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**IMPACTS OF THE GATT
ON MACROECONOMIC AND AGRICULTURAL POLICIES IN TURKEY**

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CONTENTS

1. Introduction
2. GATT: Agreement on Agriculture and Agreement on Textiles and Clothing
3. Trade in Agricultural Commodities and in Textiles and Clothing: Commodity and Regional Structure, 1982-1994
4. Overview of the Macroeconomic and Agricultural Developments from 1970s to 1990s
 - 4.1. Macroeconomic Developments and Policies
 - 4.2. Trade Policies
 - 4.3. Overview of the Agricultural Sector and Agricultural Policies
 - 4.3.1. Developments in the Agricultural Sector
 - 4.3.2. Agricultural Policies
5. Analysis of Commitment Schedules of Turkey
6. Modelling Studies with GATT Scenarios
 - 6.1. World Trade Model
 - 6.1.1. The Structure of the WTM Model
 - 6.1.2. Projections with the WTM
 - 6.1.3. The Results of the GATT related scenarios with WTM
 - 6.1.3.1. The Results about Turkey
 - 6.1.3.2. Regional Results
 - 6.2. The Agricultural Sector Models
 - 6.2.1. The General Structure of the Agricultural Sector Models
 - 6.2.2. Projections with the Agricultural Sector Models
 - 6.2.2.1. GATT Simulation Results of TURGAP
 - 6.2.2.2. GATT Simulation Results with TURLIV
7. Conclusion

ANNEX

IMPACTS OF THE GATT ON MACROECONOMIC AND AGRICULTURAL POLICIES IN TURKEY

Haluk Kasnakoglu and Erol H. Cakmak

1. Introduction

Uruguay Round of the GATT negotiations has been more comprehensive compared to the previous negotiations. The negotiations produced trade liberalization measures not only on the industrial products, but also rules and regulations on the trade in agriculture and in services. A smooth transition period for the trade in textiles and clothing from MFA to World Trade Organization (WTO) has been established by the Agreement on Textiles and Clothing.

In the previous GATT negotiations, the developing countries in general were usually exempt from any significant commitments, but they were faced by serious trade restrictions through bilateral trade arrangements in the commodities that they have comparative advantage. The developing countries played relatively an active role in the Uruguay Round negotiations to enjoy the potential benefits of trade liberalization.

Turkey's position with regard to GATT was parallel to the behavior of the developing countries. Two additional factors played an important role in Turkish position with respect to GATT. First, is the trade relations with the European Union (EU) countries are covered with the association arrangements with EU. Turkey was reluctant to settle trade related disputes in the framework of GATT. EU is the largest trading partner of Turkey with 50% share in the trade volume of Turkey. Secondly, before the Gulf war, Middle Eastern neighbors of Turkey had a large share in the total exports. These countries have not been involved in the GATT negotiations. In addition during the previous GATT negotiations periods, agricultural products had a large share in the Turkish exports. The total trade volume, and the share of processed and industrial products in total exports showed increased significant increase after the mid-1980s.

As it is the case for this kind of multilateral agreements the impact of the Final Act of the Uruguay Round will be effective in the long run. Yet, one definite impact is obvious. The policy tools commonly used by the decision makers will be relatively restricted. This is especially true for the government interventions in agriculture. Although developing countries were able to get special and differential treatment in the Agreement on Agriculture, they will be bound by the commitments and the rules of the Agreement in determining future trade and domestic production policies.

2. GATT: Agreement on Agriculture and Agreement on Textiles and Clothing

The Agreement on Agriculture in the Uruguay Round Final Act includes not only new rules and commitments on border measures, but also rules and commitments on domestic subsidies and export subsidies. The main elements of the Agreement can be summarized as follows:

- Reduction in domestic support

- Market access commitments
- Reduction in export subsidies and subsidized exports

Reduction in domestic support:

Reduction in domestic support is based on the Total Aggregate Measure of Support (Total AMS) which is the sum of all aggregate measurements of support for basic agricultural products, all non-product specific aggregate measurements of support and all equivalent measurements of support for agricultural products. The base period is 1986-88. Total AMS reduction commitments should be 20% in six years for the developed countries and 13.3% in ten years for developing countries. Again no reduction is required for the least-developed countries. Output price support is strictly non-exempt from the Total AMS calculations and subject to reduction. The agreement provides a number of exemptions in favor of developed and developing countries.

In the case developing countries two important exemptions are:

First is government measures of assistance to encourage agricultural and rural development which are an integral part of the development programs, and investment subsidies

Second one is agricultural input subsidies generally available to low-income or resource poor producers. General government services (such as research, disease control, infrastructure) and direct payments under production-limiting programs, provided that they are based on fixed area, yields and fixed number of heads, are not subject to reduction. In addition, if domestic support is only 5% of value of production for individual products or, in the case of non-product-specific support, the value of total agricultural production, then the developed countries are not required to reduce such domestic support. This is called "de minimis" percentage, and it is 10% for developing countries.

Market access commitments:

Market access commitments include tariff reductions and minimum market access opportunity commitments. All of the non-tariff measures (such as quantitative import restrictions, variable import levies, minimum import prices, voluntary export restraints) are subject to tariffication. The package of protective measures is replaced by a new tariff which is supposed to provide at least a comparable level of protection with the actual protection measures.

The new tariff is allowed to be either an ad valorem tariff or a specific duty. Under this heading, all tariffs (including the new tariffs) on agricultural products are to be reduced by a simple average of 36% in six years starting from 1995 for the developed countries, and 24% in ten years for developing countries, with minimum tariff line based reductions of 15% and 10%, respectively. The base period for the tariff reduction is 1986-88. The least developed countries are exempt from tariff reduction.

The market access opportunities should be maintained after the tariffication. Furthermore, minimum market access commitments are required for the products which had prohibitive protection measures. The countries shall apply most favored nation tariff rates for at least 3% of domestic consumption in the base period 1986-88, rising to 5% of the base figure by the end of 2000 for the developed countries or 2004 for developing countries. Special safeguard measures are possible depending upon well defined trigger quantity and price of imports.

Reductions in export subsidies and subsidized exports:

Developed countries are required to reduce the outlays for export subsidies and the quantities benefiting from such subsidies by 36% and 21%, respectively over a six-year implementation period. The same reduction commitments are 24% and 14% for the developing countries over a ten-year implementation period. The base period for the calculation of export subsidies is 1986-90, but the Agreement gives the opportunity to choose 1991-92 as the base period if the subsidized exports have increased since the 1986-90 period. Developing countries are not required to undertake commitments with respect to the provision of subsidies to reduce to reduce the costs marketing exports including handling, processing costs, and the costs of domestic and international transport and freight until 2005.

Agreement on Textiles:

The Agreement on Textiles aims to start a process of integration of Arrangement Regarding International Trade in Textiles (MFA) into GATT. This process should be completed in 10 years after the establishment of MTO.

The reduction in tariffs in the textiles is between 15.5% and 12.1% due to the conversion of the quantitative restrictions into tariffs.

The member countries are expected to integrate at least 16% of the total volume of imports in 1990 of the products stated in the Agreement on Textiles and Clothing into GATT. The integrated products should cover each of the following four groups: tops and yarns, fabrics, made-up textile products, and clothing. The product integration and the increase in the quantitative restrictions will be achieved in three periods. The increase in the quantitative restrictions should be at least 16% which corresponds to a 6.96% increase per annum between 1995-98. On the first day of 1998, an additional 17% of total volume of 1990 imports should be integrated into GATT 1994. The quantitative restrictions should grow 8.36% per year, a total of at least 25% in the period. During the 2002-2004 period, the integration rate should be 18%, and the growth of the remaining quantitative restrictions should be at least 27% (minimum 11.05% per annum). In 2005 the remaining 49% of the 1990 imports should be integrated into GATT 1994, and the restrictions of the Agreement on Textiles will be eliminated. In summary, the quantitative restrictions of the MFA will be eliminated in ten years.

The important point in the Agreement on Textiles is about the selection of the products to be integrated into GATT 1994. The countries can select these products not only from restricted products, but from the product list on textiles and clothing. Hence, the liberalization attempts in the sector can be easily delayed by at least 10 years. Safeguard measures can be implemented if there is a significant increase in the imports and if the negative impact on the domestic industry can be proven.

3. Trade in Agricultural Commodities and in Textiles and Clothing: Commodity and Regional Structure, 1982-1994

- total and commodity based
- commodity and regional flow (agricultural & textiles)

4. Overview of the Macroeconomic and Agricultural Developments from 1970s to 1990s

4.1. Macroeconomic Developments and Policies

Turkey started an ambitious development program based on five-year development plans in the first half of 1960's. Given the backward state of its industrial sector, much effort has been directed to capital accumulation and investment. The inward looking import substitution policies of 1970s had to be backed up by policies that would widen the internal demand since many domestic industries were infant and could not compete internationally. During this era, high support prices, input subsidies and low interest rates on agricultural credits while increasing the domestic demand for industrial commodities from the rural population, also helped the integration of the agricultural sector to the rest of the economy. By the end of 1970s almost all the agricultural products were commercialized and agricultural exports increased. At the same time the limits of growth using the import substitution policies were reached, and following a severe balance of payments crisis Turkey initiated a stabilization and adjustment program in January 1980 to restore its macro balances. The program aimed to integrate the domestic economy with the world economy through re-orientation of economic incentives towards the traded goods sectors. The theoretical basis of the reform package was the orthodox view that, in an economy in which world prices were undistorted by trade restrictions, and that capital accumulation was based on the profit motive (which was yet to be privately internalized), one would achieve the optimum allocation of resources.

To restore macrobalances, this theoretical perspective has rested its policies on the monetarist prescription of domestic credit restraint in order to control excess commodity demand. A price reform was enacted which was complemented by a series of commercial policies to liberalize commodity trade and encourage exports. Subsidies to agriculture and to the state enterprise system were either eliminated or were significantly reduced. The foreign exchange regime was liberalized beginning 1984, and successive steps have been taken to attain complete liberalization of the financial system by the end of the decade.

The economic development after 1980 can be divided into two distinct periods: The 1981-87 period as the export oriented growth and after 1988 financial liberalization era (Yeldan, 1994). During the 1981-87 period, the economic growth was slow (5.1% per year) relative to the before crisis period (6.9% per year between 1972-76). The industrial sector performed well in terms of exports and capacity utilization. The exports of manufactured product increased on the average 25% per year until 1985, and the share of exports in GNP increased from 5.1% in 1980 to 16.4% in 1988. However, the growth rate of private investments was almost half of the rate before the crisis. Real Private investments was able to reach the level of 1979 in 1988. Combined with the policy choice of decreasing the share of the public sector in total investments, the expected increase in fixed capital investments was not achieved. This established the end of the growth strategy based on the increase in manufactured exports and the signals of another economic crisis.

The economy followed cyclical growth pattern after 1987. The growth rates of GNP were 1.5 in 1988-89, 9.4% in 1990, 0.4% in 1991, around 7.0% in 1992-93, and -6.2% in the first three quarters of 1994 (SIS, 1994). Public sector deficit grew at a significant rate in the period. Public sector borrowing requirement (as a percentage of GNP) increased from an average of 5.5% for 1981-87 period to 17% at the end of 1993. This has been the major source of inflationary pressures. The main components of the deficit are the central government budget and the deficit of the state-owned enterprises. Despite the new tax legislation, the deficit has been financed by

domestic borrowing with increasing interest payments. The privatization program was aimed, among other things, to decrease the pressure of the government deficit. Yet, since its start in 1984, it hasn't gained a momentum to have a significant impact on government revenue. Since 1984, total privatization receipt amounted to 2.3 billion dollars.

Another source for financing the deficit is the government borrowing from the Central Bank. It has an upper limit by law which is 15% of the budgetary expenditures. The Central Bank announced its first monetary program in 1990. No monetary program was announced in 1991. The 1992 monetary program was a complete failure because of the increase in the Central Bank advances to the Treasury. The central bank money expanded by 105%, double the amount foreseen in the monetary program of 1992. No monetary program has been announced since 1992.

After slightly negative real interest rates in the 1980s, the real rates of interest rose to significant positive rates in the 1990s. In 1994, the real rate of interest fluctuated in a range of significant negative and positive rates. The average nominal interest rate on the government bonds was around 148%, which corresponds to a real rate of around 14%.

Although the exchange rate is determined in the market, Central Bank has the ultimate control. In 1989-1990 domestic currency appreciated by 20%. Following a devaluation in the first quarter of 1994, in February 1995 the appreciation of TL is back to 15%.

4.2. Trade Policies

During the import substitution era, all imports were regulated by the annual import programs. The commodities were classified in various lists. The most important of all was the quota list as the major tool of protection for the domestic industry. The quota list was partly phased out in 1981. In 1984, import prohibitions were removed except for health and security reasons. With a significant decline in the number of items requiring import permit, the system of import permit was abolished in 1990. Significant tariff cuts started in 1983. Yet, while tariffs were being reduced, the number and scope of the other charges on imports grew. Imports, in addition to tariffs, were subject to nine different tariff like charges (municipality tax, resource utilization and support fund tax, support and price stabilization tax, mass housing fund tax, etc.) during the 1980s. Fund charges frequently exceeded tariffs. The 1993 Import Regime consolidated most of these tariff like charges into mass housing fund tax.

Exports are encouraged by a complex system of incentives. Subsidized export credits, tax rebate scheme, payments from the support and price stabilization fund and from resource utilization support fund, freight incentive, exemption from taxes, duties and fees were the major tools utilized in promoting exports. Direct payments and indirect tax rebates have been eliminated. Agriculture is the only sector where exports are taxed. Exports of agricultural commodities receiving government support are subject to export tax by the government decree. The number of commodities subject to export tax has been reduced and the tax is expected to be phased out. At present hazelnuts, livestock and dried figs are the major commodities subject to export tax. The average tax rate in agricultural exports was 1.4% in 1986. It declined to 0.4% in 1991. The highest tax rate is in "other food processing" sector according to the input-output classification with 8.0% in 1991 (Togan, 1994).

Important indicators of import policies are nominal and effective protection rates. Table 1 shows the nominal and effective protection rates (NPR and EPR, respectively) for the agricultural and agriculture related commodities. The overall figures indicate that there has been

significant decline in the economy-wide protection. However, the effective protection rates on export industries were higher than those of the other sectors. This indicates that the success in export expansion was achieved under protection.

[insert Table 1]

The protection on the primary agricultural commodities has been lower than the average protection and remained low in 1991. However, the protection rates of the processed agricultural commodities, textiles and especially of clothing were significantly higher than overall average. The effective protection on clothing in 1991, with wide fluctuations during the period, was 25 times higher than 1983 level.

Table 2 shows the nominal and effective subsidy rates in exports of agricultural and agriculture related commodities. Similar to the protection measures, the export subsidy rates escalates from lower to higher stages of processing. Primary agricultural goods received significantly smaller export subsidies compared to the overall average. Export subsidy rates for beverages and clothing declined in the 1980s, but still remained relatively at a higher level. One important exception is the increase in the export subsidy rate of the grain milling products which showed more than three times increase from 1984 to 1990.

[insert Table 2]

Turkey imposes specific Mass Housing Fund levies on a number of agricultural and food products whose prices are expected to rise and fall according to season. In 1994, the Mass Housing Fund levies varied between \$30/ton for barley and maize, and \$3,000/ton for tea. The MHF levy for wheat was \$100/ton and \$1,500/ton for wheat and beef, respectively. Thus, although Turkey does not have explicit variable levies, it maintains levies which are likely to have variable effects in practice.

4.3. Overview of the Agricultural Sector and Agricultural Policies

4.3.1. Developments in the Agricultural Sector

Turkish agriculture had to bear the brunt of the adjustment process and was deeply affected from the implemented policy reforms. For decades, the sector has operated under severe government regulation. After the Reform, however, it has found itself in an entirely different environment with competitive pressures of competing imports, market determined prices and reduced subsidies.

Table 3 shows the major economic indicators of the agricultural sector during 1980s. In all the years except 1982, the growth rate of the agricultural gross domestic income has been less than the corresponding growth rate of the overall economy, resulting in a declining share of agriculture in gross domestic income from 22.6% in 1980 to 15.9% in 1992. Following the usual trend in the development process of the most of the developing countries, with a relatively higher labor productivity¹ and hence higher real earnings in the non-agricultural sector, the share of

¹ The relative labor productivity index, which is defined as the ratio of non-agricultural value

agricultural labor in total labor force has declined from 55% in 1980 to 44% in 1990.

[insert Table 3]

A further factor which compounds the slow growth rate of the agricultural GDP is the declining importance of agricultural fixed investment in total fixed investment (Table 4). The growth rate of fixed investment showed large fluctuations throughout the era. Moreover the contraction of agricultural credits both in real terms and also in their share in agricultural GDP exacerbated the unfavorable capital accumulation environment in the sector.

[insert Table 4]

Indices of terms of trade can be cited as an important indicator of the extent of the transfer from agriculture. As can be seen in Table 5, the terms of trade show dramatic regression from 1976 to 1988 and a substantial recovery in 1989 and 1990. With the implementation of the structural adjustment program in 1980, cutbacks in the support prices with biased export incentives directed almost exclusively to manufacturing, and the reduction of the purchasing power of urban workers, caused a substantial fall in the relative net price of the agricultural sector (Celasun and Rodrik 1989). The differences between pricing behavior of agriculture and industry provide an additional explanation of the terms of trade movements. Numerous studies (e.g. Sahinkaya, 1993; Boratav, et al., 1993) argue that, the pricing behavior of industrial sector can be characterized by average cost plus mark-ups in oligopolistic markets, whereas agricultural prices are determined in perfectly competitive markets. The recovery of the terms of trade during the recent years can be attributed to several effects. After substantial real wage losses during the most of the 1980s a reversal of the trend took place in 1989, when average nominal wages in the private and public sector were raised by around 120 to 140 percent. A boost to wage incomes of similar magnitude occurred in 1990, so that real wages have been raised at high rates, more than compensating the losses incurred in the preceding years. As this process was causing an increase in the demand for agricultural goods, agricultural output suffered from a severe drought causing domestic supply shortages. As a result food prices accelerated sharply. Meanwhile, when industrial exports stagnated because of sluggish Middle Eastern markets, the increased domestic supply of industrial goods reduced the wedge between industrial and agricultural prices.

[insert Table 5]

In 1980s, agricultural economy has further witnessed a secular rise in interest costs of credit, along with an economy-wide repression of loanable funds. In this period, the Treasury has gradually changed its financial policy away from monetization through Central Bank advances towards domestic finance via issues of new debt instruments. With the rapid rise in the public sector borrowing requirements (PSBR) and the increase in the claims of the Treasury in the credit markets, real cost of credit rose sharply (Tables 4 and 5) and squeezed rural incomes.

added per unit of non-agricultural labor to agricultural value added per unit of agricultural labor, fluctuates around 4 throughout the era.

4.3.2. Agricultural Policies

Several objectives of agricultural policies have been set out in the Five-Year Development Plans (Kasnakoglu, 1994). However, the implementation of the policies indicates that closely allied two objectives have been consistently persistent in the mind of policy makers:

- Increasing the yields and production levels: The increase in production volume was achieved mainly by the expansion of cultivable area until 1960s. The limits of cultivable land have been reached with about only 2 million hectares of land left for cultivation. After 1960s, the government targeted to promote greater use of the inputs, such as fertilizers, hybrid seeds, and pesticides, to increase the yields. Input price subsidies and credit at a substantially subsidized rates constitute the major policy tools for the expansion in the use of modern inputs. Heavy public investment on irrigation have been made to increase both the yields and volume of production, at the same time to decrease the variability of production under the rainfed conditions.

- Increasing agricultural incomes and achieving income stability: Combined with the input price subsidies and public involvement in irrigation, the government used output price support policies and trade measures to prevent at least the decrease in the agricultural income and bring the agricultural per capita income to a compatible level with the rest of the economy.

Apart from these basic objectives of the agricultural policies, given a rather large resource base in agriculture, the governments in the last three decades tried to achieve the targets on self-sufficiency (both in individual products and in total nutrient volume), and increase in exports through the first objective stated above by changing the relative price structure of the agricultural products by using different state procurement and output support policies.

Instruments of Agricultural Policies

Turkish Government has used various measures to fulfill its objectives. In the crop sector, measures have been primarily domestic input price subsidy and/or output support price, augmented by quantitative restrictions on imports in the past and high specific duties recently. In the livestock sector, trade measures have been the main mechanism to put a wedge between the domestic and import prices.

Output Price Support

This is the most widely used instrument of the agricultural policy in Turkey. It has always been at the center of the policy discussions and has gained relative popularity among other instruments beyond its relative significance. The number of covered products declined in the 1980s, but there was a sharp increase in 1991, and in 1992 it reached 26 crops (Table 6). There was also a sharp increase in the support purchases after 1990. During the 1980s the total of support purchases was around \$1 billion, in 1991 and 1992 it increased to \$3.0 billion, with a share of around 5% and 10% in the total value of agricultural production, respectively, in the same periods. Yet, because of the budgetary pressures, the coverage of support purchases is

reduced to 8 commodities and the amount of support purchases is estimated to be 60% lower than the 1992 level, in 1994.

[insert Table 6]

Support prices are announced by government decree each year. State economic enterprises and agricultural sales cooperatives are commissioned to buy at the determined prices. In August 1993, a new system is introduced for crops covered by ASCUs. Instead of floor prices, a target price and a relatively lower intervention price (close to the world price) are announced. Farmers selling their crop to ASCU or commodity exchange receive the difference between the price received and the target price as the deficiency payment from the Agricultural Bank which is reimbursed by the Treasury. This system is applied to cotton, and the government intends to extent of the coverage of the new output support price scheme.

Livestock products are seldom covered by the support purchases. Domestic prices for the livestock prices relies mainly on the border measures.

Input Subsidies in Agriculture

Input subsidies is the most important component of agricultural support policies in Turkey. The most important category is the credit to the farmers with negative real interest rates well below the commercial rates. The subsidy on the inputs directly used in the production forms the second important category in the input subsidies. These are the price subsidies on fertilizers, seeds, pesticides, feed, and the subsidy on the operation and maintenance costs of irrigation.

Table 7 is designed to show both the magnitude and the changing composition of the agricultural subsidies between 1986-1993. Agriculture is subsidized through three distinct channels. Of these, the relative importance of the premia and input subsidies, almost 90% of which is fertilizer subsidy, has diminished throughout the period. Admittedly, part of this subsidy goes to the domestic fertilizer producers as they produce at a cost higher than the c.i.f. price of fertilizer (Niron, 1984). The most important subsidy component both in real terms and also in its share in total subsidy is the interest concessions through concessional loans to farmers and Agricultural Sales and Credit Cooperatives by the Agricultural Bank (Table 7). The concessional loans by the Central Bank are only devoted to the Turkish Grain Board and are decreasing in importance a result of the pressures on the Central Bank to reduce the monetary expansion.

[insert Table 7]

The third subsidy item is the transfers to the state agencies to compensate for the losses that they have incurred during their support purchases. As the figures show, there seems to be a shift of emphasis from input subsidies to support purchases.

5. Analysis of Commitment Schedules of Turkey

The commitments of Turkey on the major items of the Agreement can be summarized as follows:

- i. All of the agricultural products are consolidated to GATT². Commodity based tariffs will be decreased by a minimum of 10%, and the average decline in the agricultural commodities will be 24% by 2004. The reduction in tariffs will be implemented in equal installments starting from 1995. The tariff rates in September 1986 are taken as the basis of reduction.
- ii. Turkey will reduce the outlays for export subsidies and the quantities benefiting from such subsidies by 24% and 14% respectively over ten year implementation period. The base period for the reduction commitment was 1986-90 for almost all commodity groups, for a few the base period was 1991-92 marketing year.
- iii. Turkey benefitted from the exemptions and special and differential treatment of the developing countries in domestic support reduction commitments. Total non-product specific support or product specific domestic support was below the "de minimis" level of support (10% of the value for the individual products, or 10% of the total value of agricultural production for non-product specific support), and Turkey was not required to make any reduction commitment in domestic support.

More detailed analysis of the tariff reduction commitments of Turkey reveals that for the commodities which are considered to be important for the domestic producers, the tariff reduction commitments are at the minimum level and there are high import taxes on these commodities, i.e. Livestock products, tea, cereals, wheat flour, sugar, tomatoes, manufactured tobacco³. The achievement of self-sufficiency for some products (especially in wheat) seems to be the major reason for this structure of tariffs and reductions. The base rate of tariff and reduction commitments for these products are shown in Table . The other extreme is valid for the products for which Turkey is usually a net importer or the inputs of export oriented industries. Vegetable oils, silk, cotton have relatively low levels of tariffs and higher rates of reduction. The general tendency for the tariff reductions is that high tariffs are matched with low reductions. The opposite is true for the products with low levels of import duty.

Budgetary outlay and quantity reduction commitments of export subsidies are presented in Table A6. The total export subsidy for the agricultural products amounted to \$ 140 million in the base period. The only important feature in the export subsidy commitments is related to wheat, barley, and wheat flour. Turkey used rather high levels of outlay commitments for these products in the starting year of reduction. The government is involved in support purchases in wheat and barley and hence this situation will give TMO the opportunity to export the surplus at subsidized prices for at least next five years.

Domestic subsidies in agriculture showed cyclical fluctuations during the last 15 years. Total budgetary transfer range was between 1.3-5.3 billion dollars per year in the 1979-1994

² See annex Table A9 for the list of agricultural products.

³ Four digit level tariffs and reduction commitments are in the annex Table A5.

period (OECD, 1994). The base period for the calculation of AMS in the GATT agreement (1986-88) coincided with the one of the low periods of agricultural support in Turkey.

6. Modelling Studies with GATT Scenarios

There are three modelling studies which attempt to analyze the impact of GATT negotiations on agricultural commodities on the Turkish agriculture:

1. World Trade Model (WTM): The model is a dynamic non-spatial partial equilibrium model, where world prices and regional market prices for goods are determined simultaneously by equating world net exports and net imports.
2. Turkish Agricultural Sector Model with special emphasis on GAP (TURGAP):
3. Turkish Agricultural Sector Model with special emphasis on the livestock sector (TURLIV):

6.1. World Trade Model

The World Trade Model (WTM) belongs to the type of conventional trade models, where all regions are described by behavioral supply and demand functions. The aim of the model is to forecast production, demand, trade and world market prices. The forecasts are based on various assumptions concerning supply and demand trends as well as the policy scenarios. The results of the trade model serve as input to the Turkish agricultural sector model.

6.1.1. The Structure of the WTM Model

The basic characteristics of WTM can be summarized as follows:

- The WTM model belongs to the class of multi-regional world trade models. The main characteristic of these type of models is to emphasize on interrelations and simultaneities among countries and regions through agricultural trade.
- In the model the world is divided into 55 countries and country groups. the regional differentiation is country specific in the case of Europe, Near and Middle East, North Africa, and North America, whereas other countries of Africa, Asia and Latin America are considered as country groups. The country disaggregation takes into account the importance of the countries with regard to Turkish imports and exports.
- Within the agricultural sector several primary and processed commodities are distinguished on the demand and supply side. The number of commodities covered in the model is more than 40. The interdependencies among the commodities are taken into account via cross-price elasticities.
- The model is a partial equilibrium model since other sectors of the economy are not presented in the model.
- World market prices and regional market prices for goods are determined simultaneously by equating world net exports and world net imports, so that the sum of net trade across all regions is approaching zero. The model solution gives the world market-clearing prices, equilibrium quantities and the excess supply/demand of each country/region.
- Domestic producer and consumer price changes are linked to world market price changes through response coefficients. These price transmission elasticities define the degree of isolation of domestic markets from external markets. Besides the linkage to world market prices,

domestic prices are influenced by exogenously determined changes in domestic policies, which are usually represented as prices wedges as PSE, CSE or nominal protection rates.

- The WTM is a synthetic model, since most model parameters have not been estimated but have been taken from other empirical studies. Several checks were carried out to guarantee that these parameters have a reasonable range and fit into the model.

6.1.2. Projections with the WTM

The projections are performed under two main policy scenarios:

- Base Scenario: It is assumed that all countries continue the agricultural policies of the past, so that their level of support does not change up to 2010.

- GATT Scenarios: These scenarios are based on the Dunkel proposal for the GATT negotiations of December, 1991. It is assumed that the proposed reduction of support level (over the period 1993-1999) will continue at the same time path up to the year 2010 in all countries.

Two simulations on the impact of the GATT are conducted with WTM.

i. Complete liberalization: Main points of the Dunkel proposal are implemented in the model:

- Ordinary custom duties, including those resulting from tariffication, are reduced by 36% with a minimum rate of reduction of 15% for each tariff line. Reduction of duties are implemented in equal steps.

- All domestic supports, expressed in AMS of the period 1986-88, are reduced by 20% using the PSEs and CSEs and implemented in constant installments during the 1993-99 period.

- The reduction in export subsidies (by 36%) are incorporated into the model through the changes in the transmission elasticities.

ii. Partial liberalization: This scenario assumes that the Dunkel proposal will be partly realized. The countries or country groups with a highly protected agriculture will not fully accept the proposal. It is assumed that they will try to get a compromise at a lower level of support reduction. This lower level will be expected to be about 2/3 of the envisaged level, that is to say a reduction on 24% in price transmission elasticities and a reduction of 13.33% in nominal support expressed in PSEs up to 1999. From the year 2000 to 2010 the liberalization will continue at the same rates.

6.1.3. The Results of the GATT related scenarios with WTM

Under the Base Run Scenario, the projected world market prices for most commodities show similar price trends as the long-term developments in the past. Most nominal prices in US\$ increase slightly between 0.3 and 1.7% per year. The Agreement on Agriculture of GATT-1994 is close to the GATT-Full Liberalization (GATT-FL) Scenario.

The overall results of the GATT-FL Scenario show for most agricultural commodities higher prices than in the Base Scenario (Table 8). This is especially true for those commodities which are highly supported in the main producing countries, like sugar, milk products, and grains.

[insert Table 8]

These price deviations can be explained as follows: The reduction of trade barriers and exports subsidies decreases producer and consumer prices, especially in highly protected

countries. The lower producer prices tend to reduce production whereas lower consumer prices stimulate the demand. This causes world market prices to rise to a higher level as compared to the Base Scenario. The higher the former support of an individual product, the higher is the relative increase in the world market price. The results of GATT-Partial Liberalization tend into similar direction.

6.1.3.1. The Results about Turkey

The results of the scenarios for Turkey are reported in Table 9. The expected developments for cereals are different on the market for wheat, barley, maize, and other cereals. Turkish wheat supply is still of importance in relation to other countries and country groups. The net export in wheat will not reach significant levels and almost all of the increase in production will be consumed domestically. The future about barley is quite different. The world market share of Turkish Barley production was around 3.8%, and the production is expected to increase to 5%. Following North America, Australia/New Zealand, and EU, Turkey will stay the fourth largest exporter of barley in 2010. Compared to the Base Projection barley exports increase by 33% in the GATT-FL scenario. Turkey is expected to stay as the major producer and exporter in lentils and chickpeas. Other important products are cotton, sugar, and mutton. Turkey may become a net exporter of sugar under the GATT-FL scenario.

[insert Table 9]

In the case of oilseeds and oilseeds products, Turkey's production, demand and net trade quantities after liberalization are almost identical to the Base Scenario. Turkey, who is an important net exporter of fresh and processed vegetables will strengthen its position in the liberalization scenario. Trade of milk and milk products is only of minor importance for Turkey. Like in the Base Scenario, Turkey stays at the self-sufficiency level with small export quantities of milk and butter and small import quantities of milk powder and cheese. The tobacco market is again a market with no major changes relative to the Base Scenario. Turkey will keep the same export level like in the Base Scenario.

6.1.3.2. Regional Results

The simulation results on selected agricultural commodities for the regions which are important in terms of Turkish trade are reported in Table 10. The decrease in the world production of wheat is mainly caused by the EU and North America. Both regions subsidize wheat production heavily and the reduction of assistance dominates the increase in world market prices leading to much lower wheat production compared to the Base Projection. In the other relevant regions production increases relative to the Base Scenario due to higher world prices. The tendency in barley is similar to wheat. The importance of Middle East as the major importer of wheat is expected to increase. The imports of wheat and barley of the Middle East may increase by almost 90% by 2010. In all scenarios, the Middle East appears to be a major importer of the agricultural commodities.

[insert Table 10]

6.2. The Agricultural Sector Models

TURGAP and TURLIV are two agricultural sector models which use the world price estimates of the WTM to estimate the impact of GATT on the Turkish agriculture. The basic structure of the models are similar with special emphasis related to the purpose of the modelling exercise.

6.2.1. The General Structure of the Agricultural Sector Models

TURGAP and TURLIV are sector-wide models in the sense that they describe total national supply (production and imports) and use (domestic demand for food, feed, and exports). They are a single period models. The base years for TURGAP and TURLIV are 1988 and 1991, respectively. To take into account the interactions involved in the sector for the evaluation of policy effects and growth possibilities, they are designed as regional, partial equilibrium, non-linear, static optimization models. The models maximize Marshallian surpluses and incorporate a technique known as Positive Quadratic Programming (PQP)⁴, to overcome the overspecialization problem in production by using the information provided by the actual actions taken by the farmers. This provides an internally consistent quantitative framework of analysis to study the impact of changes in resource prices, resource availabilities, policies, techniques of production, and economic growth on the location, production, consumption and price of agricultural commodities.

The production side of the models is decomposable into submodels for each of four geographical areas. On the demand side, consumer behavior is regarded as price dependent, and thus market clearing commodity prices are endogenous to the models.

Figure 1 and 2 summarize the flow of input and outputs at the regional and national level of the TURLIV, respectively. The livestock sub-sector structure is less detailed in the TURGAP.

The objective functions are defined as the maximization of producers' and consumers' surplus plus net trade revenue. The most important features of the models are the following:

i) The production side of the model is disaggregated to regions for the exploration of interregional comparative advantage for the policy impact analysis. TURLIV has four regions: Coastal, Central, Eastern, and GAP. TURGAP has two macro regions (GAP, rest of Turkey), but the GAP region is disaggregated to the district level.

ii) The crop and livestock subsectors are integrated endogenously, i.e. the livestock subsector gets inputs from crop production.

iii) Foreign trade is allowed in raw and in raw equivalent form for processed products.

The regions in the models are aggregated from provincial data to minimize the aggregation error. The activities are distributed among the regions depending on the dominant production pattern in the base year.

The models are solved using the linear and non-linear programming software GAMS-MINOS (Brooke, et.al, 1991) on PC.

The objective functions are quadratic in revenue and cost because they maximize the area between linear demand and supply curves. The maximands consist of the sum of consumers' and

⁴ See Howitt and Mean, 1985.

producers' surplus plus net export revenue. The optimal solution entails equating supply to domestic plus foreign demand and prices to marginal costs for all commodities.

By incorporating linear demand curves, it is possible to solve the model for prices and quantities endogenously and simultaneously. The models consider the sector as the price maker, but implicitly assume that producers and consumers are price takers, and hence they operate in perfectly competitive markets both in output and factor markets.

The supply side of the models incorporate the PQP methodology. The underlying assumption of the methodology is that farmers operate in competitive markets and maximize profits. An important implication of this assumption is that the regional cropping pattern in the base year represents a global optimum of the maximization problem. It is consistent with the main goal of the sector models: to simulate the response of the producers to changes in market environments, resource endowments, and production techniques. Hence, although the models are optimization models mathematically, they become simulation models by incorporating the behavior of the agents (maximization of economic surpluses) into the models' structure.

TURLIV (TURGAP) contains more than 200 (4500) activities to describe the production of 51 (53) commodities. TURLIV (TURGAP) has more than 550 (1240) equations.

In the models, each production activity defines a yield per hectare for crop production, yield per livestock. The crop activities use fixed proportion of labor, tractor power, fertilizers, seeds and seedlings. The livestock and poultry activities are defined in terms of dry matter, metabolizable energy, and digestible protein in TURLIV. The relation between inputs and outputs are those which were observed on farms in each region, and not necessarily biological or economic optima.

Livestock Production is an integrated part of the models. The input requirements of the animal production in TURGAP are expressed in terms of total digestible energy equivalent of the products or by-products that can be used as feed. The rations might change depending on the prices of the crops used as feed given the absolute and variable (depending on the yield) energy requirement of the livestock. In the TURGAP, the livestock sector is treated at the national level.

In TURLIV, the input structure of the livestock activities is more detailed and more flexible than the previous models built for Turkish agriculture⁵. The input requirement of each activity is defined in terms of dry matter, metabolizable energy, and digestible protein. The feed supply is provided from the crop production sector, and it is disaggregated into six categories: Direct or raw equivalent commercial feed consumption of cereals, two categories of processing by-products, straw or stalk by-products from the crop production, fodder crops, rangeland and meadow. The demand for feed is also expressed in terms of the three types of nutrients per livestock unit for cattle and small ruminants, and per head for poultry production. The outputs of the livestock and poultry production activities are expressed in terms of kg/LU for livestock production and kg/head for poultry production, respectively.

6.2.2. Projections with the Agricultural Sector Models

After the validation step of the models, the exogenous parameters are adjusted for projection purposes. Changes in resource availabilities, technological developments will certainly occur from the base year until 2010 for TURGAP, and 2005 for TURLIV.

- Population is expected to grow on the average 2% per year in both models.

⁵ i.e. World Bank, 1983 and Cakmak, 1987.

- Foreign Trade: The structure of foreign trade is assumed to remain the same with a possibility of expansion by 20% in TURLIV. In TURGAP, the net trade quantities obtained from the WTM are incorporated in the model. Both models use the world price forecasts from the WTM.

- The same assumptions are made in both models with respect to technological improvements in crop production. In fruits and nuts production the yields are assumed to improve by 7.5% during the period. This improvement in yields is assumed to cause an increase of 2% in the use of labor and tractor and 3.75% increase in the use of fertilizer. For all other crops the yield improvements is 15%, the increase in labor and tractor use is 3%, and the fertilizer is assumed to go up by 7.5%.

- The projected increase in the availability of irrigated land are similar in both models. TURLIV uses the data used in TURGAP. In the GAP region, it is assumed that, all of the planned irrigation projects will be operational until the end of projection period. For the rest of Turkey, it is assumed that the irrigated land will increase by around 2.5% per year on the average. Since the limit of arable land has been reached, regional dry land availabilities are adjusted accordingly. Tree land areas are allowed to expand slightly, partly due to shift of the dry land to tree land and some additional irrigated land is also assumed to be allocated for the tree crops.

- The stocks of different livestock and poultry types are expressed in terms of livestock units and of heads, respectively, in TURLIV, in TURGAP in terms of heads only.

6.2.2.1. GATT Simulation Results of TURGAP

GATT simulation with TURGAP assumes that, in addition to the changes for the base projection, GATT negotiations lead to full liberalization of trade and removal of subsidies in agriculture as it is described in the Dunkel Proposal. The world trade prices to emerge from full liberalization and trade potentials for Turkey estimated by the WTM are employed to reposition export demand and import supply functions employed by TURGAP.

The overall and commodity specific results are in Tables 11 and 12, respectively. The liberalization of trade and removal of subsidies in agriculture are projected to have significant impacts on Turkish agriculture. Agricultural production suffers a slight loss, more in value terms than in quantity. The decline in production is higher in the rest of Turkey than in the GAP region, and higher in crop production than in livestock. As a result, the share of the GAP Region in total agricultural value increases. The losses in revenue are partly compensated by declines in labor and machinery use, but more importantly by gains from trade.

[insert Tables 11 and 12]

Overall, Turkey is predicted to gain from GATT's outcome of liberalization. Both the consumer and producer surpluses register increases.

Cereals and pulses, for which exports increase significantly, are expected to show high rates of growth in domestic production. There is either no change or slight decline in the domestic production of the other products. Turkey becomes a net importer in many products due to relatively favorable world prices, and principally due to the increases in the population and income. Because of the competition from imports, the domestic prices received by farmers decline in most products, excluding cereals, oilseeds and some animal products.

6.2.2.2. GATT Simulation Results with TURLIV

One base projection and five different scenarios are conducted with TURLIV for the year 2005. The results of the GATT Scenario and related "Change in Breed composition and Improved Management Practices (BST)" Scenario are described in this section.

In the BST Scenario, in addition to the trend change in breed composition, possible increase in herd off-take, increase in milk yield, and improvement in carcass weight are taken into account. GATT Scenario follows BST. In addition, it assumes GATT negotiation lead to partial liberalization of trade and removal of subsidies in agriculture. The world trade prices to emerge from trade liberalization and trade potential for Turkey estimated by the World Trade Model (GAP, 1992) are employed to reposition export demand and import supply functions employed by TURLIV. The projections of the WTM had 1987 as the base year. The potential prices are adjusted for the base year of TURLIV. The structure of the foreign trade is not constrained to the base year structure. A commodity can be exportable or importable, and all of the commodities are assumed to be tradable.

Overall results of the relevant policy scenarios are given in Table 13. GATT scenario gives the best result for the producer, whereas BST is the best for the consumer. The increase in the trade prices seem to benefit the producers more than the possibility to import. Livestock production reaches its peak point in the GATT experiment. Change in the breed composition plus improved management practices coupled with higher foreign trade prices and less restrictive import and exports causes the livestock production to become 38% higher than the base projection. Net exports in both subsectors improve. Crop consumption shows a slight decline. Yet, the livestock products consumption remains around the BST level. In addition, the lowest overall and livestock price levels occur in GATT.

[insert Table 13]

The volume of production according to the commodity groups are presented in Table 14. Apart from wheat, oilseeds, and fruits and nuts, all commodity groups register increases in the volume of production in the GATT Scenario. Because of the trade possibility in the GATT simulation, the cattle subsector turns out to be an importer of meat, but an exporter of milk.

[insert Table 14]

The model can simultaneously solve for the equilibrium prices (Table 15). It is interesting to denote that with the expansion of the resource base the prices of cereals are expected to come closer to the present world prices. For instance, the domestic price of wheat in GATT is close to the export price of wheat. The relative cost structure of the crops and the demand pressure expressed by the population and income growth and income elasticities determine the relative price structure among the different scenarios. Holding the structure of foreign trade constant, technological development in livestock production does not bring significant decline in the prices of livestock products. Yet, the increase in milk yield for cattle in the BST experiment reduces the price of milk by 50%. In GATT scenario, due to the increase in the world price of milk, nearly 5 million tons of cattle milk is exported and the domestic price of milk is up by 38% compared to the base year price.

[insert Table 15]

7. Conclusion

- Assessment of the potential impacts of GATT
- Recommendations for appropriate policy measures

Table 3. Selected Economic Indicators, 1980-1993.					
Years	Share of Agriculture in GDP ¹ (%)	Growth Rate of Agricultural GDP ¹ (%)	Growth Rate of GDP ¹	Agricultural Labor/Total Labor ²	Relative Productivity Coefficient ³
1980	22.6	1.9	-2.0	0.55	4.11
1981	22.0	-1.6	5.4	0.54	4.24
1982	20.8	4.4	4.2	0.54	4.06
1983	19.6	-0.8	5.3	0.53	4.14
1984	19.6	1.4	7.4	0.52	4.09
1985	18.8	0.1	4.4	0.51	4.05
1986	18.5	5.4	7.8	0.50	3.91
1987	18.0	1.1	9.0	0.49	3.97
1988	17.5	7.9	2.2	0.46	3.43
1989	16.7	-7.4	-0.5	0.47	4.15
1990	18.1	7.1	9.6	0.46	3.86
1991	16.9	-1.2	0.9	0.47	
1992	15.9	3.7	6.4	0.44	
1993	15.1	-1.9	5.3	0.43	

Sources: ¹ SIS, 1994.

² SPO, 1994.

³ calculated from SIS, 1993.

	Agricultural Fixed Investment				Agricultural Credits	
	Billion TL ¹ (1988 prices)	Growth Rate ² (%)	Share in Total ² (%)	Share of Public Sector ¹ (%)	Billion TL ³ (1968 prices)	Share in Agricultural Value-added ⁴ (%)
1976	1,523	40.83	9.66		12.48	
1980	1,185	1.94	6.67		8.59	18.38
1981	1,587	33.85	8.88		8.75	18.69
1982	1,621	2.17	9.24		5.89	11.85
1983	1,707	5.31	9.55	51	6.74	13.55
1984	1,683	-1.42	9.38	49	5.98	11.63
1985	1,489	-11.53	7.10	51	6.46	12.22
1986	1,502	0.89	6.45	57	9.67	17.01
1987	1,863	24.06	7.62	58	9.85	16.97
1988	1,727	-7.34	7.14	61	7.33	11.71
1989	1,618	-6.32	6.77	69	7.42	13.24
1990	1,795	10.97	6.58	59	6.41	10.27
1991	1,872	4.27	6.93	63	7.24	11.73

Sources: ¹ SPO, 1991.

² Calculated from SPO (1991).

³ Calculated from SIS (1987), SIS (1989) and SIS (1991) using GNP implicit deflator of SPO.

⁴ Calculated from SIS (1993) and ³.

	Terms of Trade ^a		Inflation Rate (CPI)	Cost of Loanable Funds ^b (%)	PSBR/GNP
	Index	Growth Rate (%)			
1976	100.0	--	25.8	16.0	2.6
1980	67.3	-17.3	110.2	28.3	10.5
1981	65.4	-2.8	36.6	38.3	4.9
1982	56.7	-13.3	29.9	47.6	4.3
1983	59.2	4.4	31.4	43.1	6.0
1984	66.1	11.7	48.4	44.6	6.5
1985	63.7	-3.6	44.9	47.1	4.6
1986	62.1	-2.5	34.6	46.9	4.7
1987	59.0	-5.0	38.9	41.6	7.8
1988	49.8	-15.6	75.4	88.5	6.3
1989	57.8	16.1	69.6	75.2	7.1
1990	70.7	22.3	63.6	67.9	10.6
1991	66.2	-6.4	65.9	75.0	14.4

Notes: ^a Index of agricultural prices/index of manufacturing prices. They are calculated from the GNP implicit deflator.

^b Maximum lending rate of commercial banks on agricultural credits.

Sources: Boratav et al., 1993, Central Bank, 1992.

Category of Subsidy	1986		1987		1988		1989		1990		1991		1992		1993	
		%		%		%		%		%		%		%		%
Input Subsidies	488	31	586	30	503	23	552	23	376	25	310	14	334	17	324	18
Duty Losses	30	2	38	2	126	6	294	12	54	4	755	34	56	3	190	10
Concessional Loans	1076	68	1316	68	1556	71	1572	65	1065	71	1181	53	1578	80	1336	72
to Farmers and ASCUs	948	60	1133	58	1341	61	1437	59	972	65	1043	47	1494	76	1215	66
by the CB to TMO	128	8	182	10	215	10	135	6	93	6	137	6	83	4	121	6
Total	1594		1940		2185		2416		1495		2246		1967		1850	
Share of Total Subsidy in Agricultural Value-added		12		15		15		18		11		16		14		13

Source: Calculated from OECD (1993) using GNP implicit deflator of SPO.

	Base Projection		GATT-Full Liberalization		GATT-Partial Liberalization	
	Total	Annual	Total	Annual	Total	Annual
Wheat	22.89	1.04	35.97	1.55	30.33	1.33
Barley	14.73	0.69	30.45	1.34	24.93	1.12
Maize	19.34	0.89	34.96	1.51	28.83	1.27
Other cereals	17.05	0.79	34.57	1.50	28.11	1.25
Rice	41.30	1.74	36.59	1.57	36.05	1.55
Sugar	20.31	0.93	51.10	2.09	40.45	1.71
Lentils	14.92	0.70	15.00	0.70	14.98	0.70
Chickpeas	4.33	0.21	4.34	0.21	4.34	0.21
Drybeans	16.56	0.77	16.56	0.77	16.58	0.77
Soybean	14.83	0.69	15.24	0.71	15.23	0.71
Sunflower	16.64	0.77	19.97	0.91	20.10	0.92
Groundnut	15.90	0.74	19.67	0.90	17.14	0.79
Soyoil	19.81	0.91	16.62	0.77	17.71	0.82
Sunflower oil	16.14	0.75	16.86	0.78	17.19	0.80
Groundnut oil	19.21	0.88	61.64	2.43	45.84	1.90
Olive oil	22.55	1.02	17.44	0.81	19.42	0.89
Soycake	22.28	1.01	13.17	0.62	16.56	0.77
Sunflower cake	18.08	0.83	10.47	0.50	13.37	0.63
Groundnut cake	17.97	0.83	17.07	0.79	18.40	0.85
Beef	33.44	1.45	34.37	1.49	30.49	1.34
Mutton	28.78	1.27	41.92	1.77	35.43	1.53
Poultry	16.74	0.78	23.01	1.04	20.64	0.94
Eggs	2.45	0.12	4.54	0.22	4.03	0.20
Milk	10.26	0.49	19.08	0.88	14.36	0.67
Butter	6.81	0.33	56.92	2.28	35.07	1.51
Dry milk	39.90	1.69	62.57	2.46	46.88	1.94
Cheese	36.76	1.58	44.72	1.87	34.41	1.49
Tobacco	10.13	0.48	8.33	0.40	9.17	0.44
Cotton	12.27	0.58	19.33	0.88	17.43	0.81
Potatoes	2.74	0.14	6.46	0.31	5.21	0.25
Vegetable, fresh	16.56	0.77	19.18	0.88	18.09	0.83
Vegetable, processed	10.76	0.51	16.57	0.77	14.41	0.68
Fruit, fresh	14.67	0.69	16.18	0.75	15.46	0.72
Fruit, processed	8.21	0.40	14.50	0.68	12.19	0.58

Source: GAP (1992).

Table 9. World Trade Model Results, Turkey (million tons)

	1987			2010								
	Base			Base Projection			GATT - Full Liberalization			GATT - Partial Liberalization		
	Supply	Demand	Net Trade	Supply	Demand	Net Trade	Supply	Demand	Net Trade	Supply	Demand	Net Trade
Wheat	18.90	19.30	0.14	28.46	28.09	0.38	29.20	27.36	1.84	28.82	27.71	1.12
Barley	6.90	6.43	0.07	11.39	9.51	1.88	11.85	9.34	2.51	11.69	9.39	2.29
Maize	2.40	2.48	-0.08	4.74	4.14	0.60	4.93	4.04	0.89	4.85	4.08	0.77
Cotton	0.54	0.64	-0.10	0.70	0.89	-0.19	0.71	0.88	-0.17	n.a	n.a	n.a
Potato	4.30	4.26	0.04	7.47	7.30	0.17	7.56	7.24	0.32	n.a	n.a	n.a
Sugar	1.78	1.66	-0.16	2.26	2.31	-0.04	2.30	2.24	0.06	n.a	n.a	n.a
Mutton	0.31	0.29	0.02	0.43	0.36	0.07	0.45	0.35	0.10	0.44	0.35	0.09
	Export	Import	Net Trade	Export	Import	Net Trade	Export	Import	Net Trade	Export	Import	Net Trade
Fresh Vegetables	0.98	0.01	0.97	2.23	0.03	2.20	2.31	0.03	2.88	2.28	0.03	2.25
Processed Vegetables	0.12	0.01	0.11	0.26	0.02	0.23	0.27	0.02	0.25	0.27	0.02	0.24
Fresh Fruits	0.61	0.01	0.60	1.37	0.04	1.32	1.40	0.04	1.36	1.39	0.04	1.35
Processed Fruits	0.05	0.00	0.05	0.11	0.00	0.11	0.12	0.00	0.12	0.12	0.00	0.12

Table 10. World Trade Model Regional Results (million tons)

	1987			2010					
	Base			Base Projection			GATT - Full Liberalization		
	Supply	Demand	Net Trade	Supply	Demand	Net Trade	Supply	Demand	Net Trade
Wheat									
European Union	75.72	63.85	13.88	102.46	80.98	21.57	87.97	85.00	3.17
Eastern Europe	35.93	36.93	-1.80	49.67	51.41	-1.74	50.70	50.74	-0.04
Former USSR	83.30	102.00	-16.60	117.93	145.06	-26.62	121.07	142.53	-20.37
Middle East	13.14	21.20	-9.01	22.91	43.21	-20.31	23.65	42.92	-19.27
North Africa	7.96	20.89	-13.36	12.46	37.79	-25.34	12.76	37.31	-24.55
Barley									
European Union	51.59	43.02	7.35	50.85	45.11	5.74	49.65	46.07	3.58
Eastern Europe	12.11	12.74	-0.38	16.22	17.53	-1.31	16.70	17.28	-0.58
Former USSR	58.40	59.40	-2.99	76.04	76.93	-0.89	76.57	75.80	0.77
Middle East	4.32	11.00	-8.58	6.66	21.49	-14.83	6.83	20.92	-14.09
North Africa	3.17	4.30	-0.57	4.57	6.98	-2.41	4.60	6.98	-2.38
Maize									
European Union	25.89	30.78	-4.89	36.21	36.61	-0.41	27.87	42.86	-14.99
Eastern Europe	30.07	31.88	-1.81	45.18	44.79	0.39	45.91	44.16	1.75
Former USSR	14.80	23.80	-8.98	20.22	33.12	-12.90	20.79	32.69	-11.91
Middle East	0.27	3.27	-3.10	0.36	6.69	-6.33	0.37	6.50	-6.13
North Africa	3.27	6.95	-3.70	4.72	11.77	-7.05	4.65	10.90	-6.24
Cotton									
European Union	0.26	1.51	-1.25	0.30	1.97	-1.67	0.27	1.94	-1.67
Eastern Europe	0.02	0.61	-0.60	0.01	0.69	-0.67	0.01	0.69	-0.67
Former USSR	2.46	1.75	0.71	2.27	1.82	0.44	2.29	1.81	0.48
Middle East	0.30	0.22	0.10	0.36	0.39	-0.02	0.37	0.38	-0.01

North Africa	0.37	0.33	0.04	0.51	0.51	0.00	0.52	0.50	0.02
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Table 10. continued									
	1987			2010					
	Base			Base Projection			GATT - Full Liberalization		
	Supply	Demand	Net Trade	Supply	Demand	Net Trade	Supply	Demand	Net Trade
Potato									
European Union	54.98	53.46	1.06	52.79	51.95	0.84	50.64	53.40	-2.77
Eastern Europe	50.67	51.34	0.45	55.46	56.02	-0.56	56.13	55.35	0.78
Former USSR	75.90	76.10	-0.18	85.08	84.07	1.01	85.79	83.31	2.47
Middle East	3.43	3.62	-0.16	7.00	6.77	0.22	7.06	6.69	0.37
North Africa	3.41	3.25	-0.09	7.35	6.81	0.55	7.42	6.72	0.70
Sugar									
European Union	14.83	12.83	3.69	16.92	13.47	3.47	16.22	14.24	2.03
Eastern Europe	4.68	5.24	-0.37	5.66	6.38	-0.73	5.80	6.25	-0.45
Former USSR	9.57	14.30	-4.88	12.15	17.15	-5.00	12.05	17.02	-4.96
Middle East	0.76	3.59	-2.71	0.99	6.78	-5.79	1.01	6.71	-5.70
North Africa	1.50	3.55	-2.18	2.65	6.46	-3.81	2.68	6.38	-3.70
Mutton									
European Union	0.95	1.15	-0.20	1.52	1.24	0.28	1.26	1.46	-0.20
Eastern Europe	0.27	0.23	0.04	0.31	0.27	0.05	0.32	0.27	0.06
Former USSR	0.87	0.93	-0.06	1.02	1.12	-0.11	1.02	1.11	-0.09
Middle East	0.49	0.71	-0.21	0.85	1.37	-0.52	0.90	1.33	-0.43
North Africa	0.26	0.27	-0.01	0.40	0.60	-0.20	0.38	0.59	-0.20

Table 10. continued

	1987			2010					
	Base			Base Projection			GATT - Full Liberalization		
	Export	Import	Net Trade	Export	Import	Net Trade	Export	Import	Net Trade
Fresh Vegetables									
European Union	10.69	10.49	0.20	17.84	17.27	0.56	17.44	17.52	-0.08
Eastern Europe	1.14	0.53	0.62	1.89	1.14	0.75	1.96	1.12	0.84
Former USSR	0.15	0.66	-0.51	0.23	1.21	-0.99	0.24	1.19	-0.96
Middle East	0.57	1.33	-0.76	0.91	2.48	-1.57	0.94	2.44	-1.49
North Africa	0.43	0.47	-0.04	0.87	1.04	-0.17	0.90	1.03	-0.12
Processed Vegetables									
European Union	2.51	1.98	0.53	4.14	3.17	0.97	3.94	3.29	0.65
Eastern Europe	0.36	0.15	0.21	0.54	0.34	0.20	0.58	0.33	0.25
Former USSR	0.03	0.39	-0.36	0.04	0.74	-0.70	0.04	0.72	-0.67
Middle East	0.04	0.28	-0.24	0.08	0.54	-0.46	0.09	0.52	-0.44
North Africa	0.07	0.10	-0.04	0.12	0.25	-0.13	0.13	0.24	-0.11
Fresh Fruits									
European Union	7.37	10.77	-3.41	12.55	18.11	-5.56	12.12	18.27	-6.15
Eastern Europe	0.66	1.24	-0.58	1.08	2.49	-1.42	1.10	2.46	-1.36
Former USSR	0.09	1.08	-0.99	0.14	2.11	-1.97	0.14	2.08	-1.94
Middle East	0.95	1.26	-0.30	1.81	2.36	-0.55	1.85	2.33	-0.48
North Africa	0.78	0.02	0.76	1.34	0.04	1.31	1.37	0.04	1.34
Processed Fruits									
European Union	1.99	2.81	-0.82	3.44	4.59	-1.15	3.24	4.72	-1.47
Eastern Europe	0.80	0.12	0.68	1.22	0.25	0.98	1.32	0.24	1.08
Former USSR	0.09	0.32	-0.23	0.13	0.65	-0.53	0.14	0.63	-0.49
Middle East	0.31	0.24	0.07	0.56	0.47	0.09	0.60	0.45	0.15

North Africa	0.04	0.00	0.03	0.05	0.00	0.05	0.05	0.00	0.05
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Table 11. TURGAP, Aggregate Results, 2010		
	Base Projection	GATT Projection
Total Surplus (\$ bil.)	120.38	127.44
Consumer Surplus	72.38	76.05
Producer Surplus	48.00	51.39
Value of Agricultural Production (\$ bil.)	75.84	72.40
Crop Value	40.31	30.56
Livestock Value	35.53	41.84
Volume of Agricultural Production (\$ bil)	33.80	31.95
Crop Volume	22.68	21.20
Livestock Volume	11.12	10.75
Net Trade (\$ bil.)	3.06	5.36
Input Use		
Labor (billion hrs)	11.65	11.52
Machine (million hrs)	298.03	291.82
Nitrogen (million tons)	1.14	1.40
Phosphate (million tons)	0.42	0.88

Source: GAP, 1992.

Table 12. TURGAP Agricultural Sector Model Results, 2010

	Base Projection			GATT Projection		
	Production (1000 tons)	Net Trade (1000 tons)	Prices (\$/ton)	Production (1000 tons)	Net Trade (1000 tons)	Prices (\$/ton)
Wheat	27,558		113	27,652	600	114
Corn	4249	650	152	5,052	1,700	169
Rye	597		82	597	48	85
Barley	13,219	123	114	14,999	2,464	122
Rice	120	-432	356	112	-443	344
Chick pea	1,117	510	294	915	300	275
Dry bean	426		902	425		904
Lentil	1,374	268	302	1,422	315	302
Dry pea	10		419	10		420
Potato	9,413		182	6,165	-4,300	133
Onion	2,670		206	1,474	-1,300	141
Tomato	10,131		383	6,485	-4,500	250
Aubergine	1,570		461	1,570		460
Melon	4,243		268	3,822	-517	246
Cauliflower	145		559	89	-75	373
Water melon	7,183		198	7,180		198
Carrot	320		377	212	-150	259
Cabbage	1,075		261	927	-208	228
Cucumber	1,675		480	1,674		481
Okra	45		1,042	34	-14	834
Pepper	1,539	30	578	1,582	92	594
Lettuce	282		278	189	-132	192
Spinach	295		378	226	-98	296
Squash	466		630	388	-150	529
Leek	630		304	531	-141	258
Groundnut	155	30	487	197	75	544
Sesame	102	-10	1,222	70	-50	963
Sunflower	3,241		427	3,241		427
Soybean	771		186	1,198	350	199
Linseed	11	2	293	16	5	308
Colza	3		244	2	-2	233
Cotton	3,220	700	457	4,534	1500	480
Tobacco	484	150	2,581	484	150	2,582
Sugarbeet	28,815	600	35	37,879	10,000	40
Pistachio	46		4,985	46	-3	4,256
Hazelnut	302	146	1,653	420	250	1,301
Olive	1,772		2,472	1,411	-950	1,420
Tea	1,309		1,725	1,016	-650	1,202
Grape	7,341	98	133	7,858	-503	555
Fig	603		683	619	-25	608
Orange	1,581		583	975	-800	344
Lemon	605		571	363	-300	330
Apple	4,361		609	2,794	-2,250	342
Pears	935		792	597	-500	431
Peach	775		626	485	-385	387
Apricot	382		588	265	-147	364
Cherry	311		932	327		783
Wild cherry	174		663	261	90	692
Pomegranate	86		338	93		286

Table 12. TURGAP Agricultural Sector Model Results, 2010

	Base Projection			GATT Projection		
	Production (1000 tons)	Net Trade (1000 tons)	Prices (\$/ton)	Production (1000 tons)	Net Trade (1000 tons)	Prices (\$/ton)
Wheat	27,558		113	27,652	600	114
Corn	4249	650	152	5,052	1,700	169
Rye	597		82	597	48	85
Barley	13,219	123	114	14,999	2,464	122
Rice	120	-432	356	112	-443	344
Chick pea	1,117	510	294	915	300	275
Dry bean	426		902	425		904
Lentil	1,374	268	302	1,422	315	302
Dry pea	10		419	10		420
Potato	9,413		182	6,165	-4,300	133
Onion	2,670		206	1,474	-1,300	141
Tomato	10,131		383	6,485	-4,500	250
Aubergine	1,570		461	1,570		460
Melon	4,243		268	3,822	-517	246
Cauliflower	145		559	89	-75	373
Water melon	7,183		198	7,180		198
Carrot	320		377	212	-150	259
Cabbage	1,075		261	927	-208	228
Cucumber	1,675		480	1,674		481
Okra	45		1,042	34	-14	834
Pepper	1,539	30	578	1,582	92	594
Lettuce	282		278	189	-132	192
Spinach	295		378	226	-98	296
Squash	466		630	388	-150	529
Leek	630		304	531	-141	258
Groundnut	155	30	487	197	75	544
Sesame	102	-10	1,222	70	-50	963
Sunflower	3,241		427	3,241		427
Soybean	771		186	1,198	350	199
Linseed	11	2	293	16	5	308
Colza	3		244	2	-2	233
Cotton	3,220	700	457	4,534	1500	480
Tobacco	484	150	2,581	484	150	2,582
Sugarbeet	28,815	600	35	37,879	10,000	40
Pistachio	46		4,985	46	-3	4,256
Hazelnut	302	146	1,653	420	250	1,301
Olive	1,772		2,472	1,411	-950	1,420
Tea	1,309		1,725	1,016	-650	1,202
Grape	7,341	98	133	7,858	-503	555
Fig	603		683	619	-25	608
Orange	1,581		583	975	-800	344
Lemon	605		571	363	-300	330
Apple	4,361		609	2,794	-2,250	342
Pears	935		792	597	-500	431
Peach	775		626	485	-385	387
Apricot	382		588	265	-147	364
Cherry	311		932	327		783
Wild cherry	174		663	261	90	692
Pomegranate	86		338	93		286

Source: GAP, (1992) Agricultural Commodities Marketing Survey, Planning of Crop Pattern and Integration of Marketing and Crop Pattern Studies, Volume IV, Ankara.

Figure 1. Input-Output Structure of the Model

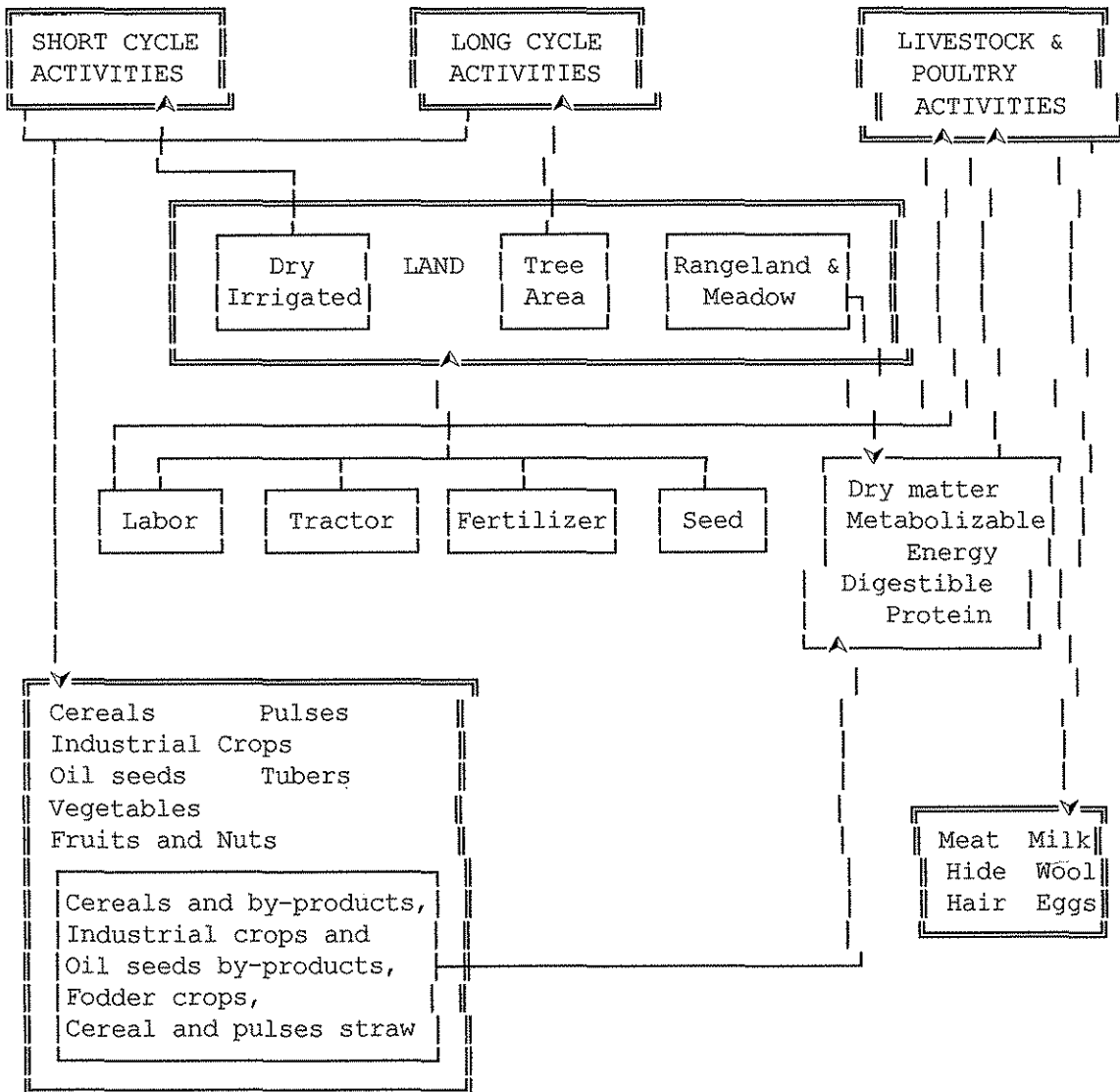


Figure 2. Supply and Demand Interactions in the Model

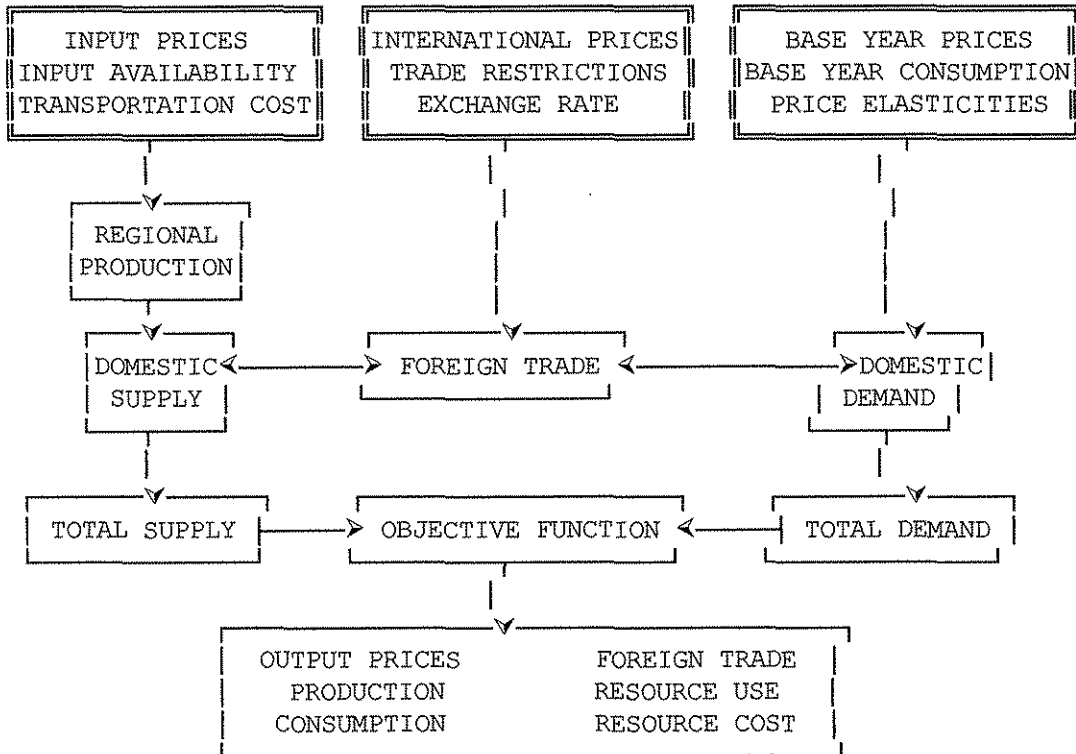


Table 13. Overall Results of the Scenarios with TURLIV (\$ b.)				
	BY	BP	BST	GATT
Total Welfare INDEX	100	202	208	214
Producer Welfare	100	155	136	161
Consumer Welfare	100	227	247	243
Total Production				
Volume	25.8	35.9	39.0	41.2
Value		45.6	42.9	49.4
Crop Production				
Volume	18.7	27.1	27.5	29.0
Value		26.4	26.7	30.7
Livestock Production				
Volume	7.1	8.8	11.5	12.2
Value		19.2	16.3	18.7
Total Consumption				
Volume	20.7	32.6	35.2	34.9
Value		44.0	41.1	43.3
Crop Consumption				
Volume	13.4	23.3	23.2	22.9
Value		23.4	23.6	24.7
Livestock Consumption				
Volume	7.3	9.3	12.0	12.0
Value		20.5	17.5	18.6
Net Exports	1.6	0.2	0.2	4.4
Crop Products	1.8	0.6	0.6	2.7
Livestock Products	-0.2	-0.4	-0.4	1.7
Price INDEX -- All	976	1423	1319	1147
Crop Products	762	641	644	657
Livestock Products	1545	3500	3111	2449

Notes: BY: Base Year, BP: Base Projection, BST: Breed Composition Change+improved management practices, GATT:BST+Liberalized Trade.

Volume: Base year prices*simulated results

Value: Simulated prices*simulated results

Table 14. Simulated Production According to Commodity Groups with TURLIV (at 1991 prices)								
	BY		BP		BST		GATT	
	(\$ m.)	%	(\$ m.)	%	(\$ m.)	%	(\$ m.)	%
Cereals	4,815	19	5,515	15	5,963	15	6,169	15
Wheat	3,281	13	3,780	11	3,749	10	3,701	9
Pulses	777	3	1,266	4	1,195	3	1,059	3
Industrial Crops	2,951	11	3,309	9	3,380	9	3,723	9
Oil Seeds	390	2	938	3	958	2	952	2
Tubers	1,257	5	1,916	5	1,904	5	2,079	5
Vegetables	3,981	15	6,878	19	6,866	18	8,012	19
Fruits and Nuts	4,542	18	7,244	20	7,244	19	6,962	17
Livestock Products	7,050	27	8,849	25	11,513	30	12,233	30
Total	25,763		35,915		39,022		41,189	

Note: For the explanation of the simulations see note in Table 13.

Table 15. Base and Simulated Prices of Selected Commodities-TURLIV				
	BY	BP	BST	GATT
	(\$/ton)	(base year prices=100)		
Wheat	161	68	71	82
Barley	136	65	43	86
Corn	162	69	79	97
Lentil	450	111	115	124
Tobacco	5829	69	70	71
Sugarbeet	43	116	115	128
Cotton	631	97	95	107
Sunflower	329	140	134	140
Soybean	301	184	176	234
Onion	235	70	71	80
Melon	196	73	75	96
Tomato	307	114	115	116
Apple	292	124	124	136
Hazelnut	1012	98	98	88
Grape	476	108	108	98
Cattle meat	2425	271	230	115
Cattle milk	391	198	54	138
Mutton	2929	196	188	157
Sheep milk	466	257	254	254
Goat meat	2433	237	237	186
Goat milk	466	244	244	244
Poultry meat	2697	200	200	144
Egg	1219	174	174	166

Note: For the explanation of the simulations see note in Table 13.

Table 1. Nominal and Effective Protection Rates of Agricultural and Agriculture related Commodities (%)

I/O	Sector Name	Nominal Protection Rates					Effective Protection Rates				
		1983	1984	1988	1990	1991	1983	1984	1988	1990	1991
1	Agriculture	25.05	36.12	53.00	9.86	22.45	22.35	34.49	59.98	13.81	28.92
2	Animal husbandry	21.66	25.90	21.65	11.57	12.72	13.91	15.24	7.32	21.13	16.13
11	Slaughtering and meat	78.28	78.68	40.00	10.03	20.54	364.66	301.94	79.59	16.43	40.85
12	Fruits and vegetables	140.71	145.54	94.85	69.97	69.30	-1949.80	383500.00	272.29	413.51	244.96
13	Vegetable and animal oil	56.71	61.29	16.23	17.90	12.65	83.18	83.57	9.76	25.19	12.00
14	Grain mill products	46.80	51.16	104.75	38.61	45.19	182.87	117.38	-793.92	512.60	261.01
15	Sugar refining	139.66	144.43	103.17	44.71	44.09	-21.47	-24.86	-19.75	141.83	105.01
16	Other food processing	108.36	131.73	104.24	39.79	48.36	-1159.90	-1580.20	346.76	93.21	107.93
17	Alcoholic beverages	90.42	95.02	224.82	234.34	182.25	623.82	709.79	870.41	642.31	382.30
18	Non-alcoholic beverages	63.99	68.35	172.62	152.37	151.70	129.73	142.73	-16921.00	902.08	1001.50
19	Processed tobacco	372.79	378.68	78.16	87.63	86.96	-1841.20	-2815.80	97.58	180.96	157.38
20	Ginning	7.42	9.67	22.52	4.35	3.55	-12.03	-15.62	-0.71	12.67	-2.55
21	Textiles	109.07	104.44	64.20	34.37	34.49	330.77	285.01	114.50	70.32	68.43
22	Clothing	154.89	160.46	169.45	122.03	123.07	234.38	258.88	25418.00	5969.60	6106.00
23	Leather and fur production	154.48	157.05	40.77	15.85	17.36	779.91	819.27	55.46	30.97	27.76
24	Footwear	157.00	161.75	57.56	54.48	51.89	187.95	191.10	74.82	93.66	86.95
	Overall Mean and Standard Deviation	65.22 63.75	70.19 65.39	55.42 48.28	28.68 40.49	28.25 35.80	70.99 213.01	74.71 205.39	68.56 212.72	39.12 116.26	38.38 65.83

Source: Togan (1994), p. 52,53.

Table 2. Nominal and Effective Export Subsidy Rates of Agricultural and Agriculture related Commodities (%)

I/O	Sector Name	Nominal Export Subsidy Rates			Effective Export Subsidy Rates		
		1983	1984	1990	1983	1984	1990
1	Agriculture	7.713	7.707	5.588	4.786	4.337	2.730
2	Animal husbandry	9.880	9.032	4.175	12.553	10.606	4.006
11	Slaughtering and meat	36.536	27.464	12.581	207.420	132.126	25.386
12	Fruits and vegetables	26.203	19.265	8.679	-504.476	1324.200	35.423
13	Vegetable and animal oil	27.056	22.181	13.264	49.854	35.388	20.720
14	Grain mill products	16.332	11.257	14.338	74.865	32.559	109.344
15	Sugar refining	29.334	22.735	16.616	42.526	29.228	44.062
16	Other food processing	21.589	15.937	0.365	-220.038	-199.662	-14.100
17	Alcoholic beverages	31.286	23.903	7.586	84.157	63.494	14.601
18	Non-alcoholic beverages	29.818	22.971	8.716	60.639	44.683	24.828
19	Processed tobacco	7.439	1.127	13.485	-20.614	3.344	26.349
20	Ginning	3.618	2.601	7.366	1.863	-0.851	13.494
21	Textiles	33.429	25.268	8.683	91.064	55.723	6.440
22	Clothing	44.860	35.461	8.076	91.070	65.686	43.879
23	Leather and fur production	44.847	36.803	20.648	254.957	188.771	36.670
24	Footwear	41.116	31.663	26.658	59.160	43.222	42.042
	Overall Mean and Standard Deviation	31.978 19.760	24.125 11.617	13.035 8.133	37.519 115.861	30.838 189.638	12.250 22.513

Source: Togan (1994) p. 141,147.

Table 6. Support Purchases in Agriculture, 1979-1994

Year	Number of Commodities	Total Purchases		Exchange Rate (TL/\$)
		(billion TL)	(million \$)	
1979	22	73	2,355	31
1980	22	123	1,618	76
1981	17	175	1,591	110
1982	17	216	1,342	161
1983	16	278	1,241	224
1984	15	388	1,063	365
1985	13	469	905	518
1986	14	744	1,112	669
1987	14	966	1,129	856
1988	10	1,224	861	1,421
1989	11	1,885	889	2,121
1990	10	5,421	2,079	2,608
1991	24	12,526	3,004	4,170
1992	26	21,304	3,093	6,888
1993	24	24,460	2,226	10,986
1994 ^a	8	34,135	1,149	29,704

Note: ^a Estimate
Source: SPO, Annual Programs, various years.

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