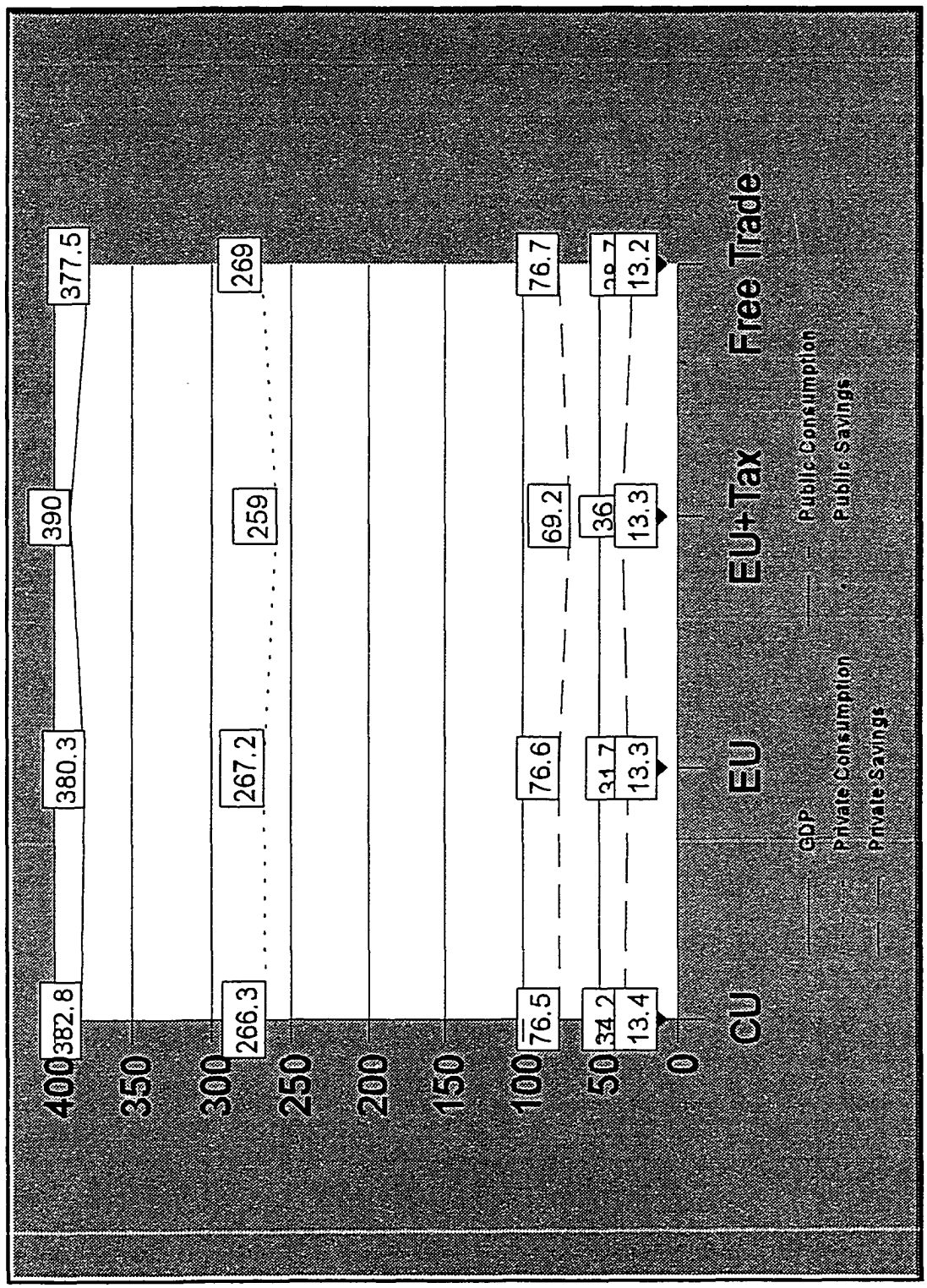

Figure 5.1:Macroeconomic Balances (Billion TL)

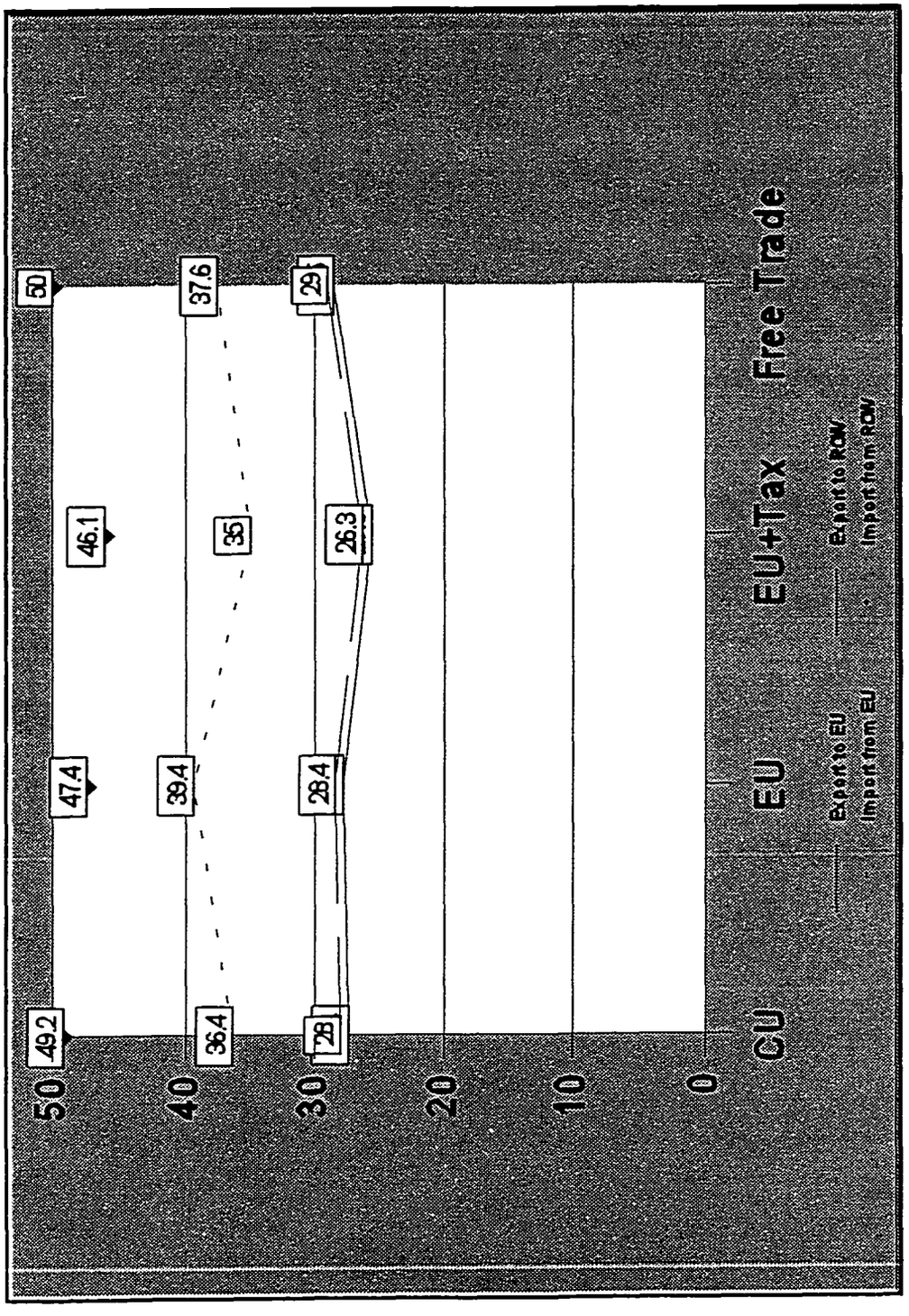

Figure 5.2: Exports and Import Balances (Billion TL)

Table 5.19 shows the changes in government balance under the proposed policy scenarios. Total indirect taxes collected by government is 20,525 billion TL in the base year. There are no significant changes in indirect taxes under the customs union, full membership or free trade scenarios. However, a 22.8% increase will be experienced under the replacement tax scenario. This shows that indirect taxes should be increased by 22.8% to compensate for the losses due to tariff reduction. This can be called a "compensation tax rate". The changes in corporate and income taxes, however, are too small to be considered. Government factor income will show a decrease by 3% of the base value, and experiences almost equal changes under all policy scenarios.

Government interest payments are the major problem for the Turkish economy because, almost 10% of total government revenue went to interest payments in 1990, and this rate is increasing every year. This is a real burden for an already in-debt Turkish budget. The increases in interest payments will be 12% under the customs union scenario, 14% under the full membership scenario, 13% under the replacement tax scenario, and 19% under the free trade scenario. This also shows that government debts should be reduced to cut down interest payments.

Validity of the Model and Sensitivity Analysis

The validity of the model can be checked in two ways. Both checks should be done during the calibration process. One method to validate the model is to reconstruct the SAM using GAMS software and compare the results obtained under the original SAM constructed (model replication). If these two shows no differences, it is assumed that the model is valid, and further

progress can be done concerning initialization and model formulation in the GAMS software. The second method is easier than reconstructing the SAM. It concerns the base year price levels. As explained before, CGE models take the base year price levels as given and equal to unity for all sectors, and compare the percentage changes under different policy scenarios. Thus, the validity check can be done by looking at the base year price levels. If the results indicate that all price levels are equal to unity for all sectors, then the validity of the model is accepted, and further steps can be taken after that. Both validity checks are performed in this study and completed successfully.

The sensitivity analysis also performed for this model. All elasticities in the base year are assigned a priori to values which indicate the best estimates. Since elasticity estimates includes a margin of error, the remedy for this problem is to perform a sensitivity analysis. The elasticity values are obtained from Kose (1996), de Santis (1996) and Harrison et. al. (1996), and adjusted according to sectoral aggregation of this study. The sensitivity analysis is performed by choosing different elasticities for each sector, and comparing the results obtained from each simulation.

The results show that overall conclusions obtained are not fragile to the assumptions made regarding elasticities, and the variations are in an acceptable range. For example, GDP variations are in the range of -1% and 2.8%, government revenue variations are in the range of -2.3% and 1.9%, and replacement tax rate variations are in the range of -2.4% to 3.2%. The highest variations are seen in the domestic sales and EU imports. However, these are not large variations considering the scope of the study and the number of sectors involved.

Another test is performed to evaluate sectoral impacts of integration. Tariff and fund rates are changed gradually for some basic sectors, and the results are compared with the original results. This process is important for economists to see if the changes in macroeconomic variable are due to an individual sectoral changes. The results of this test indicate any unusual variations. The directions of the changes were the same, and no unusual effects has been observed on the prices. The effects of lower and upper bound changes on the GDP are shown in the Appendix 2.

CHAPTER 6

SUMMARY AND CONCLUSIONS

This chapter of the dissertation consists of three parts. The first part summarizes the entire study. More specifically, it summarizes the objective of the dissertation, theoretical and empirical models, calibration, and results obtained under different scenario assumptions. The second part of the chapter includes policy implications and policy related suggestions. The last part explains the limitations of the study and some recommendations for future studies.

Summary

As explained in the previous chapters, Turkey's joining the EU will have a significant impact on Turkey's budget as well as the EU's budget and financial structure. Since the decisions are made politically, Turkish policy makers need to know how to concentrate their efforts over the transition period, and produce policies accordingly. For that reason, the research question of the dissertation in the first chapter was how to maximize the net gains from integration. The analysis focused on this research question and analyzed three major sectors of the Turkish economy: agriculture, services, and manufacturing. Economic theory, however, suggests that an instant integration may result in very extensive social and economic problems for the involved countries, especially if they have unequal levels of economic development. Therefore, the EU offered Turkey a transition period to avoid such negative impacts. In this transition period, Turkey is obligated to lower its tariffs, quotas, and other import duties on products from EU countries.

Under the light of neoclassical macroeconomic closure, a single country, multi-sectoral computable general equilibrium (CGE) model with implicit inclusion of the EU and ROW was

developed and various policy scenarios were adopted. In order to get the best results form this analysis, the Turkish economy was divided into 22 sectors: 2 agricultural, 18 manufacturing, and 2 service sectors. One important specification of the study was to consider the differentiation of imports and exports as EU and ROW. This differentiation made the computation of net gains due to integration much easier. Also, impacts of integration on individual sectors were evaluated as well as government budget and various accounts of macroeconomic balances to capture the entire picture of integration.

The main focus of the dissertation is on the short term effect of integration on the Turkish economy. The model developed for this purpose was a unique one in terms of differentiation of the imports and exports according to their origins. Since there is no recent IO table for the Turkish economy available, general structure of the TRCGE model lean on 1990 base year values and Neoclassical assumptions with a few exceptions. The IO table was reduced to a total of 22 sectors.

The TRCGE model has some characteristics in terms of factor markets and international trade specifications. First of all, separation of the labor market into two classifications as marginal and organized labor gives more powerful results concerning the structure of the labor market in Turkey. A second specification of the model was the consideration of import and export origins. Total exports and imports are divided into two origins (EU and ROW). This differentiation gave more accurate results in terms of measuring the impact of integration, and made the interpretation of the results easier. Also, with this differentiation, trade creating and trade diverting impacts of the integration by origin were analyzed in a more clear and detailed way. A third specification of

the model was the consideration of monopoly power in some manufacturing sectors. Although most of the sectors in the Turkish economy have a nearly competitive structure, some of the sectors still have monopoly power in the market. Thus, in order to capture the "mark up" pricing structure of these sectors, an extra element was included into the model. This inclusion also made the TRCGE model more powerful than most of the similar models in the literature. The small country assumption of the model is specified according to product differentiation criteria. With this specification, an infinite elasticity of import supply function with world price levels is assured and the world export demand function was considered as negatively sloped. In this perspective, the traditional Armington and CET assumptions are made throughout the model.

After giving brief general notes about the model, each chapter can be summarized specifically. The first chapter of the dissertation consisted of an introductory title, problem and justification statements, and objectives of the study. The main objective of this dissertation is explained as to quantify the financial effects of Turkey's trade liberalization efforts, and evaluate the policy decisions made during the transition period toward full membership in the EU. In addition, trade relations between the EU and the rest of the world (ROW) modeled to obtain complete general equilibrium results of Turkey-EU integration. Four specific objectives of the dissertation is also explained as follows: i) identify and review relevant literature concerning economic integration, and relevant trade policies for the EU, Turkey, and the rest of the world, ii) formulate a theoretical model for integration, and use the model to hypothesize impacts of integration for each sector individually, and for the economy as a whole, iii) specify and estimate an empirical model to determine the budgetary impacts of Turkey's full membership in the EU and

other intermediate policy scenarios by using a computable general equilibrium approach, iv) develop recommendations for country officials, and provide implications for future economic integration and multilateral trade agreements.

The second chapter gives a very broad literature review concerning Turkish integration into the EU. In this literature review, previous studies concerning the economic liberalization efforts of Turkey and accession into the EU were reviewed, analyzed, and discussed, including the integration experiences of other countries. The first part considers the Turkish liberalization efforts during the 1990s to join the EU. The second part considers a historical overview of the political economy of a Turkish-EU relationship. The final part considers previously used integration models and other countries' integration experiences.

The third chapter presents the theoretical framework of trade policies concerning economic integration and constructs an empirical General Equilibrium Model that can be applied to the Turkish economy. As a tool to examine economic liberalization, the concept of General Equilibrium was discussed first. Then, the international trade theories were reviewed and the theoretical implications of trade liberalization were addressed. Finally, implications for the empirical model were explained in a detailed way. More specifically, international trade theories and applications of the models were combined in a CGE model concept.

A General Equilibrium model is a system of demand and supply functions in which all prices are determined jointly by the markets for a given policy specification, and a set of equilibrium conditions. The initial equilibrium is the base solution to the model. After the initial results, different scenarios are adopted, assumptions of the model may be changed, and results

of each scenario are compared to create policy suggestions. Since there is no money illusion in a CGE model, the decisions are made according to endogenously determined relative prices. By considering these facts, tariff and tariff related trade barriers are individually explained and theoretical implications of integration are presented in a detailed way.

Another main issue in Chapter Three was the presentation of a General Equilibrium Model for the Turkish economy. An extended version of Kose(1996) was used to formulate the impacts of Turkey-EU integration. The model covers all sectors of the Turkish economy with the exception of financial markets. In other words, the variables concerning financial markets such as stock markets are excluded from the model, and this can be considered as a limitation of the model. As summarized before, the TRCGE model consists of three sectors and a differentiated ROW account. Also, the specification of imperfect competition in the manufacturing sectors and labor market created an additional strength for the model.

Three components for each sector are considered in the model: (i) consumers (households), (ii) producers (firms), and (iii) the government (fiscal authority). Consumers have constant elasticity of substitution (CES) utility functions between imported and domestic goods. The utility maximization of the consumers is determined according to the Armington criteria. The firms representing the producer side of the economy are assumed to maximize the value of their profits. Thus, the main goal of the firms is to make production and investment decisions that allow them to maximize the value of the firm. The third agent in the model is the government. It represents the fiscal authority, and collects taxes to finance public expenditures such as

social security payments, public investments, and public services. The difference between public revenue and public expenditure is assumed to be financed by issuing public bonds.

The production technology is assumed to have a multi-level constant elasticity of substitution. This assumption is made because the restrictions on the elasticity of substitution makes the model more discrete and reduces the area of flexibility. Also, an intermediate demand function is assumed to have Leontieff technology in which inputs are used in constant proportions to produce a specific amount of output. This kind of technology assumes producer demand for a commodity is optimal and minimizes the cost of production. The model also assumes that capital accumulation is constant for each sector. These types of assumptions are made in most of the static CGE models to analyze heterogenous capital stocks in different sectors.

Unlike traditional trade models, the commodities are differentiated into two groups: tradable goods and non-tradable goods. This feature of the model gives more flexibility concerning analysis of Turkish membership to the European Union. Also, the model distinguishes the "domestic demand" and "domestic commodity" terms and follows traditional Armington specification. This specification distinguishes the commodities in terms of their origin as well as their types. In other words, the Armington assumption allows for the fact that the same type of commodities might be both exported and imported at the same time. However, in traditional trade models, intra-industry trades are omitted from the analysis and inter-industry trades are considered instead. This assumption causes "extreme specializations" in trade, which makes domestic prices and resource allocation more sensitive to foreign policies. The model, in this context, determines the production process into two different stages. In the first stage, the

composition of domestic demand must be determined as domestics and imports. In the second stage, the imports are differentiated as EU imports and ROW imports (Kose, 1996).

The model indicates that private income is the gains from value added private production, transfers from government and rest of the world, and factor incomes. Private sector value added income is determined by subtracting government income and corporation tax from the total valued added income. Government revenue, however, is determined by summing taxes collected and factor income of the government.

Chapter Four explains data collection procedure, the basic idea of social accounting matrix, stages to be used to construct a CGE based calibration, and constructs a SAM for the Turkish economy. As explained earlier, a SAM has two objectives. The first one is to organize the information about a country's social and economic structure for a specific year, and the second objective is to construct a statistical basis for the model chosen.

The basic idea of the SAM is the same as double entry bookkeeping in accounting, which means income and expenditure of an entity must balance each other. In this point, a SAM resembles a traditional national account in which income of one account must be expenditure of another account.

Considering these facts, a SAM is constructed for the Turkish economy for the year of 1990. This is the most recent IO table for Turkey. Six accounts are distinguished in 1990 Turkish SAM. The factors account is distinguished as labor and capital, the institutions account is distinguished into three components as households, companies, and the government. The capital account is the only non-differentiated sector in this SAM. The activities account is considered as

agriculture, manufacturing and services. The commodities account is distinguished into two sub-accounts: domestic and imported commodities. The last account is the rest of the world account. This account is also differentiated as ROW current account and ROW capital account.

Chapter Five is the most sensitive part of the dissertation. It gives policy scenarios to be adopted in the full membership process, and compares the results obtained form various policy scenarios. The first is a customs union with the EU, which considers the obligations that Turkey and the EU have, and assumes both sides perform their duties in a perfect manner. The second is full membership into the EU, which considers Turkey's full accession into the EU. According to the agreement between Turkey and the EU, Turkey has to lower tariff rates for EU imports, but continue to impose the same rate for third countries. This reduction in tariff rates causes the Turkish government to loose tariff revenues coming from the EU. However, the EU will compensate a part of the losses that the Turkish government will have. The third is full membership plus replacement tax scenario, which analyzes the impacts of full membership, and government losses due to tariff reduction compensated by increasing the indirect tax rate. By increasing indirect tax rate, government can finance its budget deficit. Fourth is a free trade scenario under which Turkey will have to reduce tariff rates for all countries. This reduction in tariff rates does not necessarily mean that tariff rates for all countries should be zero. Tariff rates on average should be asymptotically approaching to zero.

Under the mentioned policy scenarios, impacts of the EU on the Turkish economy is analyzed, and comparisons among the scenarios presented to see a full picture of integration. First, changes in domestic demand and sales, prices and international trade implication of the EU

are presented. Results show that domestic production and domestic sales will increase in most of the sectors under a customs union, full access, and free trade scenarios. The exceptions under these scenarios will be in tobacco, paper and publishing, petroleum products, electrical machinery, transportation equipments and service sectors. These sectors show a decrease in domestic production and sales in the range of 1% to 5% of the base year value. Under the replacement scenario, however, domestic production tends to decrease in all sectors. The only exceptions are mining, wearing apparels, textiles, and leather and fur products.

Simulation results showed that imports and exports of Turkey changes in favor of the EU under the tariff reduction policies. Rest of the world trade with Turkey also tends to increase due to preferential trade agreements with the non-EU countries. Second, changes in labor demand for each labor market, and possible unemployment issues are discussed. The results obtained concerning labor markets indicate that wage rate and employment will be effected positively in almost all sectors with Turkish access into the European markets. Marginal labor demand in paper and publishing, electrical machinery, transportation equipments, and service sectors decreases under every scenario. Organized labor demand, however, tends to increase more than marginal labor demand in most sectors. This shows that quality of Turkish labor tends to increase with European access. Third, changes in sectoral profit rates are presented for each policy scenario. Results obtained indicate that although profit rates increase under the free trade assumption, almost all previously monopolistic sectors experience a decrease in their profit rates. This happens because Turkish consumers will have easier access to foreign products and not buy expensive domestic commodities. The highest profit rate decreases will be seen in the tobacco

industry, paper and publishing sector, petroleum products, electrical machinery, and transportation equipments. The highest profit increases, however, will be seen in the agribusiness, mining, wearing apparel, textiles, and leather industry. Fourth, changes in the sectoral cost structure are reported. Results showed that, in general, sectoral variable costs increase due to an increase in average wage rate, and a tendency to increase demand of skilled labor, because the cost of skilled labor is higher than that of marginal labor. Lastly, macroeconomic variables and government budgetary balance are reported. Results obtained indicate that GDP decreases under all scenarios, and the government is affected negatively as a result of integration. The private sector, however, is positively affected under the assumptions of all policy selections. Total exports and imports also show an increase in general.

Policy Implications of Integration

The results discussed above concern four different scenarios and a base year value. By the nature of CGE models, base year values give the same results with the calibration process. These analogous results assure the validity of calibration procedure and SAM constructed. Thus, instead of giving full magnitudes of the results, only percentage changes in each variable are given so that policy makers have much clearer vision about the policies adopted. For that reason, each scenario is discussed individually first, then whole Turkish economy.

It is well a known issue that the Turkish economy experienced suffered tremendously with the customs union agreement due to a decrease in tariff and tariff related taxes on EU products. The losses that the Turkish economy experienced were supposed to be compensated by the EU in a timely manner, but for some political reasons the EU did not fulfill its obligation on

this matter. The EU officials promise the same thing for the full membership process and according to the agreement, a total of $1.8 billion will be given to Turkey in the transition period to compensate the tariff revenue losses. Assuming this promise is kept, full membership will send a signal of positive movements in the domestic markets as well as exports and imports.

Under the customs union scenario, a 2% decrease in GDP and a 8% decrease in government revenue will be experienced. As a result of this revenue losse, government consumption also decreases by 20%. However, private income, consumption, and savings show increases. Although this result seems to lead the policy-makers of Turkey in a direction that allow them to know what the best policy is, in reality it is very hard to have such strong conclusions, because the procedure used in this analysis is not a game theoretical approach and there is no "best" policy in political decisions like this. There are "better" policies, however, in certain cases, and these "better" policies are subject to change depending on the perspective of policy-makers, current conditions of the country, and the power of lobbyists in each sector. This fact shows that realistic decisions in policy implementations are very rare, especially in the developing countries like Turkey.

Free trade policies always attract international trade theorists, but most of the time is not applicable in reality. The reason that the free trade scenario is analyzed here is because to show the policy-maker what the ideal thing is, and give them a chance to decide accordingly. The losses in GDP under the free trade assumption are the highest among other scenarios, but it increases the trade volume and initiates private entrepreneurship. As a result, total welfare gains will be more under this scenario. However, free trade is a difficult scenario to reach for real life

international trade applications, because every country has to protect some sector or politicians have tendency to protect powerful lobbyist groups for reelection purpose. The public sector, for sure, will be worse off under this policy assumption.

The revenue replacement tax scenario results indicated that tax rates should be increased by 22.8% to compensate revenue losses due to tariff reductions. This rate is higher than that of Harrison et. al. (1996), however their results indicate a customs union revenue replacement tax rate, not a full membership rate. Therefore, a higher revenue replacement tax rate is necessary for full membership, because revenue loss due to tariff reduction is more under the full membership scenario. Decreases in GDP will be very small under this scenario, and can be ignored, but with the revenue compensation assistance given by the EU, the Turkish economy will be better off if it is used properly. This revenue compensation assistance might be used to increase the domestic production level or distributed among consumers and producers to ease the burden of taxes levied, and increase the welfare of the whole economy.

The full membership scenario, however, seems more logical in many cases. For example, domestic production, domestic sales, trade volume, and profit rate increase. Government intervention in the whole economy tends to decrease, and economic relations with the EU and the ROW gets better. Under this scenario, also, the Turkish government will get revenue compensation assistance from the EU, and the decreases in GDP will be compensated with this assistance. No replacement tax in the domestic economy will encourage domestic producers to create new and higher quality products for EU markets, and the government will not have the responsibility of redistributing assistance from the EU. Although increased rates in sectoral

average variable cost is higher under this scenario, sectoral profit rates are higher as well. This is not a contradictory result, because increases in total production will allow Turkish producers to earn more on average. Turkish consumers, also, will enjoy buying various new and higher quality products at cheaper prices. The government compensates itself by getting revenue assistance from the EU. Thus, the Turkish economy as a whole will be better off with a full membership, even though some sectors individually lose a portion of their profits.

In light of the policy assumptions discussed above, full membership appears to be the most beneficial scenario for the Turkish economy based on domestic production, domestic sales and private income. However, knowing that this process is political rather than completely economic, appropriate cautions should be taken to utilize the results of this study.

Another issue to be considered is how to use the EU's compensation assistance. If the government uses this money in the low production sectors in which the private sector has no interest, then the general price level will likely decrease and exports increase. This increase in trade volume will create new markets for private sector. If this increase in private sector income compensates for the losses experienced due to indirect tax levied, total gains might be greater under the replacement tax scenario, but an increase in tax will likely restrain production. The government is already assumed revenue neutral under the revenue replacement tax scenario. In other words, the losses due to tariff reductions are compensated for by an increase in domestic tax income. Thus, private income and the GDP might increase and better results could be obtained under this scenario if the EU's assistance is used properly by government officials.

Limitations of the Study

There is not a single study performed perfectly. Every study has its own limitations and there is always a space in that study for others to improve. Considering this fact, this dissertation also has some limitations. First of all, it is a static model and does not consider some dynamic elements. Including a time elements into the model, and analyzing some dynamic variables such as growth will make the model results more accurate.

Exclusion of the financial markets can be considered as the second limitation of the model. The importance of financial markets such as banking and stock markets in the Turkish economy cannot be denied. Thus, omission of these markets causes some diversions in the model results. For that reason, adding the financial markets into the model will allow for determining the changes in the reel sector more accurately.

The third limitation of the model is the data structure of the model. Although most of the data was obtained from the IO table for the Turkish economy, some data obtained from other sources was very hard to collect. Another limitation concerning data structure is the non-availability of the current IO table of the Turkish economy. Since the most current IO table published by Turkish statistical institutions was the 1990 IO table, the results might show some tendencies in some sectors. Since after 1990, major changes happened in the Turkish economy.

Lastly, the model does not consider the impacts of Turkish accession on the EU budget, because the EU and the ROW are implicitly included into the model. The reason for this is because no input-output table is available for the whole European Union, and constructing a

Social Accounting Matrix for these countries is not within the scope of this study. If available data is found, this study can be extended to capture the budgetary impacts of Turkish integration on the European Union countries as well.

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APPENDICES

APPENDIX 1

DEFINITION OF ACCOUNTS

(Adopted from de Santis, 1996)

The disaggregated SAM for Turkey comprises 281 accounts. The code numbers used to identify the accounts have been organized as follows:

I - FACTORS OF PRODUCTION

Labor:

1. Scientific, technical, professional and related workers.
2. Administrative, executive and managerial workers.
3. Clerical and related workers.
4. Sales workers.
5. Service workers.
6. Agricultural, animal husbandry and forestry workers, fishermen and hunters.
7. Non-agricultural production and related workers, transport equipment operators and laborers.
8. Workers not classifiable by occupation.

Capital:

9. Rent.
10. Operating surplus in agriculture.
11. Operating surplus in non-agriculture.
12. Operating surplus in trade.
13. Operating surplus in services.

II - HOUSEHOLDS

Urban households (monthly disposable income groups - thousands of TL):

14. 0 - 133
15. 133 - 267
16. 267 - 400
17. 400 - 533
18. 533 - 667
19. 667 - 800
20. 800 - 933
21. 933 - 1067
22. 1067 - 1200
23. 1200 - 1333

24. 1333 - 1600
25. 1600 - 1867
26. 1867 - 2133
27. 2133 - 2400
28. 2400 - 2667
29. 2667 - 4000
30. 4000 - 5333
31. 5333 - 13333
32. 13333 - 26667
33. 26667 - 66667

Rural households (monthly disposable income groups - thousands of TL):

34. 0 - 133
35. 133 - 267
36. 267 - 400
37. 400 - 533
38. 533 - 667
39. 667 - 800
40. 800 - 933
41. 933 - 1067
42. 1067 - 1200
43. 1200 - 1333
44. 1333 - 1600
45. 1600 - 1867
46. 1867 - 2133
47. 2133 - 2400
48. 2400 - 2667
49. 2667 - 4000
50. 4000 - 5333
51. 5333 - 13333
52. 13333 - 26667
53. 26667 - 66667

III - COMPANIES

Private enterprises:

54. Enterprises in non-agricultural sectors.
55. Enterprises in trade sectors.
56. Enterprises in services.

Public enterprises:

57. State economic enterprises.

IV - GOVERNMENT

58. Government.

V - ACTIVITIES

59. Agriculture and animal husbandry.
60. Forestry.
61. Fisheries.
62. Coal mining.
63. Crude petroleum and natural gas production.
64. Iron ore mining.
65. Non-ferrous ore mining, non-metallic mineral mining, stone quarrying.
66. Slaughtering, preparing and preserved meat.
67. Canning and preserving of fruits and vegetables.
68. Manufacture of vegetable and animal oils and fats.
69. Grain mill products.
70. Sugar.
71. Manufacture of other food products.
72. Alcoholic beverages.
73. Soft drinks and carbonated water industries.
74. Tobacco manufactures.
75. Manufacture of textiles (inc. ginning).
76. Manufacture of wearing apparel.
77. Manufacture of leather and fur products.
78. Manufacture of footwear.
79. Manufacture of wood and wood products.
80. Manufacture of wood furniture and fixtures.
81. Manufacture of paper and paper products.
82. Printing, publishing and allied industries.
83. Manufacture of fertilizers.
84. Manufacture of drugs and medicines.
85. Manufacture of other chemical products.
86. Petroleum refineries.
87. Manufacture of petroleum and coal products.
88. Manufacture of rubber products.
89. Manufacture of plastic products.
90. Manufacture of glass and glass products.
91. Manufacture of cement.
92. Manufacture of other non-metallic mineral products.
93. Manufacture of iron and steel.

94. Manufacture of non-ferrous metal.
95. Manufacture of fabricated metal products.
96. Manufacture of machinery except electrical.
97. Manufacture of agricultural machinery and equipment.
98. Manufacture of electrical machinery.
99. Manufacture of shipbuilding and repairing.
100. Manufacture of railroad equipment.
101. Manufacture of land transport vehicles and equipment.
102. Manufacture of other transport equipment.
103. Other manufacturing industries.
104. Electricity.
105. Gas manufacture and waterworks.
106. Building construction, other construction.
107. Wholesale and retail trade.
108. Restaurants and hotels.
109. Railway transport, other land transport, water transport, air transport.
110. Communications.
111. Financial institutions and insurance.
112. Personal and professional services, public services, ownership of dwellings.

VI - COMPOSITE COMMODITIES

113. Agriculture and animal husbandry.
114. Forestry.
115. Fisheries.
116. Coal mining.
117. Crude petroleum and natural gas production.
118. Iron ore mining.
119. Non-ferrous ore mining, non-metallic mineral mining, stone quarrying.
120. Slaughtering, preparing and preserved meat.
121. Canning and preserving of fruits and vegetables.
122. Manufacture of vegetable and animal oils and fats.
123. Grain mill products.
124. Sugar.
125. Manufacture of other food products.
126. Alcoholic beverages.
127. Soft drinks and carbonated water industries.
128. Tobacco manufactures.
129. Manufacture of textiles (inc. ginning).
130. Manufacture of wearing apparel.
131. Manufacture of leather and fur products.

132. Manufacture of footwear.
133. Manufacture of wood and wood products.
134. Manufacture of wood forniture and fixtures.
135. Manufacture of paper and paper products.
136. Printing, publishing and allied industries.
137. Manufacture of fertilizers.
138. Manufacture of drugs and medicines.
139. Manufacture of other chemical products.
140. Petroleum refineries.
141. Manufacture of petroleum and coal products.
142. Manufacture of rubber products.
143. Manufacture of plastic products.
144. Manufacture of glass and glass products.
145. Manufacture of cement.
146. Manufacture of other non-metallic mineral products.
147. Manufacture of iron and steel.
148. Manufacture of non-ferrous metal.
149. Manufacture of fabricated metal products.
150. Manufacture of machinery except electrical.
151. Manufacture of agricultural machinery and equipment.
152. Manufacture of electrical machinery.
153. Manufacture of shipbuilding and repairing.
154. Manufacture of railroad equipment.
155. Manufacture of land transport vehicles and equipment.
156. Manufacture of other transport equipment.
157. Other manufacturing industries.
158. Electricity.
159. Gas manufacture and waterworks.
160. Building construction, other construction.
161. Wholesale and retail trade.
162. Restaurants and hotels.
163. Railway transport, other land transport, water transport, air transport.
164. Communications.
165. Financial institutions and insurance.
166. Personal and professional services, public services, ownership of dwellings.

VII - DOMESTIC COMMODITIES

167. Agriculture and animal husbandry.
168. Forestry.
169. Fisheries.

170. Coal mining.
171. Crude petroleum and natural gas production.
172. Iron ore mining.
173. Non-ferrous ore mining, non-metallic mineral mining, stone quarrying.
174. Slaughtering, preparing and preserved meat.
175. Canning and preserving of fruits and vegetables.
176. Manufacture of vegetable and animal oils and fats.
177. Grain mill products.
178. Sugar.
179. Manufacture of other food products.
180. Alcoholic beverages.
181. Soft drinks and carbonated water industries.
182. Tobacco manufactures.
183. Manufacture of textiles (inc. ginning).
184. Manufacture of wearing apparel.
185. Manufacture of leather and fur products.
186. Manufacture of footwear.
187. Manufacture of wood and wood products.
188. Manufacture of wood furniture and fixtures.
189. Manufacture of paper and paper products.
190. Printing, publishing and allied industries.
191. Manufacture of fertilizers.
192. Manufacture of drugs and medicines.
193. Manufacture of other chemical products.
194. Petroleum refineries.
195. Manufacture of petroleum and coal products.
196. Manufacture of rubber products.
197. Manufacture of plastic products.
198. Manufacture of glass and glass products.
199. Manufacture of cement.
200. Manufacture of other non-metallic mineral products.
201. Manufacture of iron and steel.
202. Manufacture of non-ferrous metal.
203. Manufacture of fabricated metal products.
204. Manufacture of machinery except electrical.
205. Manufacture of agricultural machinery and equipment.
206. Manufacture of electrical machinery.
207. Manufacture of shipbuilding and repairing.
208. Manufacture of railroad equipment.
209. Manufacture of land transport vehicles and equipment.
210. Manufacture of other transport equipment.

211. Other manufacturing industries.
212. Electricity.
213. Gas manufacture and waterworks.
214. Building construction, other construction.
215. Wholesale and retail trade.
216. Restaurants and hotels.
217. Railway transport, other land transport, water transport, air transport.
218. Communications.
219. Financial institutions and insurance.
220. Personal and professional services, public services, ownership of dwellings.

VIII - IMPORTED COMMODITIES

221. Agriculture and animal husbandry.
222. Forestry.
223. Fisheries.
224. Coal mining.
225. Crude petroleum and natural gas production.
226. Iron ore mining.
227. Non-ferrous ore mining, non-metallic mineral mining, stone quarrying.
228. Slaughtering, preparing and preserved meat.
229. Canning and preserving of fruits and vegetables.
230. Manufacture of vegetable and animal oils and fats.
231. Grain mill products.
232. Sugar.
233. Manufacture of other food products.
234. Alcoholic beverages.
235. Soft drinks and carbonated water industries.
236. Tabacco manufactures.
237. Manufacture of textiles (inc. ginning).
238. Manufacture of wearing apparel.
239. Manufacture of leather and fur products.
240. Manufacture of footwear.
241. Manufacture of wood and wood products.
242. Manufacture of wood forniture and fixtures.
243. Manufacture of paper and paper products.
244. Printing, publishing and allied industries.
245. Manufacture of fertilizers.
246. Manufacture of drugs and medicines.
247. Manufacture of other chemical products.
248. Petroleum refineries.

249. Manufacture of petroleum and coal products.
250. Manufacture of rubber products.
251. Manufacture of plastic products.
252. Manufacture of glass and glass products.
253. Manufacture of cement.
254. Manufacture of other non-metallic mineral products.
255. Manufacture of iron and steel.
256. Manufacture of non-ferrous metal.
257. Manufacture of fabricated metal products.
258. Manufacture of machinery except electrical.
259. Manufacture of agricultural machinery and equipment.
260. Manufacture of electrical machinery.
261. Manufacture of shipbuilding and repairing.
262. Manufacture of railroad equipment.
263. Manufacture of land transport vehicles and equipment.
264. Manufacture of other transport equipment.
265. Other manufacturing industries.
266. Electricity.
267. Gas manufacture and waterworks.
268. Building construction, other construction.
269. Wholesale and retail trade.
270. Restaurants and hotels.
271. Railway transport, other land transport, water transport, air transport.
272. Communications.
273. Financial institutions and insurance.
274. Personal and professional services, public services, ownership of dwellings.

IX - EXPORTED COMMODITIES

275. Exported commodities.

X - CAPITAL ACCOUNT

276. Gross capital formation.
277. Private gross fixed capital formation.
278. Public gross fixed capital formation.
279. Changes in stocks.

XI - REST OF THE WORLD CURRENT ACCOUNT

280. Rest of the world current account.

XII - REST OF THE WORLD CAPITAL ACCOUNT

281. Rest of the world capital account.

APPENDIX 2: EFFECTS OF PIECEMEAL POLICY SCENARIOS FOR SELECTED SECTORS

	GDP		GDP	
Selected Sectors	25% Lower Bound	25% Upper Bound	75% Lower Bound	75% Upper Bound
Agriculture	-0.000091	0.000019	-0.000573	0.000085
Textile	-0.000313	0.000026	-0.001124	0.000058
Wearing Apparel	-0.000025	0.000019	-0.000062	0.000640
Petroleum	0.002634	-0.000166	-0.000344	-0.000659
Chemistry	-0.000656	0.000536	-0.024197	0.001315
Tobacco	-0.000094	-0.000063	-0.001496	-0.000388

APPENDIX 3: PROTECTION RATES FOR 1990

	MRW	tmrw	MEU	tmeu
Basic Agriculture	677.2	3.7	241.4	2.9
Agribusiness	505.0	5.2	436.9	8.1
Mining	4200.1	0.8	27.1	0.5
Beverage Industry	1.1	1.1	7.3	2.3
Tobacco Industry	326.8	21.2	10.4	9.6
Wearing Apparel	2.0	0.6	4.7	0.6
Textile	375.7	5.2	205.9	6.7
Leather & Fur Products	50.9	2.3	91.0	2.0
Wood & Furniture	25.8	0.6	34.9	3.3
Paper & Publishing ind.	208.2	3.9	113.4	6.8
Chemical Products	1437.0	33.2	1847.5	32.3
Petroleum Products	443.4	0.9	151.4	1.3
Glass & Glass Products	18.2	1.5	34.5	1.5
Non-Metalic Products	529.8	8.8	664.7	13.4
Metal Industry	994.2	4.3	1149.2	5.3
Non-elect. Machinery	1182.0	21.8	2344.5	31.1
Electrical Machinery	810.3	19.2	799.3	27.6
Transport. Equipment	770.5	41.4	1040.7	43.8
Electricity-Gas-Water	0.0	0.0	0.0	0.0
Construction	0.0	0.0	0.0	0.0
Transport-Commun.	0.0	0.0	0.0	0.0
Other Services	415.3	0.6	123.4	0.2

MRW: Total Imports from ROW
MEU: Total Imports from the EU
tmrw: Tariff rate on ROW imports
tmeu: Tariff rate on ROW.

APPENDIX 4: INPUT-OUTPUT TABLE

TABLO 1.- *INPUT-OUTPUT* TABLOSU, 1990 (SANAYİLERİN SANAYİLERDEN KULLANIMI)
(ÜRETİCİ FİYATLARIYLA MİLYON TÜRK LİRASI)

BİR SANAYİNİN OUTPUTUNUN DAĞILIMI İÇİN *O SANAYİNİN SIRASINI OKUYUNUZ* / BİR SANAYİNİN INPUTLARI BİLEŞİMİ İÇİN O SANAYİNİN *SÜTUNUNU OKUYUNUZ*	TARIM	HAYVAN-CILIK	ORMAN-CILIK	BALIK-CILIK	KÖMÜR MADEN-CİLİĞİ	HAM PET. DOĞALGAZ ÇIK.	DEMİR CEVHERİ ÇIK.	DİĞER METALİK CEVHER ÇIK.	METALİK OLMAYAN MADEN ÇIK.	TAŞ OCAK-CILIĞI	HAZIRLANMIŞ ÜRÜNLERİ	SEBZE, MEYVE İŞLEME	BİTKİSEL, *HAYVANSAL* YAĞLAR	OKUTULMUŞ *TAHIL* ÜRÜNLERİ	*ŞEKER* ÜRETİMİ	DİĞER *BESİN* MADDE.	ALKOLLÜ İÇKİLER	ALKOLSÜZ İÇKİLER	TÜTÜN SANAYİİ
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1 TARIM	4,161,668	8,191,610	58	12,963	0	0	0	0	0	0	24,692	720,468	729,016	4,329,673	1,810,785	2,256,176	207,476	28,930	1,847,433
2 HAYVANCILIK	649,061	1,473,910	209	0	0	0	0	0	0	0	1,646,671	0	688	1,902	0	1,914,765	0	0	0
3 ORMANCILIK	48,963	0	4,567	21	49,117	0	369	6,494	4,770	232	41	9	32	851	0	77,132	7	4	67
4 BALIKCILIK	0	0	0	1,689	0	0	0	0	0	0	0	0	0	0	0	47,135	0	0	0
5 KÖMÜR MADENCİLİĞİ	5,078	0	2,523	81	6,166	0	916	996	4,469	875	1,156	1,760	10,063	1,726	105,180	14,461	345	304	561
6 HAM PETROL ÇIKARIMI VE TABİİ GAZ ÜRETİMİ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7 DEMİR CEVHERİ ÇIKARIMI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 DEMİR CEVHERİ DIŞ.DİĞER METALİK CEVHER ÇIK.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9 METALİK OLMAYAN MADENLER ÇIKARIMI	0	0	0	891	0	0	0	0	0	0	0	7	638	125	40	11,919	0	0	0
10 TAŞ OCAKÇILIĞI	0	2,948	0	0	0	0	0	0	0	1,019	0	13	0	12	1,302	217	0	0	0
11 HAZIRLANMIŞ ÜRÜNLERİ	0	0	0	6,427	0	0	0	0	0	0	310,316	3,882	7,332	0	220	1,430	0	0	0
12 SEBZE VE MEYVE İŞLEME SANAYİ	0	0	0	8,876	0	0	0	0	0	0	12	8,389	6,858	3,197	0	16,369	8,471	134,167	0
13 BİTKİSEL VE HAYVANSAL YAĞLAR İMALİ	0	127,494	0	3,735	0	0	0	0	0	0	13,581	4,910	964,924	12,298	31	434,214	94	104	0
14 OKUTULMUŞ TAHIL ÜRÜNLERİ İMALİ	0	92,960	0	6,616	1,367	0	0	0	0	0	279	3,006	5,967	13,672	0	2,644,695	6,788	56	0
15 ŞEKER ÜRETİMİ	0	85,161	0	4,199	0	0	0	0	0	0	210	9,413	739	491	88	447,111	21,638	91,743	0
16 DİĞER BESİN MADDELERİ	0	1,721,776	60	40,393	2,331	0	0	0	0	0	78,248	10,267	19,371	946	0	1,932,631	16,665	149	0
17 ALKOLLÜ İÇKİLER	0	0	3	1,377	0	0	0	0	0	0	0	0	0	0	0	8,132	73,601	0	0
18 ALKOLSÜZ İÇKİLER	0	0	86	3,867	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19 TÜTÜN SANAYİ	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20 ÇİRİŞLEMA	0	0	0	0	0	0	0	0	0	0	0	0	178,278	0	0	0	0	0	0
21 DOKUMA SANAYİ	217,243	0	2,679	16,956	83	0	0	294	138	0	876	1,457	31,291	67,930	11,436	30,138	121	0	14,780
22 ELBİSE,GİYİM EŞYASI VE DOKUMADAN MAMUL EŞYA	0	0	0	0	3,334	0	167	250	160	576	3,777	1,476	1,402	218	2,971	1,857	996	1,150	2,622
23 DERİ VE KÜRK ÜRÜNLERİ	0	0	0	0	919	0	0	228	167	17	0	0	0	0	0	0	0	0	0
24 AYAKKABI SANAYİ	0	0	0	0	0	0	554	0	0	577	18	76	0	41	0	304	3	0	3
25 AĞAÇ VE MANTAR ÜRÜNLERİ(MOBİLYA HARİÇ)	50,929	0	0	8,682	0	0	0	60	0	569	7	4,529	0	0	0	105,901	3,188	6,610	44
26 AĞAÇ MOBİLYA VE MEFRUŞAT SANAYİ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	287	0	13	0
27 KAĞIT VE KAĞIT ÜRÜNLERİ	16,916	10,658	1,353	60	227	3,255	104	0	32	98	1,768	37,115	11,196	1,449	10,652	229,682	2,076	28,672	194,932
28 BASIN, YAYIN VE ÇİLTÇİLİK	0	0	1,506	41	61	3,471	0	0	101	665	1,559	3,307	2,060	2,907	665	33,697	4,397	3,188	1,533
29 KİMYASAL GÜBRELER İMALİ	2,295,077	0	1,484	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0
30 İLAÇ SANAYİ	0	138,420	0	263	0	0	0	0	0	0	160	0	741	46	0	6,126	0	0	0
31 DİĞER KİMYASAL MADDELER İMALİ	469,618	0	3,555	317	26,781	24,018	3,956	9,055	2,839	9,123	16,131	2,880	12,655	431	863	130,836	49,095	33,478	2,753
32 PETROL ARITIMI	1,943,704	36,736	24,336	221,504	152,154	33,261	19,976	27,672	22,619	49,091	22,236	41,884	36,742	10,726	89,566	356,819	26,397	14,423	5,657
33 DİĞER PETROL VE KÖMÜR ÜRÜNLERİ	134,178	3,831	4,883	30,935	8,732	671	568	1,456	1,264	12,865	131	1	3,205	2	16,642	856	165	0	54
34 KAUÇUK VE KAUÇUK ÜRÜNLERİ	267,218	0	2,174	4,152	3,906	1,018	0	493	6,004	14,133	0	11	0	0	0	3,267	0	0	0
35 PLASTİK ÜRÜNLERİ	49,529	0	569	1,016	0	0	0	0	0	0	1,638	43,679	19,174	2,890	16,904	42,371	1,661	50,720	0
36 CAM VE CAMDAN MAMUL EŞYA SANAYİ	111	0	0	0	0	0	23	0	0	0	0	22,974	330	0	0	5,267	55,186	57,167	0
37 ÇİMENTO SANAYİ	0	0	0	0	488	2,879	0	3,378	0	0	0	0	0	0	0	0	0	0	0
38 DİĞER TAŞ VE TOPRAĞA DAYALI SANAYİ	175	0	0	0	7	0	0	0	64	0	0	0	0	0	1,044	99	7	29	0
39 DEMİR, ÇELİK ANA SANAYİ	0	0	0	0	90,544	37,691	1,203	1,587	200	1,431	1	7,616	48,426	0	0	1,991	10	11	0
40 DİĞER METAL ANA SANAYİ	0	0	0	0	326	0	0	0	0	0	0	3,623	16	0	0	14,353	276	1,101	21,907
41 METAL EŞYA SANAYİ	125,021	34,167	8,709	476	36,648	293	405	845	239	3,477	1,523	39,755	28,369	3,865	311	32,636	23,563	41,229	587
42 ELEKTRİKSİZ MAKİNALAR(ÖNGÖRÜ DAHİL)	0	0	0	0	2,262	8,898	8,966	16,287	6,676	27,257	6,655	0	23,200	0	38,358	36,047	8,761	2,464	13,853
43 TARIMSAL MAKİNA VE TEÇHİZAT(ÖNGÖRÜ DAHİL)	191,588	0	1,980	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
44 ELEKTRİKLİ MAKİNALAR	0	0	1	1,966	16,402	958	466	2,376	649	992	0	0	0	0	2,850	17	0	0	0
45 DENİZ ULAŞIM ARAÇLARI (ÖNGÖRÜ DAHİL)	0	0	0	27,879	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
46 DEMİRYOLLARI ULAŞIM ARAÇLARI(ÖNGÖRÜ DAHİL)	0	0	0	0	15,190	0	0	66	0	0	0	0	0	0	0	0	0	0	0
47 MOTORLU KARA ULAŞIM ARAÇLARI (ÖNGÖRÜ DAHİL)	0	0	6,082	0	3,609	3,856	6,106	10,332	2,664	28,271	284	0	14	2,011	157	7,431	11	661	79,851
48 DİĞER TAŞITA ARAÇLARI (ÖNGÖRÜ DAHİL)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	47	0	0	10,275
49 DİĞER İMALAT SANAYİ	0	0	975	6	2,102	631	0	0	0	0	136	0	0	0	0	0	0	0	0
50 ELEKTRİK	68,711	25,345	1,606	310	152,662	9,681	17,049	17,676	11,045	11,465	21,794	17,726	54,473	203,188	93,195	188,521	21,806	21,331	11,696
51 GAZ VE SU	133,436	6,805	1,349	469	1,041	30	34	336	232	166	3,163	632	1,535	6,636	10,999	38,956	293	1,481	926
52 BİNA İNŞAATI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
53 BİNA DIŞI İNŞAAT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
54 TOPTAN VE PERAKENDE TİCARET	956,823	611,093	13,990	62,319	78,958	15,904	7,237	15,826	8,664	42,647	246,882	84,535	253,795	135,779	69,292	858,805	58,447	76,329	105,301
55 OTELCİLİK, LOKANTACILIK, BARMENCİLİK, vb.	0	0	2,505	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
56 DEMİRYOLU TAŞIMACILIĞI	6,420	1,085	466	210	898	39	53	71	112	165	267	183	420	161	8,101	2,261	58	49	118
57 KARAYOLU TAŞIMACILIĞI	2,230,474	750,000	237,638	32,156	53,910	90,176	3,494	6,047	10,616	16,689	229,584	96,292	181,888	232,448	252,478	775,521	48,668	43,695	105,428
58 DENİZ YOLU TAŞIMACILIĞI	68,598	10,286	571	2,267	7,417	19,486	336	496	458	1,137	788	3,076	7,275	8,802	12,668	38,661	2,676	1,812	2,844
59 HAVA YOLU TAŞIMACILIĞI	0	0	1,623	0	0	0	0	0	0	0	0	0	60	0	0	0	0	0	0
60 HABERLEŞME	0	0	5,101	3,346	2,690	743	883	634	617	372	3,608	1,554	5,976	12,972	1,266	33,998	1,110	6,517	1,650
61 BANKACILIK, SİGORTACILIK VE KOOPERATİFÇİLİK	2,376,389	240,788	3,302	9,329	73,469	26,122	3,520	20,674	8,163	33,317	29,493	39,664	42,471	44,993	144,693	101,547	7,798	10,183	24,706
62 KİRALAMA VE MESLEKİ HİZMETLER	330,933	66,668	171,847	10,388	6,153	13,854	4,206	21,855	4,397	12,027	21,361	24,634	186,577	68,338	19,779	273,548	33,456	78,390	3,497
63 KAMU HİZMETLERİ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KAMUYA SAMİPLİĞİ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
65 TOPLAM GİRDİLER	16,184,862	13,896,015	491,034	631,475	788,956	277,989	75,655	163,440	94,802	209,130	2,612,219	1,453,026	2,883,900	5,187,953	2,753,697	12,868,502	667,895	711,206	3,451,805
66 VERGİLİ TOPLAM ÜRETİM DEĞERİ	41,243,861	27,196,651	3,376,121	3,624,856	3,683,848	1,857,588	180,831	837,786	874,930	1,687,648	3,292,594	2,071,763	1,940,364	6,671,761	3,134,346	17,928,963	3,286,732	1,297,481	5,033,986
67 SAYRİ SAFİ KATMA DEĞER (ÜRETİCİ FİYATLARIYLA	47,058,899	13,300,636	2,883,089	2,993,381	2,897,892	1,579,599	105,166	354,346	779,128	1,298,520	680,375	618,738	1,056,464	1,483,808	380,649	5,060,461	2,618,837	586,275	1,582,181
68 DAHİLDEN ALINAN DOLAYLI VERGİLER	539,018	105,434	63,579	14,353	139,812	197,679	4,749	11,187	28,747	44,448	8,448	16,287	29,021	84,238	34,998	67,683	366,537	139,905	685,374
69 SUBVANSİYON	1,225,743	93,906	0	0	49,651	0	0	0	0	0	0	0	0	0	64,379	0	0	0	0
70 DAHİLDEN ALINAN NET DOLAYLI VERGİLER	(715,796)	11,448	62,579	14,362	88,161	197,679	4,749	11,187	28,747	44,448	8,448	16,287	29,021	84,238	(29,384)	67,683	366,537	139,905	685,374
71 GAYRİ SAFİ KATMA DEĞER (FAKTÖR FİYATLARIYLA)	47,774,704	13,379,188	2,819,510	2,979,029	2,817,731	1,381,770	100,417	343,219	749,381	1,254,040	671,796	602,776	1,027,333	825,593	423,031	4,366,797	1,254,300	446,370	1,907,187
72 ASİMİLE VE EKSİME	10,946	188,049	15,812	19,685	466,192	33,487	5,269	76,359	24,550	8,193	82,775	73,379	76,725	17,640	61,466	330,438	104,978	69,191	33,777
73 NET KATMA DEĞER (FAKTÖR FİYATLARIYLA)	47,756,658	13,191,139	2,803,998	2,959,344	1,551,539	1,348,283	95,148	266,860	724,831	1,245,847	589,021	535,499	950,608	787,953	369,587	4,044,362	1,149,322	377,179	1,884,338
74 MAAŞ VE ÜCRETLER	5,376,281	1,391,560	610,159	338,948	1,476,482	78,705	69,010	145,606	170,107	108,310	161,134	147,566	256,152	264,907	469,041	1,389,980	163,356	167,897	479,364
75 DİĞER FAKTÖR GELİRLERİ	42,480,377	11,899,579	2,193,839	1,830,196	74,057	1,267,578	26,139	121,254	554,724	1,137,537	455,797	387,935	723,456	523,046	(99,454)	2,654,382	986,966	209,282	1,404,963
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

APPENDIX 5:GAMS CODE FOR THE TRCGE MODEL

```
$TITLE GENERAL EQUILIBRIUM MODEL FOR THE TURKISH ECONOMY (TRCGE)
$offsymxref offsymlist
$offlisting

SET I SECTORS
    /AGRI BASIC AGRICULTURE

     MINE MINING
     FOOD FOOD PROSESSED PRODUCTS(AGRIBUSINESS)
     DRIK BEVERAGE INDUSTRIES
     TOBA  TOBACCO INDUSTRIES
     WEAR WEARING APPERAL
     TEXT TEXTILE AND WEARING APPAREL
     LEAT LEATHER FUR AND FOOTWEAR INDUSTRY
     WOOD WOOD PRODCUCTS AND FIXTURES
     FURN MANUFACTURE OF FURNITURE
     PAPR PAPER AND PUBLISHING INDUSTRIES
     CHEM CHEMICAL PRODUCTS
     RBER MANUFACTURE OF RUBBER PRODUCTS
     PETR PETROLIUM PRODUCTS
     GLAS GLASS PRODUCTS
     CEMT OTHER NON-METHALIC MINERAL PRODUCTS
     IRST IRON AND STEEL BASIC IND
     NIRS NON FERROUS METAL BASIC IND
     METL FABRICATED METAL PRODUCTS
     NELM NON ELECTRICAL MACHINARY
     ELCM ELECTRICAL MACHINARY
     TRNS TRANSPORTATION EQUIPMENTS
     ENRG ELECTRICITY GAS AND WATER MANUFACTURING
     CONS CONSTRUCTION

     TRCM TRANSPORTATION AND COMMUNICATION
     SERV OTHER SERVICES /

LC LABOR CATEGORY
    /ORGLAB ORGANIZED LABOR
     MARLAB MARGINAL LABOR /

IT(I) TRADED SECTORS
     /agri, MINE, FOOD, DRIK, TOBA, WEAR, TEXT, LEAT, WOOD,
      FURN, PAPR, CHEM, RBER, PETR, GLAS, CEMT, IRST,
      NIRS, METL, NELM, ELCM, TRNS, ENRG, trcm, serv/

IN(I) NONTRADED SECTORS /cons/

IINT(I) INTERMEDIATE INPUT USING SECTORS
IINTN(I) SECTORS THAT DO NOT USE INTERMEDIATE INPUTS
```

```
IIND(I) INDUSTRIAL SECTORS
     /MINE, FOOD, DRIK, TOBA, WEAR, TEXT, LEAT, WOOD,
      FURN, PAPR, CHEM, RBER, PETR, GLAS, CEMT, IRST,
      NIRS, METL, NELM, ELCM, TRNS, ENRG, CONS/

ISRV(I) SERVICES SECTORS
     / TRCM, SERV/

IEU(I) EU SECTORS
     /MINE, FOOD, DRIK, TOBA, WEAR, TEXT, LEAT, WOOD,
      FURN, PAPR, CHEM, RBER, PETR, GLAS, CEMT, IRST,
      NIRS, METL, NELM, ELCM, TRNS/

INEU(I) NON EU SECTORS
     /AGRI, ENRG, CONS, TRCM, SERV/

ILST(I) LAST SECTOR FOR CALIBRAITON
     /SERV/
IM(I) MONOPOLIST SECTORS

IM(I) MONOPOLIST SECTORS
     /DRIK, TOBA, FURN, PETR, GLAS, IRST, NIRS, NELM, TRNS/

IMC(I) COMPETITIVE SECTORS;

IMC(I)=yes; IM(I)=no ;
IMC(I)=NOT IM(I) ;

ALIAS(I,J);
ALIAS(IINT,JINT) ;



PARAMETER
     AA(I,J)    INTERMEDIATE INPUT COEFFICIENTS (NORMALIZED)
     AC(I)      ARMINGTON FUNCTION SHIFT PARAMETER
     ACM(I)       IMPORT FUNCTION SHIFT PARAMETER
     AT(I)     CET FUNCTION SHIF PARAMETER
     AX(I)      PRODUCTION FUNCTION SHIFT PARAMETER
     AV(I)      VALUE ADDED SHIFT PARAMETER
     BC(I)      ARMINGTON FUNCTION SHARE PARAMETER
     BCM(I)       IMPORT FUNCTION SHARE PARAMETER
     BT(I)     CET FUNCTION SHARE PARAMETER
     BX(I)      PRODUCTION FUNCTION SHARE PARAMETER
     BVL(I,LC)  VALUE ADDED FUNCTION LABOR SHARE PARAMETER
     BVK(I)     VALUE ADDED FUNCTION CAPITAL SHARE PARAMETER
     CLES(I)    PRIVATE CONSUMPTION SHARES
     GLES(I)    GOVERNMENT CONSUMPTION SHARES
     DSTRP(I)     RAITO OF PRIVATE INVENTORY INVESTMENT TO OUTPUT
     DSTRG(I)     RATIO OF GOVERNMENT INVENTORY INVEST TO OUTPUT
     ELSED(I)     ELASTICITY OF EXPORT DEMANDED
```

ITAX(I) INDIRECT TAX RATE
KDEP(I) CAPITAL DEPRECIATION RATE
KDIO(I) SHARE OF INVESTMENT BY DESTINATION
PWTS(I) GDP DEFLATOR WEIGHTS
RHOC(I) ARMINGTON FUNCTION EXPONENT
MRHOC(I) IMPORT FUNCTION EXPONENT
RHOX(I) CES PRODUCTION FUNCTION EXPONENT
RHOT(I) CET PRODUCTION FUNCITON EXPONENT
RHOV(I) VALUE ADDED FUNCTION EXPONENT
SUMZZ(I) PARAMETER USED IN CALIBRATION

TE(I) EXPORT SUBSIDY RATES

* teeu(i) export subsidy rate for eu exports
* terw(i) export subsidy rate for row exports

TM(I) TARIFF RATES ON IMPORTS
TMEU(I) TARIFF RATES ON IMPORTS FROM EU
TMRW(I) TARIFF RATES ON IMPORTS FORM REST OF THE WORLD
TFEU(I) FUND RATE ON IMPORTS FROM THE EU
TFRW(I) FUND RATE ON IMPORTS FROM ROW
WDIST(I,LC) WAGE PROPORTIONALITY COEFFICIENTS

*Dummies to hold initial data

AVC0(I) AVERAGE VARIABLE COST
CC0(I) COMPOSITE COMMODITY (ABSORPTION)
CD0(I) PRIVATE CONSUMPTION
DC0(I) DOMESTIC SALES
DKI0(I) DOMESTIC PRIVATE CAPITAL INVESTMENT BY DESTINATION
DSTP0(I) PRIVATE INVENTORY INVESTMENT
DSTG0(I) GOVERNMENT INVENTORY INVESTMENT

eeu0(i) exports to eu
erw0(i) exports to row

E0(I) EXPORTS
GD0(I) GOVERNMENT CONSUMPTION
ID0(I) INVESTMENT BY ORIGIN
INT0(I) INTERMEDIATE INPUT DEMANDS
K0(I) CAPITAL STOCKS
LS0(LC) LABOR SUPPLIES BY CATEGORY
M0(I) IMPORTS
MEU0(I) IMPORTS FROM THE EU
MRW0(I) IMPORTS FROM THE ROW
MKP0(I) MARK-UP RATE
N0(I) INTERMEDIATE INPUT DEMANS COMPOSITE
PWMEU0(I) EU PRICE OF IMPORTS
PWMRW0(I) NON EU ROW PRICE OF IMPORTS

PWE0(I) WORL PRICE OF exports (US DOLLARS)

* pweeu0(i) world price of eu exports
* pwerw0(i) world price of row exports

PD0(I) DOMESTIC COMMODITY PRICE
PK0(I) CAPITAL COMMODITY PRICE
PX0(I) OUTPUT PRICE
PC0(I) COMPOSITE COMMODITY PRICE
PM0(I) DOMESTIC PRICE OF IMPORTS
PMEU0(I) DOMESTIC PRICE OF EU IMPORTS
PMRW0(I) DOMESTIC PRICE OF ROW IMPORTS
PN0(I) PRICE OF INTERMEDIATE INPUT

* peeu0(i) domestic price of eu exports
* perw0(i) domesitc price of row exports

PE0(I) DOMESTIC PRICE OF EXPORTS
PVA0(I) VALUE ADDED PRICE
RP0(I) SECTORAL PROFITS
TVC0(I) TOTAL VARABLE COST
V0(I) VALUE ADDED
WA0(LC) AVARAGE WAGE RATE
XS0(I) GROSS OUTPUTS
RRP(I) SECTORAL PROFIT RATE
sumzz1(i) sum
sumzz2(i) summation
rp1 someth
rp2 somet
;

SCALAR AVRP AVERAGE PROFIT RATE
GDPFC GDP AT FACTOR COST
MRIMP MERCHANDISE IMPORTS (US DOLLARS)
MREXP MERCHANDISE EXPORTS (US DOLLARS)
CTAX CORPOTATE TAX RATE
CAPTAX0 CAPITAL TAXES ON PRODUCTION /5087.04/
PRVINC0 PRIVATE INCOME
FCTRYG0 PUBLIC SECTOR FACTOR INCOME /13450.278/
RFG PUBLIC SECTOR FACTOR INCOME TO GDP
TRSFER0 TRANSFERS /16980.748/
REMIT0 REMITTANCES FROM ABROAD/8578.311/
PFCYROW0 PRIVATE FACTOR INCOME FROM ROW /4381.652/
GFCYROW0 GOVERNMET FACTOR INCOME FROM ROW /208.776/
PBINROW0 INTEREST PAYMENTS ON PRIVATE DEBT /3676.042/
GBINROW0 GOVERNMENT INTEREST PAYMENTS /5375.319/
GIF0 GOVERNMENT INVESTMENT /34228.78/
MPS0 PRIVATE SAVINGS /76072.95/
ER0 EXCHANGE RATE /2630/

```
      HTAX INCOME TAX RATE
      WRRL WAGE RATE FOR RURAL LABOR
      TOTHHTAX0 TOTAL HOUSEHOLD TAX /26462.184/
      FSAV0 FOREIGN DEFICIT /12855.429/
      GSAV0 PUBLIC SAVINGS /13679.9/
      GDTOT0 TOTAL GOVERNMENT CONSUMPTION
      GIR GOVERNMENT INVESTMENT-GDP RATIO
      GSR GOVERNMENT SAVING RATIO OF GOV REVENUES TO GDP
      GCR GOVERNMENT DEMAND RATIO OF GDP
      GIFT0 EU ADJUSTMENT GIFT /0.0/
      ;

*#* read sam data

***$INCLUDE MYSAM.DAT
***=========================
***=========================
*tables from SAM

*#*#*#*#MODEL CALIBRATION
*
*computation of  parameters and coefficients for calibration
*
PD0(I)=MATBAL("PD0",I);
PM0(I)=MATBAL("PD0",I);
PMEU0(I)=MATBAL("PD0",I);
PMRW0(I)=MATBAL("PD0",I);
PE0(I)=MATBAL("PD0",I);

*peeu0(i)=matbal("pd0",i);
*perw0(i)=matbal("pd0",i);

PK0(I)=MATBAL("PD0",I);
PX0(I)=MATBAL("PD0",I);
PC0(I)=MATBAL("PD0",I);

ELSED(I) = MATBAL("ELSED",I);

XS0(I)=MATBAL("XS0",I);
M0(I)=MATBAL("M0",I);
MEU0(I)=MATBAL("MEU0",I);
MRW0(I)=M0(I)-MEU0(I);

E0(I)=MATBAL("E0",I);

eeu0(i)=matbal("eeu0",i);
erw0(i)=e0(i)-eeu0(i);

CD0(I)=MATBAL("CD0",I);
GD0(I)=MATBAL("GD0",I);
ID0(I)= MATBAL("ID0",I);
```

```
DSTP0(I)= MATBAL("DSTP0",I);
DSTG0(I)=MATBAL("DSTG0",I);
DSTRG(I)=DSTG0(I)/XS0(I);
DSTRP(I)=DSTP0(I)/XS0(I);
K0(I)=MATBAL("K0",I);

*## calculate investment allocation

DKI0(I)=MATBAL("TOTDK0",I);
KDIO(I) $(NOT ILST(I))=DKI0(I)/SUM(J,DKI0(J));
KDIO(ILST)=1-SUM(I $(NOT ILST(I)),KDIO(I));

*##calcualte consumption shares

GLES(I) $(NOT ILST(I))=MATBAL("GD0",I)/SUM(J,MATBAL("GD0",J));
GLES(ILST)=1- SUM(I $(NOT ILST(I)),GLES(I));
CLES(I) $(NOT ILST(I))=MATBAL("CD0",I)/SUM(J,MATBAL("CD0",J));
CLES(ILST)=1-SUM(I $(NOT ILST(I)), CLES(I));

PWTS(I)=CLES(I);
KDEP(I)=MATBAL("KDEP",I)/MATBAL("K0",I);

*##calculate intermediate input use then normalize IO matrix

AA(I,J)=IO(I,J)/XS0(J);


INT0(I)=SUM(J,AA(I,J)*XS0(J));

*define the set of intermediate input using sectors

IINTN(I)=YES$(SUM(J,AA(J,I)*XS0(I)) EQ 0);
IINT(I)= NOT IINTN(I);
N0(J)=SUM(I,AA(I,J)*XS0(J));

SUMZZ(J)=SUM(I,AA(I,J));
AA(I,JINT) $(NOT ILST(I))=AA(I,JINT)/SUMZZ(JINT);
AA(ILST,JINT)=1-SUM(I $(NOT ILST(I)), AA(I,JINT));
PN0(J)=SUM(I,AA(I,J)*PC0(I));
ITAX(I)= MATBAL("ITAX",I)/(PX0(I)*XS0(I));
V0(I) = XS0(I)-N0(I);

***
*PVA0(I)=(1-ITAX(I))*PX0(I)*(XS0(I)/V0(I))-PN0(I)*(N0(I)/V0(I));
pva0(i)=(px0(i)*xs0(i)*(1-itax(i))-pn0(i)*n0(i))/v0(i);


*##labor market, wages, etc.

LS0(LC)=LABOR("LS0",LC);
WA0(LC)=SUM(I,WAGES(I,LC))/SUM(I,XLE(I,LC));
```

```
WDIST(I,LC) $ WAGES(I,LC)=WAGES(I,LC)/(WA0(LC)*XLE(I,LC));
WDIST(I,LC) $ (WAGES(I,LC) EQ 0)=0.0;
WRRL = WA0("ORGLAB");

RP0(I)=PVA0(I)*V0(I)-SUM(LC $WDIST(I,LC),WA0(LC)*WDIST(I,LC)*XLE(I,LC));


*rp1(i)=pva0(i)*v0(i);
*rp2(i)=SUM(LC $WDIST(I,LC),WA0(LC)*WDIST(I,LC)*XLE(I,LC));
*rp0(i)=rp1(i)-rp2(i);

RRP(I)=RP0(I)/K0(I);
CTAX=CAPTAX0/SUM(I $(ORD(I) NE 1), RP0(I));


*## mark up rates

TVC0(I)=SUM(LC $ WDIST(I,LC),WA0(LC)*WDIST(I,LC)*XLE(I,LC)) + PN0(I)*N0(I);
AVC0(I)=TVC0(I)/(XS0(I)*(1-ITAX(I)));

********

MKP0(IM)= PX0(IM)/AVC0(IM)-1;
MKP0(IMC)=0.0;


*## household income and savings

PRVINC0 = SUM(I,PVA0(I)*V0(I)) - FCTRYG0 + TRSFER0 + REMIT0 +
      PFCYROW0 - PBINROW0 - CAPTAX0;

HTAX = TOTHHTAX0/PRVINC0;
MPS0 = MPS0/((1-HTAX)*PRVINC0);


*##total absorption (armington composite sum)

CC0(I) = INT0(I)+CD0(I)+GD0(I)+ID0(I)+DSTP0(I)+DSTG0(I);
DC0(I) = XS0(I) - E0(I);

*## index definitions

IT(I) = YES $M0(I);
IN(I)=NOT IT(I);

*######calibration of all shift and share parameters

*##world prices and the commercial instruments

PWMEU0(IT) = (PMEU0(IT)*MEU0(IT) - MATBAL("GVEU0",IT)-
          MATBAL("FUNEU0",IT))/(ER0*MEU0(IT));
```

```
PWMEU0(IN) = 0.0;

*pweeu0(it)=((peeu0(it)*eeu0(it)-matbal("subsidyeu",it)))/(er0*eeu0(it));
*pweeu0(in)=0.0;
*pwerw0(it)= (perw0(it)*erw0(it)-matbal("subsidy",it))/(er0*erw0(it));
*pwerw0(in)=0.0;

TMEU(IT)=MATBAL("GVEU0",IT)/(PWMEU0(IT)*ER0*MEU0(IT));
TMEU(IN)=0.0;
TFEU(IT)=MATBAL("FUNEU0",IT)/(PWMEU0(IT)*ER0*MEU0(IT));
TFEU(IN)=0.0;

PWMRW0(IT)=(PMRW0(IT)*MRW0(IT)-MATBAL("GVRW0",IT)-
        MATBAL("FUNRW0",IT))/(ER0*MRW0(IT));
PWMRW0(IN)=0.0;

TMRW(IT)=MATBAL("GVRW0",IT)/(PWMRW0(IT)*ER0*MRW0(IT));
TMRW(IN)=0.0;

TFRW(IT)= MATBAL("FUNRW0",IT)/(PWMRW0(IT)*ER0*MRW0(IT));
TFRW(IN)=0.0;

PWE0(IT)=(PE0(IT)*E0(IT)-MATBAL("SUBSIDY",IT))/(ER0*E0(IT));
PWE0(IN)=0.0;

TE(IT)=MATBAL("SUBSIDY",IT)/(PWE0(IT)*ER0*E0(IT));
TE(IN)=0.0;

*teeu(it)=matbal("subsidyeu",it)/(pweeu0(it)*er0*eeu0(it));
*teeu(in)=0.0;
*terw(it)=matbal("subsidy",it)/(pwerw0(it)*er0*erw0(it));
*terw(in)=0.0;

*foreign trade functions

*##armington composites

RHOC(I)= (1/MATBAL("SIGC",I))-1;

*********
BC(IT)=PM0(IT)/PD0(IT)*(M0(IT)/DC0(IT))**(1+RHOC(IT));
BC(IT) =BC(IT)/(1+BC(IT));
AC(IT) = CC0(IT)/(BC(IT)*M0(IT)**(-RHOC(IT))
      +(1-BC(IT))*DC0(IT)**(-RHOC(IT)))**(-1/RHOC(IT));
BC(IN)=0;
AC(IN)=1;

*##import composites

MRHOC(I) = (1/MATBAL("MSIGC",I))-1;
BCM(IT) = PMEU0(IT)/PMRW0(IT)*(MEU0(IT)/MRW0(IT))**(1+MRHOC(IT));
```

```
BCM(IT) = BCM(IT)/(1+BCM(IT));
ACM(IT) = M0(IT)/(BCM(IT)*MEU0(IT)**(-MRHOC(IT))
      +(1-BCM(IT))*MRW0(IT)**(-MRHOC(IT)))**(-1/MRHOC(IT));

BCM(IN) = 0;
ACm(IN) = 1;

**********


*## cet functions

RHOT(I) = (1/MATBAL("SIGT",I))+1;
BT(IT) = 1/(1+PD0(IT)/PE0(IT)*(E0(IT)/DC0(IT))**(RHOT(IT)-1));
AT(IT) = XS0(IT)/(BT(IT)*E0(IT)**RHOT(IT) +
     (1-BT(IT))*DC0(IT)**RHOT(IT))**(1/RHOT(IT));
BT(IN)=0;
AT(IN)=1;


*##production functions: ces of value added and intermediates

RHOX(I) = (1/MATBAL("SIGP",I))-1;
BX(IINT) = (PVA0(IINT)/PN0(IINT))*(V0(IINT)/N0(IINT))**(1+RHOX(IINT));
BX(IINT) = BX(IINT)/(1+BX(IINT));
AX(IINT) = XS0(IINT)/(BX(IINT)*V0(IINT)**(-RHOX(IINT)) +
      (1-BX(IINT))*N0(IINT)**(-RHOX(IINT)))**(-1/RHOX(IINT));


*##value added function: ces of capital and labor

RHOV(I) = (1/MATBAL("SIGV",I))-1;
BVL(I,LC)=0.0;
BVL(I,LC)=WA0(LC)*WDIST(I,LC)*XLE(I,LC)**(1+RHOV(I));
BVK(I) = RRP(I)*K0(I)**(1+RHOV(I));
SUMZZ(I)=SUM(LC,BVL(I,LC))+BVK(I);
BVL(I,LC) = BVL(I,LC)/SUMZZ(I);
BVK(I) = BVK(I)/SUMZZ(I);

SUMZZ(I) =(SUM(LC,BVL(I,LC)*(XLE(I,LC)**(-RHOV(I))))
      +BVK(I)*K0(I)**(-RHOV(i)))**(-1/RHOV(I)) ;


*SUMZZ(I) = SUMZZ1(I)**(-1/RHOV(I));
*sumzz2(I)= SUM(BVK(I)*K0(I))**(-RHOV(I));
*SUMZZ(I)= (sumzz1(i) + sumzz2(i))**(-1/RHOV);


AV(I) = V0(I)/SUMZZ(I);
```

*##scaling of all dumies to improve solution algorithm

M0(I) = M0(I)/1000;
E0(I) = E0(I)/1000;

eeu0(i)=eeu0(i)/1000;
erw0(i)=erw0(i)/1000;

MEU0(I) = MEU0(I)/1000;
MRW0(I) = MRW0(I)/1000;
XS0(I) = XS0(I)/1000;
K0(I) = K0(I)/1000;
V0(I) = V0(I)/1000;
N0(I) = N0(I)/1000;
DKI0(I) = DKI0(I)/1000;
ID0(I) = ID0(I)/1000;
DSTP0(I) $ DSTRP(I) = DSTP0(I)/1000;
DSTG0(I) $ DSTRG(I) = DSTG0(I)/1000;
CD0(I) = CD0(I)/1000;
GD0(I) = GD0(I)/1000;
INT0(I) = INT0(I)/1000;
DC0(I) = DC0(I)/1000;
CC0(I) = CC0(I)/1000;
RP0(I) = RP0(I)/1000;
LS0(LC) = LS0(LC)/1000;
XLE(I,LC) =0.001*XLE(I,LC);
TVC0(I) = TVC0(I)/1000;
PRVINC0 = PRVINC0/1000;

****####################end of calibration
****####################end of calibration
****####################end of calibration

##*#*#*varible definitions

VARIABLES

*price block

PWMEU(I) EU PRICE OF IMPORTS(US DOLLARS)
PWMRW(I) NON EU ROW PRICE OF IMPORTS (US DOLLARS)
PWE(I) WORLD PRICE OF DOMESTIC EXPORTS(US DOLLARS)

*pweeu(i) world price of domestic eu exports
*pwerw(i) world price of domesit row exports

PD(I) DOMESTIC PRICES
PM(I) DOMESTIC PRICE OF IMPORTS
PMEU(I) DOMESTIC PRICE OF EU IMPORTS
PMRW(I) DOMESTIC PRICE OF NON EU IMPORTS

PE(I) DOMESTIC PRICE OF EXPORTS

*peeu(i) domestic prices of eu exports
*perw(i) domestic prices of row exports

PK(I) RATE OF CAPITAL RENTAL BY SECTOR
PX(I) AVERAGE OUTPUT PRICE BY SECTOR
PN(I) PRICE OF INTERMEDIATE GOOD
PC(I) PRICE OF COMPOSITE GOODS
PVA(I) PRICE OF VALUE ADDED BY SECTOR
ER EXCHANGE RATE (TL per DOLLAR)
PLEV GENERAL PRICE LEVEL
MKP(I) MARK UP RATE
TVC(I) TOTAL VARIABLE COSTS
AVC(I) AVERAGE VARIABLE COSTS
CC(I) COMPOSITE GOOD SUPPLY
XS(I) DOMESTIC OUTPUT BY SECTOR
N(I) COMPOSITE INTERMEDIATE
V(I) VALUE ADDED
DC(I) DOMESTIC SALES
E(I) EXPORTS BY SECTOR

eeu(i) exports to eu
erw(i) exports to row

M(I) IMPORTS BY SECTOR(TOTAL IMPORTS)
MEU(I) EU IMPORTS
MRW(I) NON EC IMPORTS
GDPMP GROSS DOMESTIC PRODUCT AT MARKET PRICES

*factor block

K(I) CAPITAL STOCK BY SECTOR
WA(LC) AVERAGE WAGE RATE BY CATEGORY
LS(LC) LABOR SUPPLY BY CATEGORY
L(I,LC) EMPLOYMENT BY SECTOR AND LABOR CATEGORY
UCAP(I) CAPACITY UTILIZATION RATE
UNEMPUR UNEMPLOYED ORGANIZED LABOR (1000 PERSONS)
RP(I) SECTORAL PROFITS (90 BILL)

*income generation and denand block

INT(I) INTERMEDIATE USING
CD(I) FINAL DEMAND FOR PRIVATE CONSUMPTION
GD(I) FINAL DEMAND FOR GOVERNMENT CONSUMPTION
ID(I) FINAL DEMAND FOR PRODUCTIVE INVESTMENT
DSTP(I) PRIVATE INVENTORY INVESTMENT BY SECTOR
DSTG(I) GOVERNMENT INVENTORY INVESTMENT BY SECTOR
DKI(I) VALUME OF INVESTMENT BY SECTOR OF DESTINATION
PRVINC PRIVATE INCOME
MPS MARGINAL PROPENSITY TO SAVE

```
*public accounts and macro balances

TRSFER TRANSFERS TO THE PRIVATE HOUSEHOLDS
FCTRYG PUBLIC SECTOR FACTOR INCOME
*TARIF TOTAL TARIF REVENUE
GVEU CUSTOM DUTY FORM EU
GVRW CUSTOM DUTY FROM ROW
FUNEU FUND REVENUE FROM EU IMPORTS(TL)
FUNRW FUND REVENUE FORM ROW IMPORTS
INDTAX INDIRECT TAX REVENUE
TOTHHTAX HOUSEHOLD INCOME TAX REVENUE
CAPTAX CAPITAL TAXES ON PRODUCTION
EXSUB TOTAL EXPROTS SUBSIDY GRANTED
PRINV PRIVATE INVESTMENT
PBSIDEF PUBLIC SAVING INVESTMENT DEFICIT
GBINROW INTEREST PAYMENTS ON PUBLIC DEFICIT
PBINROW INTEREST PAYMENTS ON PRIVATE DEBT
GREV GOVERNMENT REVENUE
GDTOT TOTAL GOVERNMENT CONSUMPTION
GIF GOVERNMENT INVESTMENT FUND
GSAV PUBLIC SAVINGS
HHSAV TOTAL HOUSEHOLD SAVINGS
INVEST TOTAL INVESTMENT
SAVINGS TOTAL SAVINGS
FSAV FOREIGN SAVINGS
REMIT NET REMITTANCES FROM ABROAD
PFCYROW NON-LABOR FACTOR INCOME FROM ROW
GFCYROW PUBLIC FACTOR INCOME FROM ROW

*welfare indicator for objective function

OMEGA OBJEFTIVE FUNCTION VARIABLE
DROP PSEUDO VARIABLE TO IMPOSE WALRAS' LAW
;
*#*#variable initialization

PWMEU.L(I)=PWMEU0(I);
PWMRW.L(I)=PWMRW0(I);
PWE.L(I)=PWE0(I);

*pweeu.l(i)=pweeu0(i);
*pwerw.l(i)=pwerw0(i);

PD.L(I)=PD0(I);
PM.L(I)=PM0(I);
PMEU.L(I)=PMEU0(I);
PMRW.L(I)=PMRW0(I);
PE.L(I)=PE0(I);

*peeu.l(i)=peeu0(i);
*perw.l(i)=perw0(i);
```

```
PK.L(I)=PK0(I);
PX.L(I)=PX0(I);
PN.L(I)=PN0(I);
PC.L(I)=PC0(I);
PVA.L(I)=PVA0(I);
ER.L=ER0;
PLEV.L=1.00000;
MKP.L(I)=MKP0(I);
TVC.L(I)=TVC0(I);
AVC.L(I)=AVC0(I);
UCAP.L(I)=1.000;
CC.L(I)=CC0(I);
XS.L(I)=XS0(I);
N.L(I)=N0(I);
V.L(I)=V0(I);
DC.L(I)=DC0(I);
E.L(I)=E0(I);

eeu.l(i)=eeu0(i);
erw.l(i)=erw0(i);

M.L(I)=M0(I);
MEU.L(I)=MEU0(I);
MRW.L(I)=MRW0(I);
K.L(I)=K0(I);
WA.L(LC)=WA0(LC);
LS.L(LC)=LS0(LC);
L.L(I,LC)=XLE(I,LC);
UNEMPUR.L = LS.L("ORGLAB") - SUM(I,L.L(I,"ORGLAB"));
RP.L(I)=RP0(I);


INT.L(I) = INT0(I);
CD.L(I)=CD0(I);
GD.L(I)=GD0(I);
ID.L(I)=ID0(I);
DSTP.L(I)=DSTP0(I);
DSTG.L(I)=DSTG0(I);
DKI.L(I)=DKI0(I);
PRVINC.L=PRVINC0;
MPS.L=MPS0;
GVEU.L=SUM(I,MATBAL("GVEU0",I))/1000;
GVRW.L=SUM(I,MATBAL("GVRW0",I))/1000;
FUNEU.L=SUM(I,MATBAL("FUNEU0",I))/1000;

*FUNRW.L=SUM(I,MATBAL("FUNRW0",I))/1000;

FUNRW.L = (SUM(I,MATBAL("TARIF",I))/1000)-
        (GVEU.L + GVRW.L + FUNEU.L);
INDTAX.L=SUM(I,MATBAL("ITAX",I))/1000;
FCTRYG.L=FCTRYG0/1000;
```

```
TOTHHTAX.L=HTAX*PRVINC.L;
EXSUB.L = SUM(I,MATBAL("SUBSIDY",I))/1000;
GDTOT.L=SUM(I,GD.L(I));
GIF.L=GIF0/1000;
HHSAV.L = MPS.L*(1-HTAX)*PRVINC.L;
GSAV.L = GSAV0/1000;
FSAV.L =(FSAV0/ER0)/1000;
PRINV.L=HHSAV.L+FSAV.L*ER.L+GSAV.L+GIF.L;
INVEST.L=PRINV.L + GIF.L;
SAVINGS.L=INVEST.L;
REMIT.L=(REMIT0/ER0)/1000;
GBINROW.L=(GBINROW0/ER0)/1000;
PBINROW.L=(PBINROW0/ER0)/1000;
PFCYROW.L=(PFCYROW0/ER0)/1000;
GFCYROW.L=(GFCYROW0/ER0)/1000;
CAPTAX.L = CAPTAX0/1000;
TRSFER.L = TRSFER0/1000;
PBSIDEF.L = GIF.L - GSAV.L;
GREV.L = (GVEU.L +GVRW.L) +(FUNEU.L +FUNRW.L) +INDTAX.L +TOTHHTAX.L
     + CAPTAX.L + FCTRYG.L + GFCYROW.L*ER.L + PBSIDEF.L;
GDPMP.L = SUM(I,PVA0(I)*V0(I)) + (GVEU.L + GVRW.L)
        + (FUNEU.L + FUNRW.L) + INDTAX.L;
DROP.L = 0.0;


option decimals=7;

**************************end of initialization
**************************end of initialization
**************************end of initialization

*#*#*#*#* equation definitions

EQUATIONS

*price block

PMDEF(I) DEFINITION OF DEMESTIC IMPORT PRICES
PMEUDEF(I) DOMESTIC PRICE OF EU IMPORTS
PMRWDEF(I) DOMESTIC PRICE OF NON EU IMPORTS
PEDEF(I) DEFINITION OF DOMESITC EXPORTS PRICES

*peeudef(i) definition of domestic eu export prices
*perwdef(i) definition of domestic row export prices

ABSORPTION(I) VALUE OF DOMESTIC SALES
SALES(I) VALUE OF DOMESTIC OUTPUT
PNDEF(I) PRICE OF INTERMEDIATE GOOD COMPOSITE
VAFC(I) VALUE ADDED AT FACTOR COST
PKDEF(I) DEFINITON OF CAPITAL GOODS PRICE
PLEVDEF DEFINITION OF GENERAL PRICE LEVEL
```

TVCEQN(I) DEFINITION OF TOTAL VARABLE COSTS
AVCEQN(I) DEFINITION OF AVERAGE VARIABLE COSTS

*output block

ACTIVITY(I) PRODUCTION TECHNOLOGY:CES(V AND N)
ACTIVITY2(I) PRODUCTION FUNC FOR SECTORS WITHOUT INTER INPUTS
INTERMED(I) FOC FOR INTERMEDIATE INPUT USE ALONG CES
VALUEADD(I) VALUE ADDED FUNCTION: CES(K AND L)
PROFITMAX(I,LC) FIRST ORDER CONDITION FOR PROFIT MAXIMIZATION
UNURDEF SPECIFICATION OF UNEMPLOYMENT IN ORG LABOR MARKET
LSMARLAB MARGINAL LABOR SUPPLY
PROFITS(I) SECTORAL AGGREGATE PROFITS

CET(I) GROSS OUTPUT-EXPORTS FRONTIER
ESUPPLY(I) EXPORT SUPPLY

*esuppeu(i) export supply eu
*esupprw(i) export supply row

ARMINGTON(I) COMPOSITE GOOD AGGREGATION FUNCTION
IMPAGG(I) IMPORT AGGREGATION
IMPFOC(I) FOC FOR IMPORT AGGREGATION
COSTMIN(I) FOC FOR COST MIN. OF COMPOSTIE GOOD
DCN(I) DOMESTIC SALES FOR NONTRADED SECTORS
XSN(I) COMPOSITE COOD AGG. FOR NONTRADED SECTORS

*demand block

INTEQ(J) TOTAL INTERMEDIATE USES
CDEQ(I) PRIVATE CONSUMPTION BEHAVIOR
DSTPEQ(I) PRIVATE INVENTORY INVESTMENT
DSTGEQ(I) PUBLIC INVENTORY INVESTMENT
GDPDEF GROSS DOMESTIC PRODUCT
PRVINCDEF TOTAL PRIVATE INCOME
HHTAXDEF TOTAL HOUSEHOLD TAXES COLLECTED BY GOVT.
GDEQ(I) GOVERNMENT CONSUMPTION
GREQ GOVERNMENT REVENUE
FCTRYGEQ PUBLIC FACTOR INCOME
*TARIFEQ TOTAL IMPORT TAXES
GVEUEQ IMPORT TAXES FROM EU IMPORTS
GVRWEQ IMPORT TAXES FROM ROW IMPORTS
FUNEUEQ FUNDS REVENUE FROM EU IMPORTS
FUNRWEQ FUNDS REVENUE FROM ROW IMPORTS
INDTAXDEF INDIRECT TAXES ON DOMESTIC PRODUCTION
CAPTAXDEF CAPITAL TAXES ON PRODUCTION
EXSUBDEF ESPORT SUBSIDIES
EDEMAND(I) EXPORT DEMAND

```
edemandeu(i) eu export demand
edemandrw(i) rw export denand

*saving investment block

HHSAVEQ HOUSEHOLD SAVINGS
GRUSE GOVERNMENT BUDGET ALLOCATION
GOVSAV CALCULATION OF PUBLIC SAVINGS
*MACROBAL MACRO BALANCES
GIFEQN DETERMINATION OF PBSIDEF
SAVEQN TOTAL DOMESTIC SAVING POOL
INVFUND TOTAL INVESTMENT FUND
PRODINV(I) PRIVATE INVESTMENT BY SECTORS OF DESTINATION
WALRAS WALRAS' LAW EQUATION
IEQ(I) INVESTMENT BY SECTOR OF ORIGIN

*market equilibrium

EQUIL(I) GOOD MARKET EQUILIBRIUM
MKPEQN(I) DOMESTIC PRICE FOR MARKUP PRICING SECTORS
CAEQ CURRENT ACCOUNT BALANCE(BILL DOLLARS)

*objective function

OBJ OBJECTIVE FUNCTION
;

*equations of the model...

*price block

PMEUDEF(IT).. PMEU(IT)=E=PWMEU(IT)*ER*(1+TMEU(IT)+TFEU(IT));
PMRWDEF(IT).. PMRW(IT)=E=PWMRW(IT)*ER*(1+TMRW(IT)+TFRW(IT));
PMDEF(IT).. PM(IT)*M(IT)=E=PMEU(IT)*MEU(IT)+PMRW(IT)*MRW(IT);
PEDEF(IT).. PE(IT)=E=PWE(IT)*ER*(1+TE(IT));

*peeudef(it).. peeu(it)=e=pweeu(it)*er*(1+teeu(it));
*perwdef(it).. perw(it)=e=pwerw(it)*er*(1+terw(it));

ABSORPTION(I).. PC(I)*CC(I)=E=PD(I)*DC(I)+(PM(I)*M(I))$IT(I);
SALES(I).. PX(I)*XS(I)=E=PD(I)*DC(I)+(PE(I)*E(I))$IT(I);
PNDEF(IINT).. PN(IINT)=E=SUM(J,AA(J,IINT)*PC(J));
VAFC(I).. PX(I)*XS(I)*(1-ITAX(I))=E=PVA(I)*V(I)+PN(I)*N(I);
PKDEF(I).. PK(I)=E= SUM(J,PC(J)*IMAT(J,I));
PLEVDEF.. PLEV=E=SUM(I,PWTS(I)*PX(I));

*output and factors of production block

MKPEQN(IM).. PX(IM)=E=(1+MKP(IM))*AVC(IM);
ACTIVITY(IINT).. XS(IINT)=E=AX(IINT)*(BX(IINT)*V(IINT)**(-RHOX(IINT))
        +(1-BX(IINT))*N(IINT)**(-RHOX(IINT)))**(-1/RHOX(IINT));
```

```
ACTIVITY2(IINTN).. XS(IINTN)=E= V(IINTN);
INTERMED(IINT).. V(IINT)/N(IINT)=E=(PN(IINT)/PVA(IINT)*BX(IINT)/
                (1-BX(IINT)))**(1/(1+RHOX(IINT)));
VALUEADD(I).. V(I)=E=UCAP(I)*AV(I)*(SUM(LC $WDIST(I,LC),
          BVL(I,LC)*L(I,LC)**(-RHOV(I)))+
          BVK(I)*K(I)**(-RHOV(I)))**(-1/RHOV(I));
PROFITMAX(I,LC)$WDIST(I,LC).. L(I,LC)/V(I)=E=((BVL(I,LC)*PVA(I))/
      ((AV(I)**RHOV(I))*WA(LC)*WDIST(I,LC)))**(1/(1+RHOV(I)));
*URLVDEF.. WA("ORGLAB")=E=VRRL*PLEV;
UNURDEF.. UNEMPUR =E= LS("ORGLAB")-SUM(I $WDIST(I,"ORGLAB"),L(I,"ORGLAB"));
LSMARLAB.. SUM(I $WDIST(I,"MARLAB"), L(I,"MARLAB"))=E= LS("MARLAB")+UNEMPUR;
PROFITS(I).. RP(I)=E=PVA(I)*V(I)-SUM(LC $WDIST(I,LC),
          WA(LC)*WDIST(I,LC)*L(I,LC));

TVCEQN(I).. TVC(I)=E=SUM(LC $WDIST(I,LC),
          WA(LC)*WDIST(I,LC)*L(I,LC))+PN(I)*N(I);
AVCEQN(I).. AVC(I)=E=TVC(I)/(XS(I)*(1-ITAX(I)));


CET(IT).. XS(IT)=E=AT(IT)*(BT(IT)*E(IT)**RHOT(IT)
        +(1-BT(IT))*DC(IT)**RHOT(IT))**(1/RHOT(IT));
ESUPPLY(IT).. E(IT)/DC(IT)=E=(PE(IT)/PD(IT)*(1-BT(IT))/
          BT(IT))**(1/(RHOT(IT)-1));

*esuppeu(it).. eeu(it)/dc(it)=e=(peeu(it)/pd(it)*(1-bt(it))/
*           bt(it))**(1/(rhot(it)-1));
*esupprw(it).. erw(it)/dc(it)=e=(perw(it)/pd(it)*(1-bt(it))/
*           bt(it))**(1/(rhot(it)-1));


EDEMAND(IT).. E(IT)=E=E0(IT)*(PWE0(IT)/PWE(IT))**ELSED(IT);

*edemandeu(it).. eeu(it)=e=eeu0(it)*(pweeu0(it)*(1+teeu(it))/pweeu(it))**elsed(it);
*edemandrw(it).. erw(it)=e=erw0(it)*(pwerw0(it)*(1+terw(it))/pwerw(it))**elsed(it);

edemandeu(it).. eeu(it)=e=eeu0(it)*(pwe0(it)/pwe(it))**(elsed(it)+0.8);
edemandrw(it).. erw(it)=e=erw0(it)*(pwe0(it)/pwe(it))**(elsed(it)-0.8);


ARMINGTON(IT).. CC(IT)=E=AC(IT)*(BC(IT)*M(IT)**(-RHOC(IT))
           +(1-BC(IT))*DC(IT)**(-RHOC(IT)))**(-1/RHOC(IT));
COSTMIN(IT).. M(IT)/DC(IT)=E=(PD(IT)/PM(IT)*(BC(IT)/
          (1-BC(IT))))**(1/(1+RHOC(IT)));
DCN(IN).. DC(IN)=E=XS(IN);
XSN(IN).. DC(IN)=E=CC(IN);
IMPAGG(IT).. M(IT)=E=ACM(IT)*(BCM(IT)*MEU(IT)**(-MRHOC(IT))
          +(1-BCM(IT))*MRW(IT)**(-MRHOC(IT)))**(-1/MRHOC(IT));
IMPFOC(IT).. MEU(IT)/MRW(IT)=E=(PMRW(IT)/PMEU(IT)*(BCM(IT)/
          (1-BCM(IT))))**(1/(1+MRHOC(IT)));
```

```
*income generation and demand  block

INTEQ(I).. INT(I)=E=SUM(J,AA(I,J)*N(J));
DSTPEQ(I).. DSTP(I)=E=DSTRP(I)*XS(I);
DSTGEQ(I).. DSTG(I)=E= DSTRG(I)*XS(I);
PRVINCDEF.. PRVINC=E= SUM(I,PVA(I)*V(I))-CAPTAX + TRSFER - FCTRYG
        + PFCYROW*ER - PBINROW*ER + REMIT*ER;
CDEQ(I).. PC(I)*CD(I)=E= CLES(I)*(1-MPS)*PRVINC*(1-HTAX);
HHSAVEQ.. HHSAV=E= MPS*PRVINC*(1-HTAX);
GREQ.. GREV=E= (GVEU+GVRW+FUNEU+FUNRW)+INDTAX + TOTHHTAX
      + CAPTAX + FCTRYG + PBSIDEF + GFCYROW*ER;
GOVSAV.. GSAV=E=GSR*GDPMP;
*GIFDEF.. GIF=E= GIR*GDPMP;
GIFEQN.. PBSIDEF=E= GIF-GSAV;
*GCONEQ.. GDTOT=E= GCR*GDPMP;
GRUSE.. GREV=E= GDTOT + GIF + EXSUB + GBINROW*ER + TRSFER;
GDEQ(I).. PC(I)*GD(I) =E= GLES(I)*GDTOT;
GVEUEQ.. GVEU =E= SUM(IT,TMEU(IT)*MEU(IT)*PWMEU(IT))*ER;
GVRWEQ.. GVRW =E= SUM(IT,TMRW(IT)*MRW(IT)*PWMRW(IT))*ER;
FUNEUEQ.. FUNEU =E= SUM(IT,TFEU(IT)*MEU(IT)*PWMEU(IT))*ER;


FUNRWEQ.. FUNRW =E= SUM(IT,TFRW(IT)*MRW(IT)*PWMRW(IT))*ER;

INDTAXDEF.. INDTAX =E= SUM(I,ITAX(I)*PX(I)*XS(I));

EXSUBDEF.. EXSUB =E= SUM(IT,TE(IT)*E(IT)*PWE(IT))*ER;

CAPTAXDEF.. CAPTAX =E= CTAX*SUM(I $(ORD(I) NE 1), RP(I));

FCTRYGEQ.. FCTRYG =E= RFG*GDPMP;

HHTAXDEF..  TOTHHTAX =E= HTAX*PRVINC;

SAVEQN.. SAVINGS =E= HHSAV + GSAV + FSAV*ER;

INVFUND.. INVEST =E= PRINV + GIF;

*#following is guaranteed by walras' law:
*MACROBAL.. PBSIDEF =E= HHSAV - PRINV + FSAV*ER;

WALRAS.. SAVINGS =E= INVEST + DROP;

PRODINV(I).. PK(I)*DKI(I) =E= KDIO(I)*(PRINV+ GIF - SUM(J,(DSTP(J)
        +DSTG(J))*PC(J)));

IEQ(I)..  ID(I) =E= SUM(J, IMAT(I,J)*DKI(J));

GDPDEF.. GDPMP =E= SUM(I,PVA(I)*V(I)) + INDTAX + (GVEU + GVRW)+(FUNEU+FUNRW);
```

```
*balance of payments


CAEQ.. SUM(IT,PWMEU(IT)*MEU(IT) + PWMRW(IT)*MRW(IT)) + GBINROW
      + PBINROW =E= SUM(IT,PWE(IT)*E(IT)) + FSAV + REMIT
      + PFCYROW + GFCYROW;

*market clearing equilibrium

EQUIL(I).. CC(I) =E= INT(I) + CD(I) + GD(I) + ID(I) + DSTP(I) + DSTG(I);


*objective function

OBJ.. OMEGA =E= GDPMP;

*OBJ.. OMEGA =E= 1.00;

*OBJ.. OMEGA =E= DROP*DROP;


*#*#*#*#*variable bounds to improve solution algorithm
*$ONTEXT

PC.LO(I) = 0.001;
PD.LO(I) = 0.001;
PM.LO(IT) = 0.001;
PE.LO(IT) = 0.0001;
PK.LO(I) = 0.001;
PX.LO(I) = 0.001;
PVA.LO(I) = 0.001;
PN.LO(I) = 0.001;
XS.LO(I) = 0.0001;
V.LO(I) = 0.00;
M.LO(IT) = 0.0;
MEU.LO(IT) =0.0;
MRW.LO(IT) =0.0;
DC.LO(IT) = 0.0;
CC.LO(IT) = 0.0;
WA.LO(LC) = 0.001;
RP.LO(I) = 0.0;


N.LO(I) = 0.0;
E.LO(IT) = 0.0;

eeu.lo(it)=0.0;
erw.lo(it)=0.0;

ID.LO(I) = 0.0;
L.LO(I,LC)$(L.L(I,LC) NE 0) = 0.00;
```

```
GIF.LO = 0.0;
ER.LO = 0.001;
PWE.LO(IT) = 0.0001;
UNEMPUR.LO = 0.0;

*$OFFTEXT


*#*#*#*#* additional restrictions and model closure


PWMEU.FX(I) = PWMEU.L(I);
PWMRW.FX(I) = PWMRW.L(I);

*pweeu.fx(i) = pweeu.l(i);
*pwerw.fx(i) = pwerw.l(i);

PWE.FX(IN)  = PWE.L(IN);
M.FX(IN) = M.L(IN);
E.FX(IN) = E.L(IN);
PMEU.FX(IN) = 0;
PMRW.FX(IN) = 0;
MEU.FX(IN) = 0;
MRW.FX(IN) = 0;

*peeu.fx(in) = 0;
*perw.fx(in) = 0;
eeu.fx(in) = 0;
erw.fx(in) = 0;

PN.FX(IINTN) = PD0(IINTN);
N.FX(IINTN) = 0;
L.FX(I,LC) $(L.L(I,LC) EQ 0) = 0;
K.FX(I) = K.L(I);


*## labor market closure

LS.FX(LC) = LS.L(LC);

*marginal labor market is competitive

*WA.FX("MARLAB") = WA0("MARLAB");

*organized labor market: nominal wage rate is fixed

WA.FX("ORGLAB") = WA0("ORGLAB");
*UNEMPUR.FX = UNEMPUR.L;
```

```
*##pricing closure

PLEV.FX = PLEV.L;
MKP.FX(I) = MKP.L(I);
UCAP.FX(IMC) = 1.00;

*##government balance closure

GIF.FX = GIF.L;
*GDTOT.FX = GDTOT.L;
TRSFER.FX =TRSFER.L;
GBINROW.FX = GBINROW.L;
GFCYROW.FX = GFCYROW.L;
GSR= GSAV.L/GDPMP.L;
GIR = GIF.L/GDPMP.L;
GCR = GDTOT.L/GDPMP.L;
RFG = FCTRYG.L/GDPMP.L;

*##saving investment closure

MPS.FX = MPS.L;
*PRINV.FX = PRINV.L;

*##foreign exhange  market closure

*#one of the following shold be made endogenous;

*ER.FX = ER.L;
FSAV.FX = FSAV.L;
REMIT.FX = REMIT.L;
PBINROW.FX = PBINROW.L;
PFCYROW.FX = PFCYROW.L;

OPTIONS SOLPRINT=off,LIMCOL=0,LIMROW=0, ITERLIM=1000;


*##solution of the model

MODEL TURKPLAN SQUARE BASE MODEL/ALL/;

*turkplan.holdfixed=1;
*turkplan.optfile=1;

*OPTION NLP = CONOPT;

SOLVE TURKPLAN MAXIMIZING OMEGA USING NLP;
*SOLVE TURKPLAN USING MCP;

display  xs.l, m.l, meu.l, mrw.l, e.l, eeu.l, erw.l, ls.l, l.l;

display px.l, pc.l, pva.l, pn.l, pd.l, pe.l, pmeu.l, pmrw.l;
```

```
*display pm.l/pd.l, pmeu.l/pd.l, pmeu.l/pmrw, m.l/cc.l, meu.l/m.l, e.l/xs.l;

display wa.l, rp.l, k.l, rrp, tvc.l, avc.l;

display dstp.l, dstg.l, prvinc.l, hhsav.l, grev.l,
      gsav.l, gdtot.l, indtax.l, captax.l, tothhtax.l, id.l,
      prinv.l, gif.l, savings.l;

display er.l, mps.l, trsfer.l, fctryg.l, gveu.l, gvrw.l, funeu.l, funrw.l,
      remit.l, cd.l, dc.l, gfcyrow.l, pfcyrow.l, gbinrow.l, pbinrow.l;


*######END OF THE PROGRAM*######
```

VITA

Selahattin Bekmez was born in Turkey in 1970. He graduated from Ankara University, Faculty of Economics and Political Science, Department of Public Finance in 1992. He became a research assistant at Mugla University by passing a nation-wide examination granting advanced studies abroad in 1993. He came to the U.S.A. and began his master's degree program at Louisiana State University in the Department of Economics in 1993. He received his master's degree in 1996, and started for the doctoral program in the Department of Agricultural Economics. Now, he is a candidate for the degree of Doctor of Philosophy, which will be awarded in May 2001. After receiving his degree he is going to be an assistant professor at Mugla University in the Department of Public Finance in Turkey.

DOCTORAL EXAMINATION AND DISSERTATION REPORT

Candidate: Selahattin Bekmez

Major Field: Agricultural Economics

Title of Dissertation: The Budgetary Impacts of European Integration: A General Equilibrium Analysis of Turkish Accession Into the European Union

Approved:

P. Lynn Kennedy
Major Professor and Chairman

Dean of the Graduate School

EXAMINING COMMITTEE:

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Date of Examination:

April 14, 2000