The Turkish Agricultural Policy Analysis Model

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THE TURKISH AGRICULTURE AND POLICY ANALYSIS MODEL

This study evaluates food security issues in Turkey. A country commodity model for Turkey was developed and connected with CARD/FAPRI world agricultural commodity price projections. The country commodity model was developed and linked with the CARD/FAPRI baseline on the basis of past and present macroeconomic and agricultural policies in Turkey.

Review of Turkey Macroeconomic and Agricultural Policies from 1960 to 1997

Togan (1994) summarized macroeconomic policy that had been applied in Turkey from 1923 to1980. In 1923 the Ottoman Empire fell, and in its place the Turkish Republic was founded. During the 1930s, the government formulated an ideological position called "etatism," which lay between a Western-style market economy and the Soviet-style planning system. The plan assigned a leading role to the public sector in the generation of savings and in carrying out key entrepreneurial functions in industrial development. The etatist policies survived the Second World War mainly due to the necessity for government controls in the face of war. In January 1940, the law of national protection was accepted by Parliament. This law granted the government the power to completely take over the national economy. In the immediate postwar years, the Marshall Plan provided aid to Turkey, and Turkey became a member of the Organization of European Economic Cooperation (OEEC), thus promoting Turkey's ties with the West.

In 1950 the anti-etatist Democratic Party took power. The 1950s can be subdivided into three periods: 1950-54, 1955-58, and 1958-60. During the first four years of Democratic Party rule, relatively liberal policies were followed. Agricultural output increased rapidly with the introduction of mechanization in agriculture during this period.

The world trade boom, coupled with the Korean War, affected income levels favorably, and per capita incomes increased 8.5 percent. Following the massive crop failure of 1954, the government decreased the importance attached to agriculture, and again emphasized the industrial sector. Public investment increased rapidly. However, between 1955 and 1958, the economy entered into a phase of foreign exchange stringency that reduced gross domestic product (GDP) growth. The government introduced a cumbersome system of surcharges on imports and kept the exchange rate constant. The central bank financing of public sector deficits led to high inflation in 1958 and to the introduction of an International Monetary Fund (IMF)-designed stabilization and devaluation program. By 1959 inflation was under control, but the economic difficulties faced during the period led to social unrest and political instability, and eventually a military takeover in May 1960.

The socially progressive constitution of 1961 required the establishment of a State Planning Organization (SPO). Since 1963, SPO has been responsible for preparing a formal, economy-wide development strategy through five-year plans and annual programs. During the 1960s, Turkey followed an inwardly oriented development strategy. By the mid-1960s, Turkey chose an import-substitute industrialization policy. This policy required high protection, achieved through tariffs, quotas, and an over-valued exchange rate. During this period, the foreign exchange regime was strictly controlled, and capital movement was restricted. These policies helped to keep import demand under control. The Turkish economy grew steadily during the 1960s. While the growth rate of real gross national product (GNP) was 5.7 percent, the inflation rate was 5.1 percent. The foreign trade policies followed during the period led to balance-of-payment difficulties toward the end of the 1960s. The Turkish Lira was devalued in August 1971. The quadrupling of oil prices between 1973 and 1974 and the 1974-75 world recession adversely affected the Turkish economy.

Beginning in the early 1960s and continuing throughout the next two decades, the Government of Turkey (GOT) pursued a highly interventionist and planned approach to economic development.

Government intervention in agriculture during this period consisted of agricultural price supports and market guarantees, agricultural input production and distribution, agricultural commodity trade by state-owned or state-controlled marketing institutions, input price subsidies, export subsidies, exchange rate controls, import and export licenses, food price controls, and so on. State-owned or state-controlled institutions were active until recently in milk processing and marketing, meat slaughter and marketing, sugar production, vegetable oil production and marketing, textile and apparel manufacturing, agricultural tractor production, seed production and distribution, and in similar sectors.

In January 1980, the government introduced a comprehensive policy package to correct the worsening economic situation. The immediate goal of the reform was reducing inflation and the balance-of-payments deficit. Policymakers tried to make the economy responsive to market forces in the long run, and in turn, more dynamic and efficient. To this end, Turkey attempted to foster competition. It was recognized that international trade would be the most effective means to create competition in the economy (Togan 1994). Since 1980, the Turkish economy has been liberalized and integrated through open market economics. Thus, foreign trade constitutes a significant share of gross national product. In other words, the Turkish economy is not independent of world prices or economic shocks.

Since the structural adjustment program launched in 1980, macroeconomic and agricultural policies have been changing. The same year food prices and exchange rate controls were removed. During the following years, the import and export regime was relaxed in stages. Bureaucratic formalities were reduced, exchange transfers facilitated, most state-owned companies privatized, a value-added tax introduced, and the private sector was allowed to become involved agricultural input production, importing, and distribution (such as seeds and live animals). In spite of these changes, the monopoly of the state-owned marketing institutions for sugar production still continues.

Like many developed and developing countries, there is currently still some intervention in the agricultural sector. The GOT is supporting producers of wheat, barley, rye, maize, oats, sugar beets, and tobacco through support prices. All producers of these crops may receive fertilizer subsidies and subsidized agricultural credit.

A prohibitive tariff rate is used for many commodities, particularly in the livestock sector, but these are within World Trade Organization (WTO) rules. The current structure of Turkey’s agriculture system provides agricultural extension services, irrigation investment, and rural infrastructure.

The customs union agreement contained in Decision No. 1/95 issued by the EC-Turkey Association Council became effective on January 1, 1996. This trade agreement is a significant milestone for Turkey's becoming a full member of the European Union (EU), a process that began more than 35 years ago. The agreement eliminates trade barriers between Turkey and the EU in industrial goods and processed agricultural products. In addition, Turkey has adopted the EU's Common External Tariff for trade with third-world countries and is aligning its domestic policies with the EU's common commercial policy (Customs Union 1998). Turkey stands to gain between 1.0 and 1.5 percent annual growth in real GDP as a result of the customs union in manufactured goods. The benefits from Turkey's customs union with the EU would increase if the agricultural sector were included (Harrison, Rutherford, and Tarr 1996). However, until Turkey adopts measures that are compatible with the Common Agricultural Policy (CAP), trade in agricultural commodities will continue to be restricted (EC-Turkey Association Council 1998).

Agriculture is important in today's Turkish economy. It accounted for 14.5 percent of the GDP and 10.7 percent of total exports in 1995. According to State Institute of Statistics (SIS) records, the country has 23.6 million hectares of cultivated area, 785,000 hectares of vegetable gardens, 565,000 hectares of vineyards, 1.34 million hectares of fruit trees, 565,000 hectares of olive trees, and 20.2 million hectares forests in 1997.

Turkey's agricultural exports are diverse: hazelnuts, tobacco, lentils, chickpeas, citrus fruits, vegetables, pistachios, dried apricots, seedless raisins, and olive oil. Turkey also exports ready-to-eat and ready-to-cook products such as pasta, tomato paste, canned vegetables and fruits, margarine, candy, and confectionery products. Turkey's trade for wheat, barley, and sugar depends on production and stock levels. The main agricultural import products are raw vegetable oils, oilseeds, rice, cotton, maize, cattle and beef, and milk powder.

Imports of these products are growing rapidly in conjunction with population and income growth, growth of textile and apparel exports, and growth of the poultry sector. In Turkey, as in other developing countries, more than 40 percent of the total population lives in rural areas and is engaged in agricultural activities. In addition to relatively low per capita income (U.S. $3,130 1997), inequality indicators show that distribution of income among income groups, between rural and urban areas, and among regions is quite skewed.

The 1994 Household Consumption Expenditure Survey indicates that per capita income in urban areas is 1.7 times greater than per capita income in rural areas. Per capita income in the richest region, Marmara, is 2.8 times greater than per capita income in the poorest region, South Anatolia. The Household Expenditure Survey data also show that the share of food, beverage, and tobacco expenditures in total consumption expenditures is 35.6 percent in Turkey, but this is 45.3 percent in rural areas. The average monthly per household consumption expenditure in the richest region is 2 times greater than in the poorest region (SIS 1997).

Per capita average food disappearance and food intake data show that food consumption is unbalanced between animal and vegetable products. Furthermore, food intake distribution is also unequal between income groups and urban and rural areas (See Tables E.3 through E.7). Data are not available to show the number of households below the poverty line, but many economic indicators suggest that there are many households below the poverty level in Turkey.

In the following chapter, a theoretical framework for the econometric model is presented. In Chapter 3, various components of the analytical system, i.e. the demand and supply specification, are given. In the fourth and final chapters, the results of baseline and tariff reduction scenarios from the analytical system are presented.

THE TURKISH AGRICULTURAL POLICY ANALYSIS MODEL (TAPAM)

The Turkish Agricultural Policy Analysis Model (TAPAM) is designed to capture the effect of international exogenous variables and domestic agricultural policies on agricultural commodity markets and food security in Turkey. The TAPAM may be linked with CARD/FAPRI international trade model via a price transmission equation. Traded quantities from TAPAM can also be connected to the CARD/FAPRI model to obtain international price responses to changes in Turkish trade patterns. Figure 2.1 shows the relationship between CARD/FAPRI international trade model and TAPAM.

The CARD/FAPRI international trade model measures the commodity-specific factors related to production, prices, trade, economic issues, and weather data of major players in international agricultural markets. Some key components of the CARD/FAPRI International Trade Model are agricultural policies in the United States and the European Union, including the 1996 U.S. Farm Bill, and CAP. Use of the CARD/FAPRI model allows the researcher to translate changes in international exogenous variables into world price and world production, consumption, and trade patterns. These outcomes then become the primary factor affecting a particular country, such as Turkey.

These equilibrium prices are translated into commodity markets in Turkey. First, a supply and demand baseline is projected given world prices. Second, consumption patterns are then evaluated with a demand system to formulate the food security impact. In particular, using food consumption data and the recommended daily allowance for each nutrient category, a given consumption pattern is translated into its nutritional impact. Since the food consumption data are unavailable for different socioeconomic and demographic groupings in Turkey, this impact is only evaluated for a segment of the population (selected population centers in 19 provinces). In this way, we can provide possible outcomes to predict how the household groups will be affected by changes at the world level or the policy level.

For some commodities and policy scenarios, it is possible to establish a simultaneous relationship between the TAPAM and the CARD/FAPRI international trade model to

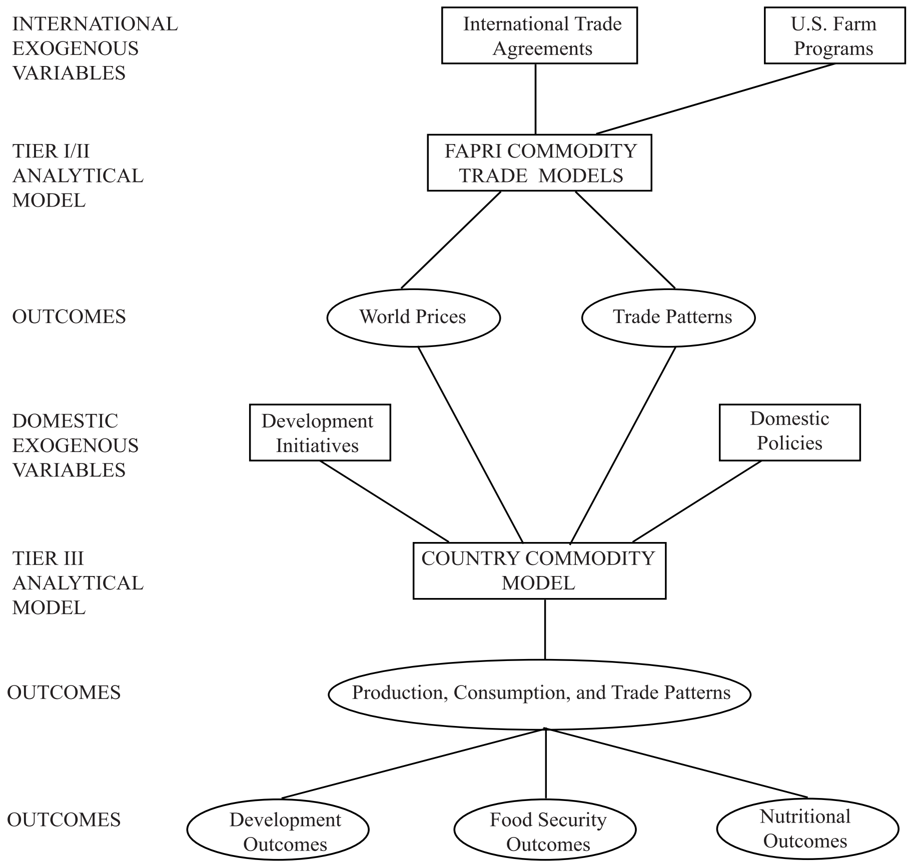


FIGURE 2.1. The Link between TAPAM and CARD/FAPRI World Trade Model

determine world price responses to changes in Turkish agricultural policy. For instance, in the case of significant liberalization of Turkey's sugar trade policy, Turkey becomes large importer in the world sugar market, affecting the world equilibrium price level.

Tier I/II: The CARD/FAPRI World Trade Modeling System

This modeling system uses a multicountry, multicommodity, nonspatial, and partial equilibrium structure. The structure is nonspatial because country-specific trade flows are not identified, and it is partial equilibrium because most nonagricultural sector and some agricultural commodities are treated as exogenous. The trade model primarily determines a world equilibrium price for major traded agricultural commodities.

The foundation of CARD/FAPRI's international trade model includes supply and demand functions for major trading countries and regions. The unique feature of the supply and demand specification is the incorporation of country-specific domestic and trade policies. Excess demand, in the case of importing countries, and excess supply, in the case of exporting countries, are derived from the country supply and demand functions. These equations are presented here in a general manner.

The excess demand of a net importing country is

$$ED_i\,(P,G) = D_i\,(P,G) - S_i\,(P,G)\,, \tag{2.1}$$

where ED is the excess demand of the i[th] country, D is the demand function, and S is the supply function. These functions are derived by a vector of economic variables, P (e.g., prices), and policy variables, G.

The excess demand function of all importing countries is summed horizontally across countries for all price levels to derive the aggregate world demand for each commodity.

The aggregate excess demand for n-country net imports is

$$AED_k\,(P,G) = \sum_{l=1}^{n} E\,D_i\,(P,G). \tag{2.2}$$

The same procedure is used for excess supply of exporting countries to generate the world aggregate supply. Equations (2.3) and (2.4) are the supply counterparts of (2.1) and (2.2).

The excess supply of a net exporting country is

$$ES_i\,(P,G) = S_i\,(P,G) - (P,G). \tag{2.3}$$

The aggregate supply for m-country net exporters is

$$AES_k\,(P,G) = \sum_{l=1}^{m} ES_i\,(P,G). \tag{2.4}$$

The equilibrium prices, quantities, and net trade are determined by equating aggregate world excess demand and aggregate world excess supply. Except where it is set by governments, the domestic price of individual countries is linked to world prices through price linkage equations, bilateral exchange rates, and marketing margins.

The equilibrium condition for commodity *k* is the world clearing price; that is, the world P_w that satisfies

$$AED_k(P,G) = AES_k(P,G). \quad (2.5)$$

The CARD/FAPRI models examine four primary areas: (1) U.S. crops; (2) U.S. livestock; (3) international crops; and (4) international livestock. The impact of the GATT is captured in the trade model through country-specific changes in the policy variable, G, as a result of GATT disciplines. The four section of the GATT agreement relating to international agricultural trade include: (1) market access through tariffication with commitment to phased tariff reductions and elimination of nontariff barriers; (2) reduction of export subsidies in both the quantity of subsidized exports and the amount spent to subsidize; (3) phased reduction of internal support; and (4) setting of minimum sanitary and phytosanitary standards, and prohibiting use of sanitary and phytosanitary measure to inhibit trade.

FAPRI prepares annual baseline projections for the U.S. agricultural sector and international commodity markets. The multiyear projection serves as a reference for evaluating scenarios involving macroeconomics, trade and agricultural policy, weather, and technology variables.

Tier III: The Country Commodity Model (TAPAM)

The TAPAM is linked to the CARD/FAPRI international trade model for the world price of imported, as well as exported, agricultural products. For a small country (a price-taker country) the world price, together with domestic price policies will drive the production, consumption, and trade pattern of the country. The foundation of a country commodity model is the demand and supply structure specific to the country.

Price Transmission Equation

The price transmission equation provides the bridge between the world price and a country's internal price. The new set of world prices determined in the CARD/FAPRI trade model is transmitted to the Turkey commodity model through these price transmission equations. Ideally, the border price in Turkey differs from the world price by the transportation cost. Since the world and border prices are highly correlated, it is adequate to generate the border price as a function of the world price. In this case, the border price was not available, so the producer or retail price was used. For the k^{th} commodity, this is

$$P_k^p = f\ (P_k^w, ER, C_k). \tag{2.6}$$

All domestic prices are expressed in the local currency and the world price is in U.S. dollars. ER is the price of one U.S. dollar in local currency (i.e., the exchange rate). Marketing cost is represented by the variable C. Whenever appropriate, the consumer price index is used as a proxy of marketing cost of the price transmission between different levels in the market chain (i.e., wholesale to retail). Also, possible lag and other variables in the regression equation will be determined empirically.

Theoretical Framework

First, the theoretical bases of the supply and demand functions that were discussed before are specified for a given country. Consumers are modeled as maximizing utility subject to some budget constraint. This framework puts structure on the decision of consumers, allowing some degree of predictability in the decisions as some variables are changed. An indirect utility function or its dual cost function can be specified to derive an estimable demand function. When indirect utility function is the starting specification, demand is derived using Roy's identity, as in the case of the translog demand function. A cost function can also be specified, and the demand function is derived using Hotelling's Lemma. That is,

$$\ln C(P,U) = a(P) + b(P) \bullet U, \tag{2.7}$$

where

$$a(P) = \alpha_0 + \sum_i \alpha_i + \ln P_i + \frac{1}{2}\sum_i \sum_l \gamma_{ij} \ln P_i \ln P_j, \tag{2.8}$$

$$b(P) = \beta_0 \prod_{k=1}^{n} P_k^{\beta_k}. \tag{2.9}$$

Taking the first derivative of (2.7) gives Hicksian demand, and substituting out U gives the Marshallian demand, to yield the Almost Ideal Demand System (AIDS) of Deaton and Muellbauer (1980a and 1980b):

$$W_i = \alpha_i + \sum_i \gamma_{ij} \ln P_j + \beta_i \ln\left[\frac{X}{P}\right], \tag{2.10}$$

where ln (P) is approximated by a Stone Price Index.

From standard microeconomic theory, the supply function is derived from an indirect profit function. That is, from a standard profit function:

$$\pi(p, y) = p \cdot y - c(y, w)\ . \tag{2.11}$$

The optimal y* = y (p, w) is substituted in (2.11) to get the indirect profit function

$$\pi * (p, w) = p \cdot y(p, w) - c\left[y(p, w), w\right]. \tag{2.12}$$

The indirect profit function is now a function of output and input prices, and other shifters. It is a common result that the first-order condition (FOC) of the indirect profit function, with respect to output price, gives the supply function, and the FOC, with respect to the input price, gives the input demand functions

$$\frac{\partial \pi * (p, w)}{\partial p} = y = y(p, w)\ , \tag{2.13}$$

$$\frac{\partial \pi * (p, w)}{\partial w} = x_i = -x_i(p, w)\ . \tag{2.14}$$

An equation system for the field crop area allocation is also specified and estimated. Area allocation model is derived from the Certainty Equivalent Profit Function (Holt, 1988). For a small open economy, the equilibrium is determined by its domestic supply and demand structure and by international market conditions. If the domestic equilibrium price under autarchy is below the world price, the country is a net exporter of that commodity. On the other hand, If the domestic equilibrium price under autarchy is above the world price, the country is a net importer. In the absence of trade distorting policies, a country has an excess demand (net importer) or an excess supply (net exporter). The country faces a perfectly elastic import supply (net importers) or export demand (net exporters) since it cannot influence the world market. In this case, world market prices are fully transmitted to the domestic market. Any price differential between domestic and world prices is fully attributed to transport cost. Figure 2.2 illustrates the case of a small open economy in the absence of trade-distorting policies.

In Figure 2.2, a theoretical framework for the supply and demand of a small economy without any trade distortion was described. But in many cases, most countries have trade-distorting policies. Thus, some modification to the general framework may be necessary when specifying a particular commodity for a specific country. Commodities included in the Turkey model are divided into two broad groups: crop and livestock. The

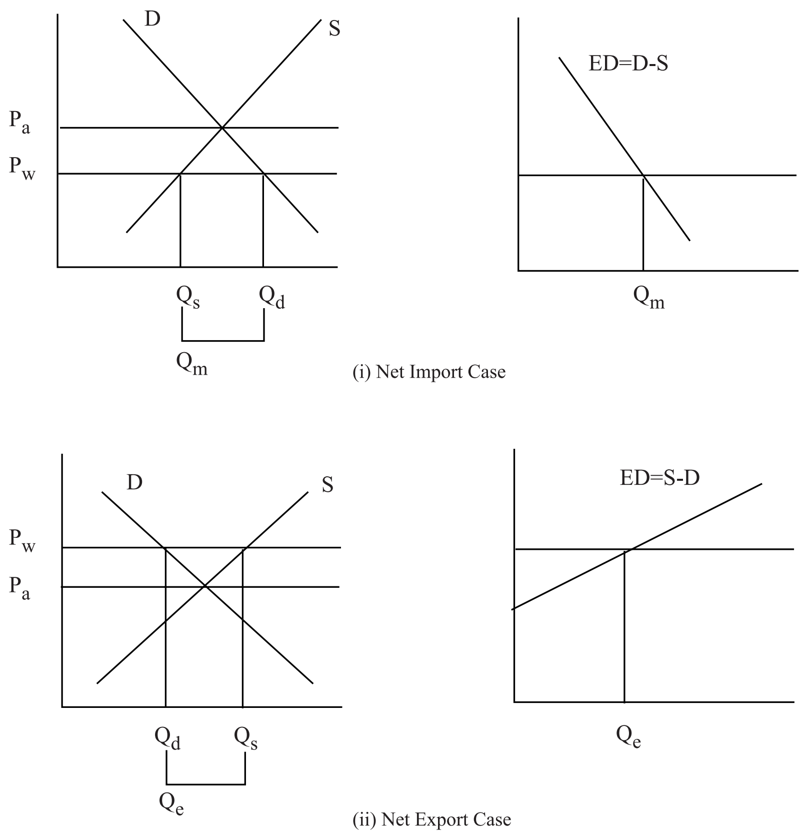


FIGURE 2.2. Demand, supply, and trade for a small open economy without trade-distorting policies, P_a = autarchy price, P_w = World Price.

crop group is further divided into staples, other food, and feed crops. Staples include wheat, rice, and corn, while other food crops include vegetable oils and sugar. Feed includes barley, soybean, corn, wheat, and cottonseed meal. Similarly, the livestock component of the model consists of beef, sheep, poultry, milk, and eggs.

Schematic Model for Wheat

Figure 2.3 shows a representation of the wheat model. Historically, Turkey has been a net exporter of wheat. Turkey became a net importer when insufficient rainfall caused severe drought.

Turkey's traditional wheat import is mostly durum wheat and wheat for seed. It is difficult to discern durum wheat and soft wheat from the reported aggregate wheat production and trade data, therefore an aggregate description of wheat trade equilibrium is presented in Figure 2.3.

Production shocks are the primary factors determining net trade, since domestic consumption is stable in the short run. Domestic wheat production is determined by area devoted to wheat and yield. Yield is dependent upon weather conditions, rainfall in

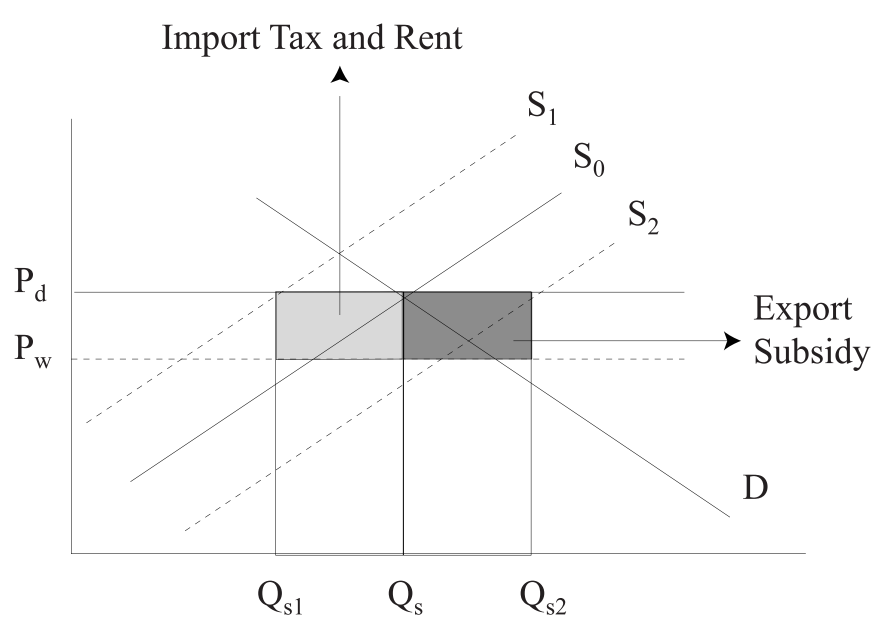


FIGURE 2.3. Wheat trade equilibrium in Turkey

particularly. When the rainfall level is normal, especially in the central region, production is usually sufficient to meet domestic demand.

The domestic wheat price does not reflect domestic supply and demand conditions due to government intervention in the market. Government intervention includes, price supports, and fertilizer and credit subsidies. In recent years, besides the traditional pressure group of farmers, a new pressure group has emerged as the Chambers of Industry and Commerce. This group is in favor of lowering producer support prices to the world price level. But it seems that the domestic producer and consumer price will continue to be higher than world price in the short-run[1]. Due to the low yield, Turkey does not have a comparative advantage in wheat production. Hence, Turkey's wheat trade varies from one year to another, depending on production shocks and buffer stock levels. When Turkey has excess production, net trade is positive. However, since the domestic price is higher than the world price, exports are only possible with export subsidies (Figure 2.3).

When the domestic production and buffer stock level do not meet domestic demand, Turkey's net wheat trade is negative. The Turkish Grain Board (TGB) is the dominant actor in the import and export of wheat. Some years the TGB gets import permission with lower import tax rates than private importers (OECD 1994). In this case, the TGB generates import rents.

Total domestic wheat use includes human consumption, feed use, seed use, and losses. Separate demands are estimated for human consumption and feed use. Seed use and losses are assumed to be stable at the average level. Total demand is obtained by summing these individual demands.

Wheat demand for human consumption is specified in a single equation framework. Since data on human consumption are only available in aggregate, direct estimation of a single equation was preferred. The homogeneity condition is imposed by dividing all prices and income by a consumer price index (Alston et al. 1998).

The per capita wheat demand is specified as a function of producer price, per capita income (GDP), time trend, and dummy variables:

$$Q^{w}_{pc(food)} = f(P^{w}_{t}, Y, T, \Theta, e). \tag{2.15}$$

The market demand of feed wheat is specified as a function of feed used in the previous period and a trend,

$$Q^{w}_{feed} = f(Q^{w}_{feed,t-1}, T, e). \tag{2.16}$$

Total wheat use is the sum of the demands for human consumption, feed use, seed uses, and losses:[2]

$$Q^{w}_{d} = [(Q^{w}_{pc(food)} * POP) + Q^{w}_{feed} + Q^{w}_{sd} + Q^{w}_{ls}]. \tag{2.17}$$

The wheat production function is calculated as the product of area planted (in share equation system framework) and yield as shown in equation (2.18). The share of the wheat in total area sown to field crops is a function of the one-period lag of gross wheat returns (yield multiplied by producer price), the one-period lag of gross returns for substitutes, the one-period lag of wheat's share of total area and a dummy variable. The dummy variable is a policy dummy that captures the impacts of the 1980 policy reform. The equation system cover six crops (wheat, barley, cotton, sunflower, lentils, and chickpea) and the share of these six crops is 85 percent of total area sown to field crops from 1993 to 1995:

$$S^{w}_{t} = f(S^{w}_{t-1}, GR^{w}_{t-1}, \sum_{i=1}^{n} GR^{s}_{t-1}, \Theta, e). \tag{2.18}$$

Wheat yield is specified as a function of time trend (technology) and dummy variable (rainfall or other weather conditions);

$$Y_{i} = f(T, \Theta, e). \tag{2.19}$$

First, the area sown to wheat is derived from estimated total field crops area, then wheat production is calculated as the product of wheat area sown and yield.
Total area sown to field crops is specified as a function of lagged total field crops area and fallow land,

$$FCA_{t} = f(FCA_{t-1}, FL_{t}, e). \tag{2.20}$$

The fallow land is further specified as a function of its own lag and a trend:

$$FL_t = f(FL_{t-1}, T, e). \tag{2.21}$$

The excess supply (demand) of wheat is the difference between domestic demand and supply. It is assumed that the stock level is constant with recent average,

$$Q^{w}_{ed,es} = Q^{w}_{d} - Q^{w}_{s}. \tag{2.22}$$

The supply of imported (demand for exported) wheat is perfectly elastic since Turkey is a small trading country. The price of imported (exported) wheat at the producer level is a function of border price, external duties, internal taxes, and marketing costs,

$$P^{w}_{p} = f(P^{w}_{b}, et^{w}, it^{w}, mc^{w}, e). \tag{2.23}$$

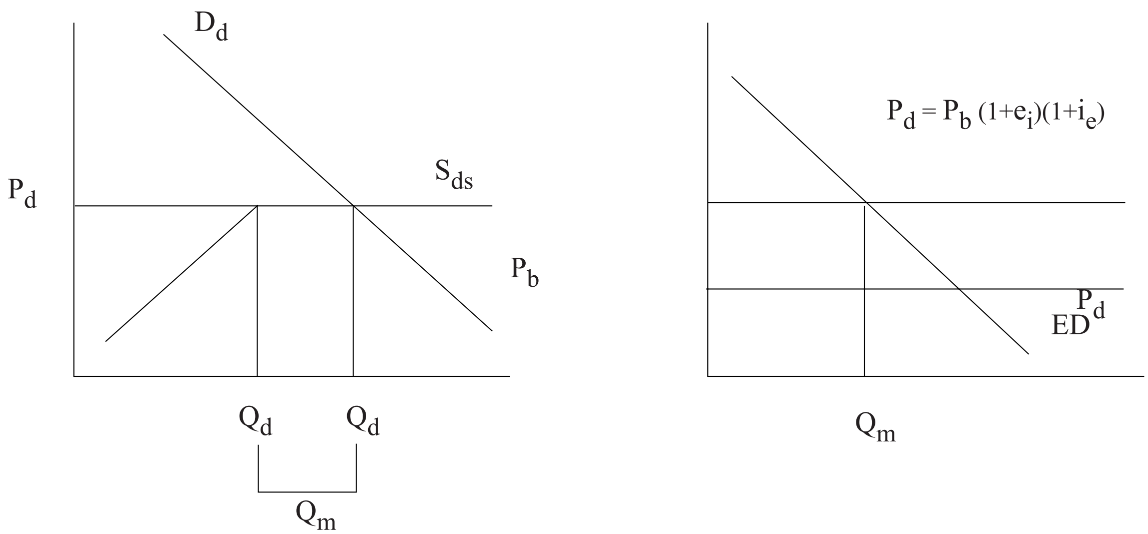
The equilibrium conditions are imposed by equating excess demand or supply with imported or exported wheat at the estimated price level,

$$Q^{w}_{ed,es} = Q^{w}_{ims,exd}. \tag{2.24}$$

Schematic Model for Rice

Figure 2.4 shows the Turkey rice model. Turkey has imported significant quantities of rice since 1984. Presently, the import supply of rice represents approximately 50 percent of domestic consumption.

Similar to that of wheat, rice demand is specified in a single-equation framework. It is specified as a function of per capita income and dummy variable. The price of rice was initially included in the model, but different estimation indicated that its own-price is not significant. This may be due to consumption habits, because rice is mostly consumed in urban Turkey. In rural areas, boiled and pounded wheat is commonly used rather than rice. Despite the fact that aggregate disappearance consumption doesn’t respond to price,



(i) Domestic Rice Supply-Demand

(ii) Excess Demand-Import Supply

FIGURE 2.4. Rice trade equilibrium in Turkey

$$Q^{r}_{pc} = f(Y, \Theta, e). \tag{2.25}$$

A support price was implemented by the GOT between 1967 and 1973, and 1991 and 1993 to encourage production of paddy. Moreover, paddy producers also benefited from other government support such as fertilizer subsidies, and low interest credits. To produce paddy, farmers have to have irrigated land and a permission certificate for planted area from the Ministry of Agriculture. The paddy area response model is specified as a function of area sown (t-1) and wholesale rice price (t-1).

$$A^{P}_{t} = f(A^{P}_{t-1}, P^{wpr}_{t-1}, e). \tag{2.26}$$

The yield model is specified as a function of time trend,

$$YD^{P}_{t} = f(T, e). \tag{2.27}$$

Paddy production is calculated as the product of area planted and yields. Equation (2.26) is multiplied by equation (2.27). Using a conversion factor, domestic rice supply is derived from paddy production.

Assuming stock level is constant and taking the difference between domestic demand and domestic supply of rice, an excess demand function (import supply function) is derived at every price level:

$$Q_{ed}^{r} = Q^{r} - Q_{ds}^{r}. \tag{2.28}$$

The supply of imported rice is perfectly elastic since Turkey is a small country. The price of imported rice at the retail level is a function of border price, external duties, internal taxes, and marketing cost; that is,

$$P_{r}^{r} = f(P_{b}^{r}, et^{r}, it^{r}, mc^{r}). \tag{2.29}$$

The equilibrium condition requires equating excess rice demand with imported supply of rice at the estimated price level,

$$Q_{ed}^{r} = Q_{is}^{r}. \tag{2.30}$$

Schematic Model for Sugar

The schematic representation of the Turkey sugar model is exactly like the wheat model (Figure 2.5). Net trade can be assumed to be residual because it depends on the domestic sugar beet production shock and stock level. Historical price data show that the domestic sugar price is well above the world price. Hence, sugar exports are only possible with an export support subsidy.

Consumer demand of refined sugar is specified as a function of per capita income, its own-price, and a dummy variable. The price of substitute and complementary goods were omitted from the demand equation to maintain a parsimonious specification.

It is difficult to discern clear substitutes and complementary goods for sugar; nevertheless, given the food consumption habits and dietary habits in Turkey, we may consider tea, flour, and vegetable oil the principal complementary goods. Consequently, the influence of complementary goods on sugar consumption is approximated using a dummy variable to indicate when prices of complementary goods rise more rapidly than the sugar price. Historically, an inverse relationship has existed between Turkish sugar consumption and the change in the food price index relative to the sugar price.

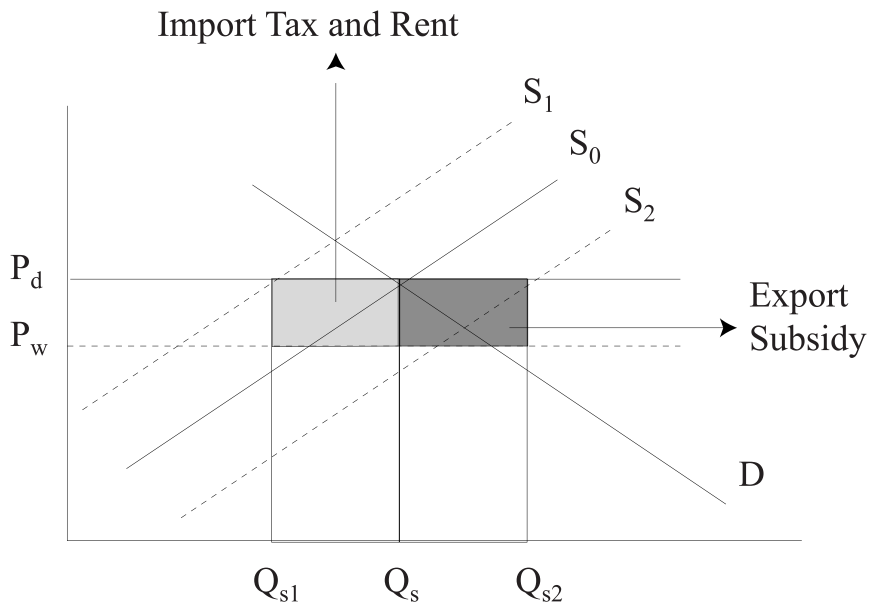


FIGURE 2.5. Sugar trade equilibrium in Turkey

Sugar consumption declines when the food price index rises more rapidly than the sugar price, as it did from 1985 to 1988; thus, the dummy variable for this time period captures the negative impact of rising prices for complementary goods;

$$Q^{s}_{pc} = f(P^{s}_{r}, Y, \Theta, e). \tag{2.31}$$

Sugar beets are produced throughout Turkey. Almost all beets are grown under contract with state-owned or state-regulated refineries. As part of the contract the refineries prescribe the optimal crop rotation for the region (a three-year rotation). A common rotation includes cereals, pulses, fodder crops, and sunflower. Planting begins as early as February and continues through May. The harvest starts late in July and continues through November. Turkish Sugar Corporation (TSC) and the Central Union of Sugar Beet Producer Cooperatives (PANKOBIRLIK) guarantee they will buy all beets produced under contract. This policy ensures that farmers have a market, so they prefer to produce beets even though the price may not always be as high as they want. TSC provides seeds and fertilizers to farmers as part of the production contract. Farmers must use TSC-provided seeds but are free to purchase fertilizers from other sources. Farmers generally prefer to use TSC-provided fertilizers because payment for the fertilizers is deducted from the farmer's proceeds after harvest. This advantage, however, is countered by the fact that farmers generally do not receive their final payment until the following March or later. Since the final payment represents a significant portion of total return, the opportunity cost of the farmers' capital is significant because of high inflation. TSC also provides harvesting equipment or custom harvest services, as needed.

Farmers are responsible for other inputs, including land and labor, irrigation, and transportation from farm to the factory or other central collection points.

Area response for sugar beet is specified as a function of own-lag (t!3) producer price(t!1), wheat price (t!3), and a policy dummy:

$$A_t^{SB} = f(A_{t-3}^{SB}, P_{t-1}^{SB}, P_{t-3}^{W}, \Theta, e). \tag{2.32}$$

The yield model is specified as a function of producer price (t-1), time trend, and climate condition,

$$YD_t^{SB} = f(P_{t-1}^{SB}, T, \Theta, e). \tag{2.33}$$

Sugar beet production is calculated as the product of area planted and yields. Equation (2.32) is multiplied by equation (2.33). Using the conversion factor, refined sugar production is derived from sugar beet production. Taking the difference between domestic demand and domestic production of sugar, the stock level is derived at every price level,

$$Q_{stc}^{s} = Q_d^s - Q_P^S. \tag{2.34}$$

This excess production or demand primarily determines stock levels and net trade. So, net trade is estimated as a function of stock level (t-1) and a policy dummy variable,

$$Q_{NT}^{s} = f(Q_{stc,t-1}^{s}, \Theta, e). \tag{2.35}$$

The supply of imported sugar or demand of exported sugar is perfectly elastic since Turkey is a small country. The price of imported sugar or exported sugar at the retail level is a function of border price, external duties, internal taxes, and marketing costs,

$$P_r^s = f(P_b^s, et^s, it^s, mc^s). \tag{2.36}$$

The equilibrium condition requires equating sugar demand with production and net trade of sugar at the estimated price level.

$$Q_d^s = Q_p^s - Q_{NT}^s \qquad (2.37)$$

The primary objective of Turkish sugar policy is self-sufficiency. The GOT determines production and uses buffer stocks as the basis for their estimated domestic demand (OECD 1994). Sugar stock varies from one year to another due to the production shocks. The main objective of imports and exports is maintaining buffer stock level. Turkey sugar exports are concentrated in regional markets such as Iran, Bulgaria, and the Middle East.

Schematic Model for Maize

The maize model is similar to the rice model (Figure 2.6). Turkey's maize imports have grown steadily since the early 1980s, in conjunction with growth of the poultry sector, while maize production in Turkey doubled between the early 1970s to early 1990s. Maize is modeled similar to rice, but there are a few changes that need to be accommodated.

Maize is used by the livestock sector, food industry (to produce oil, gluten, flour, starch, etc.), and for human consumption (popcorn and bread). However, the share of direct human consumption has decreased in recent years.

All maize users purchase it directly from producers, intermediates, or Turkish Grain Boards (TGB). Hence, the producer price is adequate for derived demand shifters.

Per capita food demand of maize demand (food industry and direct consumption) is specified as a function of own-lag (t-1), maize producer price, per capita income, and dummy variables The dummy variables take impacts of unknown external shocks,

$$Q_{pc}^{food} = f(Q_{pct-1}^{food}, P_p^m, Y, \Theta, e). \qquad (2.38)$$

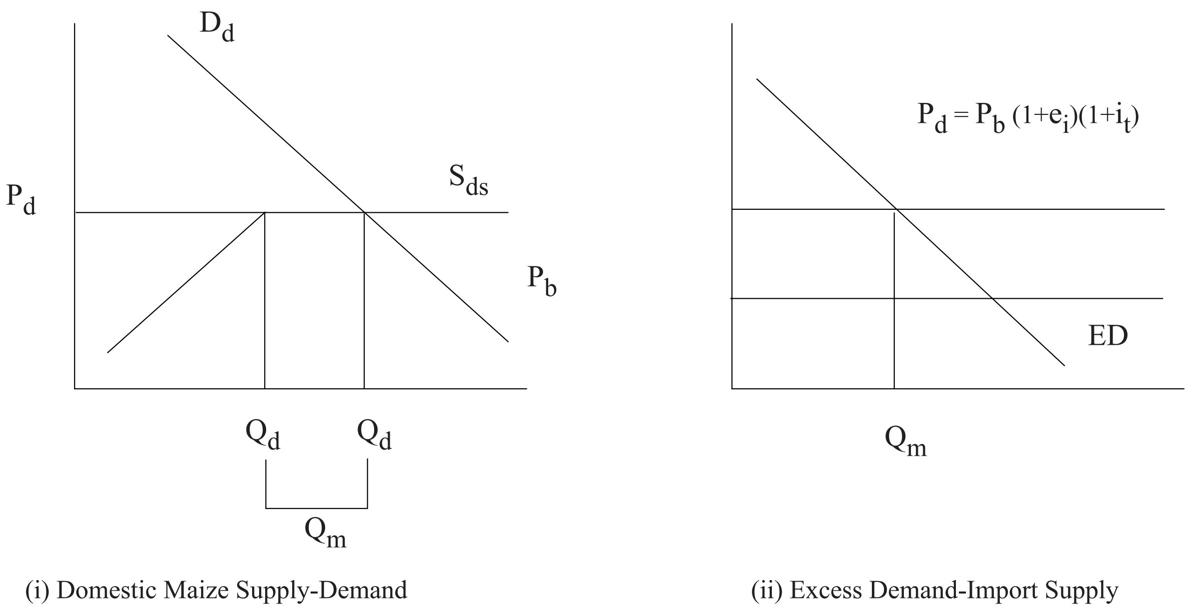


FIGURE 2.6. Maize trade equilibrium in Turkey

The feed demand of maize is specified as a function of trend and egg-broiler feed requirement index[3],

$$Q^{feed} = f(Trend, IN^{eb}, e). \tag{2.39}$$

Total maize use is the sum of the demand for feed use and industry use (including direct human consumption), demand for seed uses, and losses,

$$Q^{m}_{tu} = [Q^{m}_{food} + Q^{m}_{feed} + Q^{m}_{seed} + Q^{m}_{loss}]. \tag{2.40}$$

Similar to sugar beets, maize production can be estimated from area sown and yields. Maize area sown is specified as a function of own-lag (t!1), cotton producer price (t!1), own producer price (t!1), and dummy for weather condition:

$$A^{m}_{t} = f(A^{m}_{t-1}, P^{m}_{t-1}, P^{ct}_{t-1}, \Theta, e). \tag{2.41}$$

The yield model is specified as a function of own-lag (t-1), producer price (t-1), trend dummy for production technology such as seeds, irrigation practice, plant protection practice, etc., and a dummy for weather,

$$YD_t^m = f(YD_{t-1}^m, P_{t-1}^m, T, \Theta, e). \tag{2.42}$$

Maize production is calculated as the product of area planted and yields. Equation (2.41) is multiplied by equation (2.42).

Assuming the stock level is constant and taking the difference between domestic demand and domestic supply of maize, an import supply function is derived at every price level:

$$Q_{is}^m = Q_p^m - Q_{md}^m. \tag{2.43}$$

The supply of imported maize is perfectly elastic since Turkey is a small country. The price of imported maize at every price level is a function of border price, external duties, internal taxes, and marketing cost; that is,

$$P_p^m = f(P_b^m, et^m, it^m, mc^m). \tag{2.44}$$

The equilibrium condition requires equating excess maize demand with imported maize supply at the estimated price level,

$$Q_{ed}^m = Q_{is}^m. \tag{2.45}$$

Schematic Model for Soybeans

A schematic representation of the Turkey soybean model is similar to the rice and maize models. Turkey is a net soybean importer. The level of soybean import quantity has grown steadily since the early 1980s, in conjunction with the growth in livestock production, especially growth in poultry sector. The import supply of soybeans has been a big portion of domestic use since the early 1980s. Besides full-fat soybean imports, Turkey also imports soybean meal and soybean oil. Traditionally, Turkey is also a net importer of raw vegetable oils such as sunflower, cottonseed, palm, and soybean. Soybean industry demand (including the direct use of full-fat soybeans) is specified as a function of own-lag (t-1), own-price, and egg-poultry requirement index,

$$Q_{ind,t}^{sb} = f(Q_{ind,t-1}^{sb}, P_p^s, IN_{feed\,t}^{eb}, e). \tag{2.46}$$

Total use of soybeans is the sum of the demand for industry consumption, demand for seed uses, and losses:

$$Q_{tu}^{sb} = [Q_{ind}^{sb} + Q_{seed}^{sb} + Q_{loss}^{sb}]. \tag{2.47}$$

Similar to sugar beet, maize, and rice production, soybean production is derived from area sown and yields. Soybean area sown is specified as a function own-lag (t!1), soybean/maize producer price ratio (t!1), and a dummy for weather,

$$A_t^{sb} = f(A_{t-1}^{sb}, P_{p,t-1}^{sb/m}, \Theta, e). \tag{2.48}$$

The yield model is specified as a function of own lag (t-1) and producer price (t-1),

$$YD_t^{sb} = f(YD_{t-1}^{sb}, P_{p,t-1}^{sb}, e). \tag{2.49}$$

Soybean production is calculated as the product of area planted and yields. Equation (2.48) is multiplied by equation (2.49).

Assuming the stock level is constant and taking the difference between domestic demand and domestic supply of soybeans, an import supply function is derived at every price level:

$$Q_{is}^{sb} = Q_{p}^{sb} - Q_{md}^{sb}. \tag{2.50}$$

The supply of imported soybeans is perfectly elastic since Turkey is a small country. The price of imported soybeans at every price level is a function of border price, external duties, internal taxes, and marketing cost; that is,

$P_p^{sb} = f(P_b^{sb}, et^{sb}, it^{sb}, mc^{sb}).$ (2.51)

The equilibrium condition requires equating excess soybean demand with imported soybean at the estimated price level,

$$Q_{ed}^{sb} = Q_{is}^{sb}. \tag{2.52}$$

Schematic Model for Barley

A schematic representation of the Turkey barley trade model is similar to those for wheat and sugar. The production shocks are primary factors that determine the level of barley trade. Consequently, Turkey's net barley trade is residual. It depends on production shocks and stock levels.

Total barley use consists of feed use, industry use (beer, pasta, etc.), seed use, and losses. There are no available data for feed use and food industry use; hence, aggregate market demand is specified as a function of milk production, maize/barley producer prices ratio, weather dummy, and unknown external shock:

$$Q^{b}_{md} = f(Q^{milk}_{p}, PR^{(m/b)}_{p}, \Theta, ES, e). \qquad (2.53)$$

Total barley use is the sum of the market demand, seed uses, and losses.

$$Q^{b}_{tu} = [Q^{b}_{md} + Q^{b}_{seed} + Q^{b}_{loss}]. \qquad (2.54)$$

Similar to wheat, barley production is derived from area sown and yields. Barley area share in total area sown to field crops is a function of one period lag of own gross-return (yield is multiplied by producer price), one period lag of gross-return for substitutes (wheat, cotton, sunflower, lentils, and chickpea) and lag of own share (t!1),

$$S^{B}_{t} = f(S^{B}_{t-1}, GR^{B}_{t-1}, \sum_{i=1}^{n} GR^{s}_{t-1}, \Theta, e). \qquad (2.55)$$

Barley yield is specified as a function of time trend (technology) and dummy variable (rainfall or other weather condition):

$$YD^{b}_{t} = f(T, \Theta, e). \qquad (2.56)$$

Barley production is calculated as the product of area planted and yields. Area sown to barley is derived from estimated sown area to field crops.

It is assumed that the stock level is constant and taking the difference between domestic market demand and domestic production derives an import supply (or export demand) at every price level,

$$Q^{B}_{exd,is} = Q^{B}_{d} - Q^{B}_{p}. \tag{2.57}$$

The import supply (or export demand) of barley is perfectly elastic since Turkey is a small trading country. The barley producer price is a function of border price, external duties, internal taxes, and marketing cost,

$$P^{b}_{p} = f(P^{b}_{b}, et^{b}, it^{b}, mc^{b}). \tag{2.58}$$

The equilibrium conditions are imposed by equating excess supply or demand with imported or exported barley at the estimated price level;

$$Q^{m}_{exd,is} = Q^{b}_{ex,im}. \tag{2.59}$$

Schematic Model for Vegetable Oil (Sunflower, Cottonseed, and Soybean)

Schematic representation of the vegetable oil trade model is similar to those for maize and soybean. Traditionally, Turkey is a net importer of raw vegetable oil, but the level of net import mostly depends upon the production level of sunflower, cotton, and soybean. To calculate the contribution of domestic raw vegetable oil supply to total supply, it is also important to take into account oilseed imports.

Turkish vegetable oil consumption consists of sunflower oil, cottonseed oil, soybean oil, olive oil, maize oil, palm oil (in recent years), and other sources. But the share of sunflower, cottonseed, and soybean is more than 75 percent of total consumption. The share of olive oil is approximately 0.5 percent.

Turkey is a principal olive oil exporter in the world market. Turkish olive oil exports depend upon periodicity in production and yields. Turkey also exports margarine and refined liquid oil in consumer-ready packs to regional markets such as the Middle East countries.

Margarine comprises approximately 40 percent of total domestic consumption. The Turkish consumer uses margarine both for cooking and breakfast. The margarine for breakfast is a substitute for butter, cheese, and other high-value dairy products in low-income households. At the same time, margarine is also a substitute for butter in confectionery manufacturing such as sweets. Egg is also consumed mostly at breakfast and used in confectionery manufacturing such as sweets and pasta. It is reasonable to consider vegetable oil, milk, and eggs as a separate subgroup because there is at least a moderate substitute or complementary relationship among them.4 Aggregate market demand for vegetable oil is specified as an AIDS. The estimated share equation can be expressed as a function of weighted retail price of vegetable oils, price of close substitute products (egg and milk), and expenditure. To capture dynamic adjustment, first difference of the own share, first difference of all prices, and expenditure is included as explanatory variables. A logarithmic trend and dummy variables are also included; that is,

$$S_{pc}^{vo} = f(\Delta S, P_r^{vo}, \Delta P_r^{vo}, P_r^s, \Delta P_r^s, M, \Delta M, LT, \Theta, e). \tag{2.60}$$

Similar to wheat and barley; sunflower and cotton production are derived from area sown and yields.[5] The area share of sunflower and cotton are a function of a one-period lag of own gross-return of sunflower and cotton (yield multiplied by producer price), one period lag of gross-return for substitutes (i.e., for sunflower, cotton, wheat, barley, lentils, and chickpea) and the lag of own-share (t-1). In the cotton equation, a trend variable is included instead of own-share:

$$S_t^{SF} = f(S_{t-1}^{SF}, GR_{t-1}^{SF}, \sum_{i=1}^{n} GR_{t-1}^{s}, \Theta, e),$$

$$S_t^{CT} = f(GR_{t-1}^{CT}, \sum_{i=1}^{n} GR_{t-1}^{s}, T, e). \tag{2.61}$$

Sunflower and cotton yields are specified as a function of time trend (technology) and dummy variable (rainfall or other weather conditions):

$$YD_t^{SF} = f(T, \Theta, e),$$

$$YD_t^{CT} = f(T, e). \tag{2.62}$$

Both sunflower seed and cottonseed are calculated as the product of area planted and yield. Area sown to sunflower and cotton are derived from estimated area sown to field crops. Cottonseed is calculated from cotton production by using conversion factors. Summing of oil extraction from domestic production of sunflower seed, cottonseed, and soybean derives total domestic supply of vegetable oils. Olive oil and others are omitted due to their its small share in total production.

At every price level, taking the difference between domestic vegetable oil demand and supply of vegetable oils from domestic oil seeds production derives the excess demand (or import supply).

$$Q_{is}^{vo} = Q_{d}^{vo} - Q_{sfds}^{vo}. \tag{2.63}$$

The supply of particular imported raw vegetable oils is perfectly elastic since Turkey is a small trading country. The vegetable oil retail price is a function of border price, external duties, internal taxes and marketing cost,

$$P_{r}^{vo} = f(P_{b}^{vo}, et^{vo}, it^{vo}, mc^{vo}). \tag{2.64}$$

Equating excess demand with imported supply at the estimated price level imposes the equilibrium conditions,[6]

$$Q_{ed}^{vo} = Q_{is}^{vo}. \tag{2.65}$$

Livestock Model Specification

The livestock sector model includes poultry, beef, mutton, eggs, and milk. A standard trade model similar to that of crops is used to model these commodities. The only peculiarity is in the lag structure that captures the biological process involved in production.

Turkey has been importing meat and dairy products since the mid-1980s. Beef imports have increased considerably due to the shortage of domestic supply relative to the domestic demand in recent years. Turkey traditionally has been a net exporter of live sheep and mutton, but the shortage of sheep stock numbers and increasing domestic meat prices in recent years have considerably reduced exports. Since 1987 Turkey has also been importing breeding cows to improve the cattle carcass and milk yield. To keep consumer prices stable, the domestic market has also been opened for beef cattle in recent years.

Excess beef demand is derived from domestic supply and market demand. Then a perfectly elastic import supply is imposed and adjusted for external duties and internal taxes in the excess demand space to determine to equilibrium quantity imported. The same price is fed back to the domestic supply and demand to determine the equilibrium quantity supplied and demanded.

The market demand for chicken, beef, and mutton are specified as AIDS.[7] The estimated equation can be expressed as a function of own-price, price of substitute product (for beef demand there is chicken and mutton), and expenditure. To capture the dynamic adjustment, first differences of all prices and expenditures are included as explanatory variables. Dummy variables are also included,[8]

$$S_{pc}^{beef} = f(P_r^{beef}, \Delta P_r^{beef}, P_r^s, \Delta P_r^s, M, \Delta M, \Theta, e). \tag{2.66}$$

The domestic beef supply is specified as a function of own-producer price (t) and (t-1), producer price of cow milk (t), and time trend,

$$Q_{ds}^{beef} = f(P_p^{beef}, P_{p,t-1}^{beef}, P_p^{cwm}, T, e). \tag{2.67}$$

The domestic supply of chicken is specified as a function of broiler feed price index/producer price (live hens) (t-1), time trend, and dummy variables,[9]

$$Q_{ds}^{Chicken} = f(P_{t-1}^{FPI/P_{lh}}, T, \Theta, e). \tag{2.68}$$

The domestic supply of eggs is specified as a function of egg production (t-1), composed feed price/producer price ratio (t) and (t!1) and time trend,[10]

$$Q_{ds,t}^{E} = f(Q_{ds,t-1}^{E}, P_t^{FP/P}, T, e). \tag{2.69}$$

The domestic supply of milk is specified as a function of producer price (t!2) and time trend,[11]

$$Q_{ds}^{Milk} = f(P_{p,t-2}^{cwm}, T, e). \tag{2.70}$$

The milk net trade is specified as a function of domestic retail white cheese price and North European Cheese Export Price ratio (t-1) and lag of the net trade (own lag),

$$Q_{NT}^{Milk} = f(P_{t-1}^{DRC/NEUC}, Q_{NT[t-1]}^{Milk}, e) \tag{2.71}$$

Since Turkey imports only a negligible portion of its domestic milk consumption, the equilibrium price is determined by equating the domestic supply plus net trade to domestic demand. That is,

$$P^e = Q^s_{Dm} + Q^{NT} - Q^D. \qquad (2.72)$$

The domestic mutton supply is specified as a function of mutton price (t-1) and dummy variables,

$$Q^{Mutton}_{ds} = f(P^M_{p,t-1}, \Theta_t, e). \qquad (2.73)$$

Since Turkey is a small country in international beef import.[12] The price of imported beef at the producer level is a function of the border price of beef, external duties, internal tax, and marketing cost; that is,

$$P^{beef}_p = f(P^{beef}_b, et^{beef}, it^{beef}, mc^{beef}). \qquad (2.74)$$

Price in (2.74) is fed back to domestic supply and demand to determine the quantity demanded (Q_d) and supplied (Q_s), and fed back to the excess demand to determine the quantity imported (Q_m). The equilibrium condition is expressed in (2.73) where excess demand is equal to import supply,

$$Q^{beef}_{ed} = Q^{beef}_{is}. \qquad (2.75)$$

Tier IV: The Nutrient Component

The new price will filter into the Turkey country commodity model through the estimated supply and demand equation of the respective commodities. The outcomes of the model are per capita consumption patterns of household, production, and trade patterns. The per capita consumption of commodities at the household level will serve as input for the nutrition component to determine the macro- and micronutrient intake levels. Consumption is translated into nutrient intake using,

$$TN_i = \sum_{j=1}^{n} \beta_{ij} Q_{c,j}, \tag{2.76}$$

where TN is the total nutrient intake of the i^th^ nutrient, and β_{ij} is the proportion of the nutrient per unit of the j^th^ commodity consumed.

The vector of n -products (*Q with index j*) consumed includes wheat (as bread and cereal products), rice, sugar, oils, milk equivalent (yogurt, cheese and fresh milk), beef, mutton, chicken and egg. The vector of macro- and -micro nutrients (*index i*) includes energy, protein, fat, carbohydrates, fiber, calcium, iron, vitamin A, thiamin, riboflavin, and niacin.

To evaluate the nutritional outcomes of policy changes, the nutrient intake levels are compared with their respective recommended daily allowance (RDAs) to determine the degree of shortfall (or excess) from the RDAs. That is, a measure of nutrient adequacy is the ratio of the total intake of nutrient i to its corresponding recommended daily allowance.

$$ADQ_i = \frac{TN_i}{RDA_i}. \tag{2.77}$$

If this ratio approaches unity, it implies that intake of the i^{th} nutrient is adequate and meets the recommended daily allowance.

Household Socioeconomic and Demographic Characteristics

Various population groups (categorized by socioeconomic and demographic characteristics) are affected differently by price change. But, the income groups are first interest of this type economics study. Income groups response to price changes differ due to different proportions of expenditure for the commodities in their food basket, and different income elasticity. The nutritional impact of price change is further analyzed for the income groups. That is, the total nutrient intake is

$$TN_i^h = \sum_{j=1}^{n} \beta_{ij} Q_{c,j}^h \tag{2.78}$$

and the ratio of total nutrient intake to RDAs is

$$ADQ_i^h = \frac{TN_i^h}{RDA_i}. \tag{2.79}$$

The added index *h* represents the h^{th} household in the income grouping. A different price and income elasticity is derived for each income group. Differential price and income elasticity of household in different income group drives the differences in the consumption and nutrition impact by income group.

Consumption and nutritional impacts can also be analyzed for categories according to age, geographic location, family size, occupation, and head of household characteristics. But in this study, consumption and nutrition impact of price change on urban consumer were analyzed.

DERIVATION OF DEMAND ELASTICITY: MERGING THE TIME SERIES AND HOUSEHOLD EXPENDITURE SURVEY

A Separable Demand System in a Country Commodity Model

The commodity model for Turkey consists of two complete demand systems and four single demand equations. Besides food demand estimation, four single feed demand equations are also specified and estimated. The first complete demand system is the meat group, which consists of beef, mutton, and poultry. The second is the vegetable oils, eggs, and milk group. Single food demand equations were specified for wheat, rice, and sugar. Single feed demand equations were specified for soybean, maize, barley, and cottonseed meal. This section deals with the estimation of the conditional and unconditional elasticity from the complete demand system and the incorporation of information from the household expenditure survey in the elasticity estimates.

Dynamic Almost Ideal Demand System (AIDS)

Kesevan et al. (1993) specified the general dynamic almost ideal demand system (AIDS). This specification permits direct estimation of long-run parameters. This dynamic specification of AIDS is also used in this study. That is,

$$W_{it} = \sum_{i=0}^{n} f_{ij}\Delta W_{it} + \Phi_{i0j} + \sum_{k=1}^{s}\sum_{j=0}^{n}\Phi_{ikj}\ln P_{kt-j} + \sum_{j=0}^{n}\Phi_{i(s+1)j}\ln\frac{M_t}{P_t} +$$

$$+\sum_{k=1}^{s}\sum_{j=1}^{n} g_{ikj}\Delta\ln P_{kt-j} + \sum_{j=1}^{n} g_{i(s+1)j}\ln\frac{M_{t-1}}{P_{t-1}} + v_{it} \qquad (3.1)$$

where, W_{it} is the budget share of the ith commodity ($W_i = Q_iP_i / M$,

Q_i is the quantity demanded of ith commodity, P_i is the nominal price of commodity),

M is group expenditure on s commodities,

P_j is the nominal price of the jth commodity,

LnP is the corrected stone price index ($LnP=\sum_j W_j \ln P_j^*$)[13],

V_{it} is a vector of stochastic error terms,

f_{iij} is the element of i^{th} row and i^{th} column of the f_j coefficient matrix,

$_{ik}$ is the k^{th} element in the i^{th} column of Φ, and

g_{kij} is the k^{th} element in the i^{th} column of G_j.

Equation (3.1) allows us to impose the demand restrictions implied by the axioms of preference in demand theory (i.e., adding-up, homogeneity, and symmetry) on *long-run* parameters. The demand restriction in this formulation (equivalent those originally derived by Deaton and Muellbauer 1980) are

Adding-up:

$$\sum_{j=1}^{s} \Phi_{ij} = 1, \sum_{i=1}^{s} \Phi_{ik} = 0, \forall k = 1, \dots, s+1; \tag{3.2}$$

Homogeneity:

$$\sum_{k=1}^{s} \Phi_{ik} = 0; \, and \tag{3.3}$$

Symmetry:

$$\Phi_{jk} = \Phi_{kj} \forall k, j = 1, \dots, s \tag{3.4}$$

Note that Φ_{i0} is the intercept parameter, Φ_{ik} (k=1, … s) are parameters of prices, and Φ_{s+1} is the parameters for real expenditure of the i^{th} equation.

Deriving Conditional Elasticity from Time-Series Data

Elasticity estimates provide a convenient scale-free measure of the responsiveness of demand with respect to changes in its argument. Green and Alston (1991) provided conditional elasticities of the AIDS demand model. Following Green and Alston, the general formula for expenditure, uncompensated, and compensated price elasticities for both the long-run and short-run are:

Expenditure

$$e_i = 1 + (\Phi_i / W_i), \tag{3.5}$$

Marsallian

$$e_{ij} = \delta_{ij} + ((\Phi_{ij} - \Phi_i W_j) / W_i), \tag{3.6}$$

Hicksian

$$e_{ij} = \delta_{ij} + ((\Phi_{ij/} W_j) + W_i), \tag{3.7}$$

where $\delta_{ij} = 1$ if $i = j$, 0 if $i \neq j$.

The theoretical restriction in the parameters of the demand model given in equations (3.5), (3.6), (3.7) also automatically translate in satisfying the theoretical restriction in the estimated conditional elasticities. That is,

Adding-up:

$$\sum_{i=1}^{s} e_i w_i = 1; and \sum_{j=1}^{s} e_{ij} w_j = -w_j, \tag{3.8}$$

Homogeneity:

$$\sum_{i=1}^{s} e_{ij} = -e_i and \sum_{j=1}^{s} e^*_{ij} = 0, \tag{3.9}$$

Symmetry:

$$e_{ij} = e_{ji} \frac{w_j}{w_i} + W_j (e_i - e_j), \tag{3.10}$$

where e_i is the expenditure elasticity, W_i is the expenditure share of the i^{th} commodity, and e_{ij} and e_{ij}^* are the Marsallian and Hicsian elasticities, respectively.

Deriving Unconditional Elasticities from a Conditional Demand System

This section describes a practical methodology for converting conditional elasticities into the unconditional elasticity, which is more appropriate for policy analysis. Let equation (3.11) represent the group expenditure (e.g., meat group),

$$Ln\,M_t = \alpha_0 + \beta_1 LnPI_t + \beta_2 LnY_t + \beta_3 T + \varepsilon_t \,, \qquad (3.11)$$

where

M is the per capita group expenditure,

PI is the corrected stone price index,

Y_i is the per capita GDP (proxy of disposable income),

T is the time trend,

ε_t is the stochastic error term,

∀ and ∃'s are coefficients.

The following formula converts conditional elasticity into unconditional elasticity (Shenggen et al. 1995; John et al. 1996; Edgerton1997; Rickertsen 1998):[14]

Unconditional Elasticities

$$E_{iu} = E_i * e_i \,, \qquad (3.12)$$

$$e_{iju} = E_{ij} + e_i [W_j + (W_j e_2)], \qquad (3.13)$$

where

E_{iu} is the unconditional expenditure elasticity of the i^th^ commodity,

e_i is the conditional expenditure elasticity of the i^th^ commodity,

E_i is the income elasticity of group expenditure,

e_{jiu} is the conditional price elasticities,

E_{ij} is the conditional price elasticities, and

W_j is the budget share of the j^th^ commodity in the group expenditure.

e_2 is the own-price elasticity of group expenditure.

Incorporating Information from Household Expenditure Survey in the Unconditional Elasticity Estimation

The unconditional elasticities[15] derived from time-series data (i.e., equations (3.12) and (3.13)) provide an aggregate measure of the responsiveness of the consumer. These estimates can be enriched with more disaggregated information from household expenditure surveys that can provide measures of differential responsiveness based on income, location, and other household characteristics. What follows is a proposed methodology for constructing new elasticity estimates by merging information from time-series data and the 1994 household expenditure survey in Turkey. The starting equation is the Slutsky decomposition of the elasticity into substitution and income effects. That is, the elasticity from time series data can be decomposed into

$$e_{ij} = e_{ij}^{*} - w_j e_i . \tag{3.14}$$

The key assumption in this methodology is that differential responsiveness of the consumer is attributed wholly to the income effect. From equation (3.14) a Hicksian elasticity, which is assumed to be constant across households, can be estimated. That is,

$$e_{ij}^{*} = e_{ij} + w_j e_i = e_{ijh}^{*} \; \forall h . \tag{3.15}$$

where, *h* is the household index. With the assumption giving equation (3.15) from time-series data and household-specific income elasticities and expenditure share by commodity from the household expenditure survey, a set of elasticity estimates by household category can be constructed using equation (3.16):

$$e_{ijh} = e_{ijh}^{*} - w_{jh} e_{ih} \tag{3.16}$$

The additional information provided by the household expenditure survey is the differential income elasticity across household (e_{ih}) and the differential allocation of income across households (w_{jh}). Also, equation (3.16) can be augmented to allow examination of changes in income distribution. That is,

$$e_{\tilde{ij}} = \sum_{h=1}^{H} P_h e_{ijh}^{*} - \sum_{h=1}^{H} P_h W_{jh} e_{ih} , \tag{3.17}$$

where the parameter P_h is the proportion of the households in a particular income category. All other variables are constant, a change in the distribution in income will change the constructed elasticity in (3.17).

DATA, ESTIMATION, AND VALIDATION

Data Requirement

The data requirements of the model are listed in Appendix A. The data were obtained from two main sources. Area, yield, production, prices, population, household consumption expenditure, price indices, GDP, and GDP deflator were taken from publications issued by the State Institute of Statistics (SIS) Prime Ministry, Republic of Turkey. The consumption, export, import, and stock data were from the Ministry of Agriculture and Rural Affairs (MARA). The consumption data are disappearance consumption. This disappearance consumption series is derived as a residual in an accounting identity of the sources and uses of a commodity. Sources of a commodity include current production, imports, and beginning inventory. Data obtained from the MARA are the same data series used by the OECD to calculate producer and consumer subsidy equivalents. The 1979-93 series of consumption, export, import, and sugar production data are reported in the OECD country report for Turkey (1994).[16]

Price of inputs such as feeds were obtained from The Union of Turkish Agricultural Chambers. Policy variables included, in particular the schedule of import tariffs, was obtained from Official Press, OECD (1994) Country Report: Turkey and other studies.

Parameter Estimation

Since Turkey is a small player in the international market, it faces a perfectly elastic import supply or export demand, making the price exogenous as determined by the world market.

Border duties and internal taxes simply put a wedge between the world and domestic prices. The supply and demand functions can thus be estimated separately without introducing simultaneity bias in the estimates.

Two structural demand models were estimated separately using Iterative Three-Stage Least Squares. The first structural demand model consists of meat, and the second consists of vegetable oils, milk, and eggs. Structural demand models were specified as an

Almost Ideal Demand System (AIDS). Actual estimation was accomplished through SAS and SHAZAM 8.0.

The standard specification of an AIDS model expresses the expenditure share of each commodity as a function of its own-price, prices of related commodities (complements and substitutes), and real expenditures. The specification included the first and second difference of the expenditure share, and a trend to capture dynamic adjustments of consumers. The model allows direct estimation of the long-run parameters. The theoretical demand properties were imposed only on the long-run parameters.

Single supply and demand models were estimated using ordinary least squares (OLS). Where simultaneity exists, Two-Stage Least Squares was employed for estimation. When serial correlation is not corrected with the dynamic specification or functional form, a Cochrane-Orcutt iterative estimation procedure was used. Single supply equations included maize, soybean, sugar beet, rice, beef, mutton, chicken, milk, and egg. Single demand equations included sugar, wheat, rice, corn, barley, soybeans, and cottonseed meal.

A system of supply equations for wheat, barley, cotton, sunflower, lentils, and chickpea was also estimated using Iterative Three-Stage Least Squares a system of supply equations expressed the area share of each commodity as a function of its own-lag, own-gross-return, and gross-return of related commodities. In this specification, time trend and policy dummy were also included. Adding-up and symmetry restrictions were imposed on the supply system. Crops included in the supply system account for 85 percent of total area sown.

To avoid singularity in the system and to satisfy the adding-up restriction, the rest of the crops were excluded from the supply system. It is assumed that trend and policy dummy variables are proxy of the gross-return of the excluded equation.

The estimated parameters for demand systems, supply systems (in terms of area and yield), and price transmission equations are presented in Tables B.1 to B.57.

Elasticity estimated from the time series model and household data are presented in Tables C.1 through C.28. The estimated parameters for household expenditure are given in Tables D.1 to D.20.

The adequacy of the estimated complete demand system displays all the theoretical demand properties since these were imposed in the estimation (i.e. homogeneity). The long-run parameter estimates have correct signs as shown in the elasticity derived from them. That is, own-price elasticities are negative and expenditure elasticities are all positive. Many of the long-run parameters have coefficient estimates that are significant. Also, lagged regressors and trend are significant, suggesting dynamic adjustment of consumers.

The single demand model specification and supply functions show very good fit with R^2, mostly in the high 80 and 90 percent range. Durbin-Watson or Durbin (h) statistics suggest the absence of serial correlation.[17] Parameter estimates are theoretically consistent, giving the expected positive sign for own-price and negative sign for the substitute price in a standard supply function. Collinearity or multicollinearity may be present, especially when the R^2 is high and individual regressors have low t-values. However, since the model is primarily for simulation purposes, this was not addressed. When collinearity is present, estimates are still unbiased but not very efficient.

The price transmission equations show very good fit with R^2, most in the high 95 percent range. Durbin-Watson or Durbin (h) statistics mainly suggest absence of serial correlation. Parameter estimates are consistent with the expected direction of impact of price change transmission in the market chain. That is, an increase in the world price would increase the price at the producer and retail level. Also, changes in the exchange rate (i.e. devaluation) increase the domestic price.

Elasticity Estimation

Elasticity estimates provide a scale-free measure of supply and demand responsiveness to changes in its arguments (i.e., own-price, income, and input price). The sign of elasticity checks whether the minimum requirement of a downward sloping demand and upward sloping supply are met. Elasticity calculated from the estimated parameters satisfies all requirements of demand theory. It was calculated that all of the own-price elasticity is negative and all of the expenditure elasticity is positive. The price transmission elasticity shows a positive transmission from the world to producer and from producer to retail level. This means that producer prices respond positively to the devaluation of local currency.

Validation Statistics

Historical simulation of the model's core equation was used to validate the estimated model using a selected set of validation statistics. These statistics are presented in Tables B.58 and B.59. Table B.58 shows the prediction error expressed relative to the actual values of the endogenous variables. The first column reports the mean of the absolute value of the prediction error. The second column is the root of the mean square error. Smaller values indicate a good model.

Table B.59 decomposes the Mean Square Error (MSE) into three components: bias, variance, and covariance. The second decomposition includes the bias, regression, and disturbance. The latter offers more intuitive appeal than the former. The bias and regression components capture the systematic divergence of the prediction from actual values. Hence, for a good model the proportion of bias and regression should approach a small number (e.g., zero). On the other hand, the disturbance component, which accounts for the random divergence of the prediction from the actual values, should explain a large proportion of the MSE. Its value should approach one.[18]

BASELINE PROJECTION AND POLICY SIMULATION

Historical disappearance data and household nutrition studies indicate that the total calorie intake has not been an important problem in Turkey (see Tables E.1 to E.3). But total calorie consumption has not been balanced between vegetable and animal protein sources. The Turkish Dietetic Association Report for the Nutritional Situation of Turkish Peoples indicated that majority of Turkish citizens receive their recommended calorie requirements (TDA 1997). According to this report, insufficient calorie intake exists among the workers in the agricultural, construction, and mining sectors. Food intake and recommended daily allowances are presented in Tables E.3 to E.7.

During the period of 1988 to 1990, the average daily calorie intake per person in Turkey was 3,196 Kcal. But in the same period, only 8.2 percent of the calorie intake was derived from animal products (MARA 1994). In 1994-96, the average per capita annual disappearance consumption of meat, eggs, and dairy products (milk equivalent) in Turkey was 21.0, 9.0, and 99.8 kg. These disappearance data show that per capita consumption in Turkey is very low compared to the livestock product consumption in other developed and some developing countries.

Per capita meat and dairy consumption in selected countries is presented in Tables E.1 to E.2. To compare prices and consumption in selected countries, producer and consumer prices of livestock products are also given in Table E.8 and E.9.

The TAPAM was used to assess the impacts of world price changes on demand and production of livestock and crops. In addition to this evaluation, the impact of the tariff reduction on livestock supply, demand, and animal protein consumption was further analyzed.[19] Since the food consumption data is not available for different socioeconomic and demographic grouping, livestock product and animal protein consumption were analyzed for household in selected province centers.

The robustness of the baseline and scenario results depends primarily upon the realization of the macro economic and other assumption about exogenous variable.

In order to analyze the impact of the tariff changes on demand and supply of livestock, it was necessary to construct a baseline under the existing policy regime. The estimated equations described in previous chapters were used to project future values for the endogenous variables.

Projections of macroeconomic variables were either assumed or taken from the projections published by the WEFA, OECD or FAPRI.

Table 1 and Table 2 provides a summary of the baseline assumptions for exogenous variables and world prices of the relevant commodities. World commodity prices were obtained from FAPRI baseline projections (1988).

Table 3 presents baseline price projection of the commodities included in this study. Table 4 provides domestic and world price comparison.

Table 5 to 8 includes cultivated field crops area, wheat, barley, maize, sunflower, cotton lint, soybean and vegetable oil.[20] All crop prices are linked to the world price, except lentils and chickpeas, which were assumed to change in proportion to the wholesale price index.

A series of assumptions were made for estimating total wheat demand. Seed use was assumed 200 kg per hectares and loss is assumed 8 percent of the estimated production (area planted multiplied by yield). Ministry of Agriculture and Rural Affairs (MARA) assumes that wheat area planted is 90 per cent of the State Institute of Statistics (SIS) data, loss is 8 percent of production and seed use is 200 kg for per hectare.[21] In this study, the SIS data was used for area planted for wheat. Similar assumptions were made for barley. Barley seed use was assumed 200 kg per hectare and loss is 9 per cent of estimated production. For rice, seed use assumed 170 kg per hectare as paddy equivalent of rice, and loss was assumed 5 percent of estimated production.

To estimate vegetable oil extraction from the domestic seed production, cottonseed, soybean and sunflower seed production were considered. Cottonseed production was derived from cotton production. It is assumed that cottonseed production is two-thirds of cotton lint production. It is further assumed that 90 percent of seed production is used for cottonseed oil production and the extraction rate is assumed 16 percent. It was assumed that the rest of the cottonseed production is used for seed use, loss and other use.

We assumed that the 95 percent of soybean and sunflower are used for oil production. The oil extraction rate was assumed 40.5 and 18.5 for sunflowers and soybeans, respectively.

In the Table 5, total wheat demand will slightly exceeds total wheat production after 1999. Barley demand will also exceeds domestic supply in 2003 and it will approach 1,973 tmt by the end of the projection period (Table 6). Maize production will continue to increase, particularly with yield growth, but this production growth will not meet domestic demand during the projection period (Table 6). Sunflower and cotton lint production will also continue to increase in yield (Table 7). Soybean consumption (included all type of consumption) will continue to increase rapidly and domestic production will continue to be a small percentage of total consumption.

Soy meal demands will also increase with growth of the poultry sector (Table 7). Vegetable oil production from the domestic source will continue to be less than vegetable oil demand. Baseline result indicates that rice production is almost stable, but demand will continue to growth substantially. Projected rice imports approaches 600 tmt by 2007, (Table 8).

Table 9 shows the livestock situation. Milk production will continue to increase and it will approach 8.1 million liters by 2007, 2.1 million liters greater than the milk production in 1997. Table 9 also shows that egg production will continue to meet domestic egg demand.

Beef production does not meet beef demand during projection period. Under the baseline assumption, beef import will exceed 220.3 tmt in 2003 and 413.7 tmt in 2007. Per capita annual mutton consumption will continue stable, at around 4 Kg. Mutton production will continue to meet domestic demand. But, the share of mutton in total meat consumption will continue to decline. Chicken production will also continue to meet domestic demand at the equilibrium price level. Table 9 indicates that by the end of the period, chicken production will be 1.56 times greater than 1997 production.

Tables 10 to 12 presents the impacts of the tariff reduction of beef and live sheep. Currently, the Turkish government is applying a tariff of 200 percent for beef and 115 percent for sheep. The tariff rate was 165 percent and 70 percent in 1996 for beef and sheep. In this study, the impact of the tariff reduction on livestock supply, demand, prices and household animal protein consumption was analyzed. Tables 10 and 11 present the impacts of this tariff reduction on beef and mutton production, consumption and prices.

Tables10 shows that beef production decreases about 10 percent and beef demand increases about 20 percent with a 25 percent tariff reduction. Broiler production and consumption will continues to stable with this tariff rate. Mutton production declines only slightly and mutton consumption increases about 24 percent in this tariff level. But, the increases in consumption will approach 14 percent and 13 percent in 1999 and 2000. The real price of beef will decline around 17 percent with this tariff rate change. The real price of mutton will decline around 15 percent during the projection period with this tariff rate. The tariff reduction of beef and sheep has also impacts on broiler price slightly.

The tariff reduction will increase beef and mutton consumption for household, but increase in mutton consumption will be greater than beef. The tariff reduction will reduce household chicken consumption to about 18 percent. The impact of a tariff reduction on total animal protein consumption remains stable in comparison to baseline.

Table 13 to15 presents the result of second tariff reduction scenarios of a 50 percent reduction of beef and sheep tariff. First, the consumption of mutton increases more than tariff reduction rate after 2001. The production of beef declines about 21 percent.

The retail price of beef will drop 34 percent and mutton will drop 30 percent. Chicken production and consumption will be not effected significantly, but chicken price will decline about 3 to 6 5 percent. Household mutton consumption will increase about 21 percent after 2000. This tariff will substantially affect the household chicken consumption because it will cause it to decline about 36 percent. Since the declining in chicken consumption will be greater than increasing in total reed meat consumption, household animal protein consumption will decline slightly in comparison to the baseline projection with this tariff rate.

The tariff reduction scenario indicates that the differences between consumption and production of beef will approach 718 tmt with the 25 percent tariff reduction and approach 1,137 tmt with 50 percent tariff reduction by 2007.

Table 1. Baseline Macroeconomics

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Population (Million)	62.88	63.82	64.78	65.75	66.67	67.60	68.55	69.51	70.48	71.40	72.33
Per Captia Real GDP(1987=100)	1,776	1,849	1,918	1,990	2,068	2,149	2,232	2,318	2,407	2,500	2,596
Wholesale Price Index(1968=100)	3,863.5	5,961.3	9,913.7	14,910.1	20,203.2	26,446.0	33,242.7	41,719.6	52,358.1	65,709.4	82,465.2
Consumer Price Index(1968=100)	4,637.2	7,869.3	13,000.0	19,552.0	26,551.6	34,756.1	43,618.9	54,741.7	68,700.9	86,219.6	108,205.6
Dollar Exchange Rate	151.9	250.6	413.5	620.2	843.4	1,096.5	1,370.6	1,713.2	2,141.6	2,676.9	3,346.2
					(percentage change from previous year)						
Population (Million)	1.50	1.50	1.50	1.50	1.40	1.40	1.40	1.40	1.40	1.30	1.30
Per Captia Real GDP(1987=100)	4.72	4.09	3.73	3.77	3.90	3.92	3.85	3.85	3.85	3.85	3.85
Wholesale Price Index(1968=100)	81.80	54.30	66.30	50.40	35.50	30.90	25.70	25.50	25.50	25.50	25.50
Consumer Price Index(1968=100)	85.70	69.70	65.20	50.40	35.80	30.90	25.50	25.50	25.50	25.50	25.50
Dollar Exchange Rate	86.56	65.00	65.00	50.00	36.00	30.00	25.00	25.00	25.00	25.00	25.00

Table 2. Baseline Exogenous Variables

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
World Price											
					(U.S. $ per metric tons)						
Wheat (FOB, Golf)	155.0	155.0	150.0	151.0	157.0	159.0	160.0	162.0	164.0	166.0	171
Barley (Portland)	135.8	132.5	131.5	136.2	136.7	138.0	139.4	139.8	141.7	144.4	144.4
Maize (CIF Rotterdam)	127.0	121.0	120.0	123.0	125.0	126.0	129.0	131.0	134.0	137.0	137.0
Soybean (CIF, Rotterdam)	275.0	258.0	257.0	256.0	261.0	263.0	270.0	272.0	280.0	283.0	283.0
Sunflower (CIF, Rotterdam)	262.0	249.0	248.0	247.0	251.0	253.0	258.0	259.0	265.0	268.0	268.0
Rice (FOB, Bangkok)	284.0	315.5	315.1	314.0	314.3	315.4	316.5	317.6	317.2	319.3	319.3
Cotton (Cotlook A Index)	1,713.0	1,632.0	1,631.0	1,648.0	1,665.0	1,683.0	1,698.0	1,703.0	1,719.0	1,734.0	1,734.0
						(U.S. $ per kg)					
Beef (Australian Export, CIF, U.S.)	1.88	2.35	2.58	2.71	2.65	2.49	2.35	2.27	2.18	2.15	2.20
Sheep (Australian Export, CIF, U.S.)	1.59	1.44	1.56	1.61	1.55	1.49	1.43	1.40	1.40	1.47	1.56

Table 3. Baseline Domestic Price Projection

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Domestic Price					(U.S. $ per metric ton)						
Wheat Producer	217.6	221.1	216.7	222.4	233.0	238.4	242.7	247.5	252.2	257.9	266.8
Barley Producer	150.0	188.8	189.0	197.5	199.4	202.3	205.3	206.7	210.4	215.4	216.2
Maize Producer	197.8	187.4	190.6	199.9	206.7	211.4	219.3	225.4	233.4	241.6	244.4
Soybean Producer	337.9	317.5	316.9	316.1	322.7	325.6	334.6	337.3	347.6	351.6	351.9
Sunflower Producer	428.3	452.4	450.6	448.8	456.0	459.7	468.7	470.6	481.5	486.9	486.9
Rice Wholesale	837.2	934.7	937.2	937.2	940.5	946.1	951.2	956.3	956.6	964.9	966.7
Cotton Lint Producer	712.2	682.3	686.2	697.1	707.4	717.6	726.2	730.4	739.4	748.0	750.1
						(U.S. $ per kg)					
Beef Producer	3.24	5.10	5.15	5.19	5.21	5.23	5.28	5.31	5.33	5.35	5.38
Sheep Market Price (Istanbul)	1.76	2.33	2.48	2.54	2.41	2.31	2.20	2.15	2.13	2.21	2.34

Table 4. Baseline World and Domestic Price Ratio

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Domestic/World Price					(percentage above world price)						
Wheat Producer	40.4	42.6	44.4	47.3	48.4	49.9	51.7	52.8	53.8	55.4	56.0
Barley Producer	10.4	42.5	43.8	45.0	45.9	46.6	47.3	47.9	48.5	49.2	49.8
Maize Producer	55.7	54.9	58.8	62.5	65.4	67.8	70.0	72.0	74.2	76.4	78.4
Soybean Producer	22.9	23.1	23.3	23.5	23.7	23.8	23.9	24.0	24.1	24.3	24.4
Sunflower Producer	63.5	81.7	81.7	81.7	81.7	81.7	81.7	81.7	81.7	81.7	81.7
Rice Wholesale	194.8	196.2	197.4	198.4	199.3	199.9	200.5	201.1	201.6	202.2	202.7
Beef Producer	72.3	117.0	99.7	91.7	96.8	109.9	124.6	133.8	144.3	148.6	144.6
Sheep Market Price (Istanbul)	11.1	62.2	59.4	57.3	56.1	55.0	54.2	53.2	52.2	51.0	49.7

Table 5. Baseline Crops Supply and Demand

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Cultivated Field Areas						(thousand hectares)					
Area Sown	18,522	18,446	18,469	18,500	18,533	18,568	18,603	18,638	18,672	18,705	18,738
Fallow Land	5,060	5,038	4,976	4,898	4,813	4,726	4,641	4,559	4,479	4,402	4,328
Wheat						(thousand metric tons)					
Production	18,650	18,529	18,339	18,457	18,554	18,703	18,842	18,979	19,136	19,277	19,423
						(thousand hectares)					
Area Planted	9,340	9,272	9,096	9,074	9,041	9,033	9,020	9,005	8,999	8,986	8,974
						(mt per hectare)					
Yield	2.00	2.00	2.02	2.03	2.05	2.07	2.09	2.11	2.13	2.15	2.16
						(thousand metric tons)					
Food Demand	13,656	13,801	13,936	14,031	14,088	14,186	14,281	14,372	14,456	14,522	14,564
Feed Demand	1,150	1,150	1,240	1,280	1,321	1,363	1,407	1,452	1,499	1,547	1,596
Seed Demand	1,868	1,854	1,819	1,815	1,808	1,807	1,804	1,801	1,800	1,797	1,795
Loss	1,492	1,482	1,467	1,477	1,484	1,496	1,507	1,518	1,531	1,542	1,554
Total Market Demand	18,166	18,288	18,463	18,602	18,701	18,852	19,000	19,143	19,285	19,408	19,509
						(kilograms per year)					
Per Capita Consumption	217.2	216.3	215.1	213.4	211.3	209.8	208.3	206.8	205.1	203.4	201.4

Table 6. Baseline Crops Supply and Demand

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Barley						(thousand metric tons)					
Production	8,200	8,006	8,145	8,166	8,225	8,274	8,338	8,406	8,471	8,543	8,614
						(thousand hectares)					
Area Planted	3,700	3,597	3,636	3,622	3,624	3,622	3,626	3,632	3,636	3,643	3,649
						(mt per hectare)					
Yield	2.22	2.23	2.24	2.25	2.27	2.28	2.30	2.31	2.33	2.34	2.36
						(thousand metric tons)					
Feed and Industry Demand	6,160	6,181	6,193	6,476	6,764	7,449	7,784	8,051	8,584	8,939	9,082
Seed Demand	740.0	719.5	727.2	724.3	724.8	724.4	725.2	726.3	727.2	728.6	729.9
Loss	738.0	720.6	733.1	735.0	740.2	744.7	750.4	756.5	762.4	768.9	775.2
Total Market Demand	7,638	7,621	7,653	7,936	8,229	8,918	9,260	9,534	10,074	10,437	10,587
Maize						(thousand metric tons)					
Production	2,080	2,258	2,366	2,465	2,614	2,770	2,888	3,026	3,149	3,288	3,434
						(thousand metric tons)					
Area Planted	545.0	561.7	569.0	573.8	579.4	583.9	586.7	590.5	594.0	597.7	601.6
						(mt per hectare)					
Yield	3.82	4.02	4.16	4.30	4.51	4.74	4.92	5.13	5.30	5.50	5.71
Food Industry and Other Use	1,220	1,399	1,383	1,381	1,401	1,460	1,494	1,521	1,530	1,540	1,598
Feed Demand	1,600	1,650	1,761	1,820	1,879	1,954	2,038	2,122	2,178	2,245	2,320
Loss	104.0	112.9	118.3	123.2	130.7	138.5	144.4	151.3	157.5	164.4	171.7
Total Market Demand	2,924	3,162	3,262	3,324	3,410	3,553	3,676	3,795	3,865	3,949	4,090
Import	844	904	896	859	797	783	788	768	716	662	655

Table 7. Baseline Crops Supply and Demand

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Sunflower						(thousand metric tons)					
Production	900.0	860.0	884.9	921.0	918.9	957.8	955.1	995.6	992.3	1,034.2	1,030.9
						(thousand hectares)					
Area Planted	560.0	571.3	562.9	576.1	565.4	579.6	568.5	582.8	571.4	585.7	574.2
						(mt per hectare)					
Yield (metric tones /hectares)	1.61	1.55	1.57	1.60	1.63	1.65	1.68	1.71	1.74	1.77	1.80
Cotton Lint						(thousand metric tons)					
Production	795.0	772.9	792.5	813.7	834.7	856.2	878.8	901.9	925.6	950.1	975.0
						(thousand hectares)					
Area Planted	722.0	726.1	726.4	727.6	728.2	728.6	729.6	730.6	731.5	732.5	733.4
Yield	1.00	1.06	1.09	1.12	1.15	1.18	1.20	1.23	1.27	1.30	1.33
						(thousand TL per kilogram)					
Producer Price	396.00	441.00	484.73	509.09	514.45	505.84	492.85	483.37	480.29	485.43	496.74
Cottonseed Meal Production	497.0	483.2	495.5	508.6	521.8	535.2	549.3	563.8	578.6	593.9	609.5
Soybean						(thousand metric tons)					
Production	40,000	49,892	53,745	52,207	42,516	28,441	22,726	11,089	5,465	277	227
						(thousand hectares)					
Area Planted	19,000	20,699	22,505	21,845	17,768	11,783	9,418	4,565	2,251	113	113
						(mt per hectare)					
Yield	2.37	2.41	2.37	2.38	2.37	2.39	2.39	2.40	2.40	2.42	2.42
Total Market Demand	1,094	1,158	1,255	1,287	1,288	1,345	1,397	1,481	1,482	1,526	1,601
Meal Demand	632	653	710	726	742	773	812	851	864	887	918
						(thousand metric tons)					
Vegetable Oil Demand	1,141.3	1,171.6	1,211.6	1,226.3	1,256.0	1,303.7	1,324.0	1,383.9	1,415.8	1,511.3	1,525.2
						(kilograms per year)					
Per Capita Disapperance	18.2	18.4	18.7	18.7	18.8	19.3	19.3	19.9	20.1	21.2	21.1
						(thousand metric tons)					
Extraction from Seed Production	526.2	507.7	522.2	540.4	542.5	559.7	562.5	581.1	584.0	604.5	608.7

Table 8. Baseline Crops Supply and Demand

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Rice					(thousand metric tons)						
Production	165.0	167.2	177.1	180.8	183.6	186.4	188.2	189.6	190.7	191.3	192.7
					(thousand hectares)						
Area Planted	55.0	54.5	57.5	58.4	59.0	59.6	59.9	60.0	60.1	60.0	60.1
					(mt per hectare)						
Yield	3.05	3.06	3.08	3.10	3.11	3.13	3.14	3.16	3.17	3.19	3.21
					(thousand metric tons)						
Food Use	430.4	434.5	459.9	487.7	518.5	552.2	588.8	629.1	673.4	721.7	775.1
Seed Use (Paddy Equivalent)	15.6	15.5	16.3	16.6	16.7	16.9	17.0	17.0	17.0	17.0	17.0
Loss	8.25	8.36	8.85	9.04	9.18	9.32	9.41	9.48	9.53	9.57	9.63
Total Market Demand	454.2	458.3	485.0	513.3	544.4	578.5	615.2	655.6	700.0	748.2	801.7
Import	281.0	282.8	299.1	323.5	351.6	382.7	417.6	456.5	499.8	547.3	599.4
					(kilograms per year)						
Per Capita Consumption	7.1	7.1	7.4	7.7	8.0	8.4	8.8	9.3	9.8	10.3	11.0
Lentils					(thousand metric tons)						
Production	515.0	606.0	603.2	599.7	596.5	593.9	591.1	588.5	585.8	582.9	580.0
					(thousand hectares)						
Area Planted(000 hectares)	560.0	620.2	620.7	620.6	620.7	621.4	622.0	622.6	623.2	623.6	624.0
					(mt per hectare)						
Yield (metric tones /hectares)	0.92	0.98	0.97	0.97	0.96	0.96	0.95	0.95	0.94	0.93	0.93
Chickpea					(thousand metric tons)						
Production	720.0	704.8	698.7	690.6	683.1	675.6	668.0	660.4	652.8	645.2	637.7
					(thousand hectares)						
Area Planted	721.0	745.7	749.7	751.5	753.8	756.0	758.1	760.1	761.9	763.8	765.6
					(mt per hectare)						
Yield	1.00	0.95	0.93	0.92	0.91	0.89	0.88	0.87	0.86	0.84	0.83

Table 9. Baseline Livestock Supply, Demand and Prices

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Milk						(million metric tons)					
Production	6,010	6,000	6,328	6,532	6,749	7,188	7,406	7,574	7,877	8,068	8,144
Demand	6,180	6,180	6,466	6,672	6,880	7,344	7,556	7,772	8,076	8,275	8,355
Net Import	170.0	180.0	137.9	140.1	131.1	155.8	149.7	197.5	199.3	206.8	211.0
						(thousand TL per kilogram)					
Producer Price (000 TL / Kg)	53.51	82.56	147.68	204.79	282.98	377.88	473.09	657.07	828.37	990.97	1,340.15
						(kilograms per year)					
Per Capita Consumption (Kg/Year)	98.3	96.8	99.8	101.5	103.2	108.6	110.2	111.8	114.6	115.9	115.5
Egg						(thousand metric tons)					
Production	630.0	650.0	672.0	694.8	709.8	738.1	768.6	789.7	807.1	833.0	854.9
Demand	630.0	650.3	670.6	698.6	703.5	745.7	764.8	788.1	805.7	836.9	854.4
						(thousand TL per kilogram)					
Producer Price	213.7	327.9	554.1	845.1	1,128.1	1,569.9	1,932.2	2,386.4	2,985.0	3,897.0	4,610.4
Consumer Price	211.7	330.0	511.3	812.9	1,065.8	1,390.0	1,880.9	2,598.8	3,014.4	3,650.4	4,640.6
						(kilograms per year)					
Per Capita Consumption	10.0	10.2	10.4	10.6	10.6	11.0	11.2	11.3	11.4	11.7	11.8
Beef						(thousand metric tons)					
Production	425.0	430.0	501.4	527.0	546.8	572.5	588.1	598.4	633.4	679.1	658.4
Demand	427.5	480.0	594.3	658.2	705.0	771.5	808.4	855.4	953.5	1,028.7	1,072.1
						(thousand TL per kilogram)					
Producer Price	492.0	1,277.8	2,129.9	3,221.1	4,398.1	5,730.7	7,233.5	9,092.1	11,405.1	14,309.0	18,003.5
Consumer Price	715.1	1,912.8	3,239.0	4,961.5	6,839.9	8,985.6	11,423.9	14,461.0	18,267.3	23,079.6	29,245.5
						(kilograms per year)					
Per Capita Consumption	6.8	7.5	9.2	10.0	10.6	11.4	11.8	12.3	13.5	14.4	14.8
Mutton						(thousand metric tons)					
Production	245.0	260.0	270.0	270.6	270.8	278.1	285.4	284.8	284.3	300.9	310.1
Demand	243.0	258.0	262.7	265.6	270.3	272.0	280.9	278.6	281.9	293.6	303.1
						(thousand TL per kilogram)					
Producer Price	546.5	1,105.7	1,936.7	2,965.0	3,827.9	4,753.1	5,668.6	6,893.6	8,566.1	11,093.1	14,639.4
Consumer Price	652.8	1,287.9	2,436.1	3,951.9	5,699.0	7,395.8	9,265.6	11,362.9	14,049.6	17,551.7	22,393.7
						(kilograms per year)					
Per Capita Consumption	3.9	4.0	4.1	4.0	4.1	4.0	4.1	4.0	4.0	4.1	4.2
Chicken						(thousand metric tons)					
Production	580.0	600.0	687.3	695.0	710.7	741.6	785.6	839.3	845.8	865.0	901.7
Demand	574.1	588.2	679.7	687.3	703.0	733.9	778.0	831.6	838.2	857.3	894.0
Producer Price (000 TL / Hens)	573.6	1,033.2	1,632.4	2,649.8	3,516.3	4,640.6	6,364.7	8,921.8	10,417.2	12,723.5	16,348.9
Consumer Price (000 TL / Kg)	333.6	590.2	919.6	1,470.9	1,935.1	2,532.4	3,440.0	4,772.7	5,546.4	6,733.3	8,586.1
Per Capita Consumption (Kg/Year)	9.1	9.2	10.5	10.5	10.5	10.9	11.3	12.0	11.9	12.0	12.4

Table 10. Livestock Supply and Demand with a 25 Percent Tariff Reduction

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Beef Production					(thousand metric tons)						
Baseline	425	430	501	527	547	572	588	598	633	679	658
Scenario	425	430	449	470	487	511	524	533	564	605	586
Change	0	0	-53	-57	-60	-62	-64	-65	-69	-74	-72
% Change	0.00%	0.00%	-10.49%	-10.83%	-10.96%	-10.79%	-10.87%	-10.90%	-10.90%	-10.91%	-10.93%
Beef Consumption											
Baseline	404	480	594	658	705	772	808	855	954	1,029	1,072
Scenario	404	488	712	822	860	939	984	1,041	1,161	1,252	1,304
Change	0	8	117	164	20	24	23	32	51	70	80
% Change	0.00%	0.00%	19.76%	24.90%	21.93%	21.70%	21.70%	21.65%	21.77%	21.71%	21.67%
Broiler Production											
Baseline	580	600	687	695	711	742	786	839	846	865	902
Scenario	580	600	697	691	704	735	780	834	839	858	895
Change	0	0	10	-4	-7	-6	-6	-5	-7	-7	-7
% Change	0.00%	0.00%	1.41%	-0.58%	-0.98%	-0.87%	-0.75%	-0.58%	-0.78%	-0.83%	-0.77%
Broiler Consumption											
Baseline	574	588	680	687	703	734	778	832	838	857	894
Scenario	574	589	689	683	696	727	772	827	832	850	887
Change	0	0	10	-4	-7	-6	-6	-5	-7	-7	-7
% Change	0.00%	0.00%	1.43%	-0.59%	-0.99%	-0.88%	-0.76%	-0.59%	-0.78%	-0.83%	-0.78%
Mutton Production											
Baseline	245	260	270	271	271	278	285	285	284	301	310
Scenario	245	292	270	269	269	276	284	283	283	299	308
Change	0	32	0	-2	-2	-2	-2	-2	-2	-2	-2
% Change	0.00%	0.00%	0.00%	-0.63%	-0.63%	-0.63%	-0.64%	-0.64%	-0.64%	-0.64%	-0.65%
Mutton Consumption											
Baseline	243	258	263	266	270	272	281	279	282	294	303
Scenario	243	262	294	302	334	338	350	349	353	368	380
Change	0	4	31	36	64	66	69	70	71	74	77
% Change	0.00%	0.00%	11.85%	13.65%	23.70%	24.24%	24.46%	25.16%	25.22%	25.34%	25.36%

Table 11. Livestock Price with a 25 Percent Tariff Reduction

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Real Beef Retail Price						(Turkish Lira per Kilogram, 1968=100)					
Baseline	15.4	24.3	24.9	25.4	25.8	25.9	26.2	26.4	26.6	26.8	27.0
Scenario	15.4	24.3	20.6	21.0	21.3	21.4	21.7	21.9	22.0	22.2	22.4
Change	0	0	-4.3	-4.3	-4.4	-4.4	-4.5	-4.5	-4.6	-4.6	-4.6
% Change	0.00%	0.00%	-17.13%	-17.13%	-17.13%	-17.13%	-17.13%	-17.13%	-17.13%	-17.13%	-17.13%
Real Poultry Retail Price											
Baseline	7.2	7.5	7.1	7.5	7.3	7.3	7.9	8.7	8.1	7.8	7.9
Scenario	7.2	7.5	7.3	7.4	7.1	7.1	7.7	8.5	7.9	7.6	7.7
Change	0.0	0.0	0.3	-0.1	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2
% Change	0.00%	0.00%	3.73%	-1.62%	-2.59%	-2.40%	-2.32%	-2.14%	-2.57%	-2.66%	-2.66%
Real Mutton Retail Price											
Baseline	14.1	16.4	18.7	20.2	21.5	21.3	21.2	20.8	20.5	20.4	20.7
Scenario	14.1	15.6	17.0	17.2	18.3	18.1	18.1	17.7	17.4	17.3	17.6
Change	0.0	-0.8	-1.7	-3.0	-3.2	-3.2	-3.2	-3.1	-3.1	-3.0	-3.1
% Change	0.00%	0.00%	-9.16%	-14.94%	-14.94%	-14.94%	-14.94%	-14.94%	-14.94%	-14.94%	-14.94%

Table 12. Household Livestock Consumption with a 25 Percent Tariff Reduction

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Beef Consumption					(Kilograms per capita)						
Baseline	5.3	4.1	4.33	4.60	4.82	4.96	5.13	5.27	5.36	5.50	5.71
Scenario	5.3	4.3	4.64	4.77	5.00	5.15	5.32	5.47	5.56	5.71	5.92
Change	0.0	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
% Change	0.00%	0.00%	7.05%	3.80%	3.70%	3.72%	3.73%	3.74%	3.70%	3.69%	3.69%
Mutton Consumption											
Baseline	3.5	4.7	4.1	4.0	3.8	3.9	4.2	4.6	4.6	4.7	4.8
Scenario	3.5	4.3	4.2	4.4	4.1	4.3	4.6	5.0	5.1	5.2	5.3
Change	0.0	-0.4	0.2	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5
% Change	0.00%	0.00%	4.22%	10.03%	9.56%	9.64%	9.67%	9.74%	9.54%	9.49%	9.50%
Broiler Consumption											
Baseline	3.6	4.8	5.9	6.1	6.9	7.1	6.7	6.0	6.8	7.3	7.6
Scenario	3.6	5.1	4.8	5.0	5.7	5.9	5.5	5.0	5.6	6.1	6.3
Change	0.0	0.3	-1.1	-1.1	-1.2	-1.2	-1.2	-1.1	-1.2	-1.3	-1.3
% Change	0.00%	0.00%	-19.09%	-18.21%	-17.26%	-17.46%	-17.54%	-17.74%	-17.28%	-17.19%	-17.19%
Egg Consumption											
Baseline	7.6	7.7	7.9	7.7	8.0	8.2	8.1	8.0	8.4	8.5	8.7
Scenario	7.6	7.7	7.8	7.7	8.1	8.3	8.2	8.1	8.5	8.6	8.9
Change	0.0	0.0	-0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
% Change	0.00%	0.00%	-1.53%	1.06%	1.48%	1.29%	1.29%	1.21%	1.37%	1.43%	1.42%
Milk Consumption											
Baseline	70.7	75.9	74.4	75.9	78.1	79.3	80.8	79.9	81.3	83.1	83.4
Scenario	70.7	75.9	74.4	75.8	78.1	79.3	80.9	80.0	81.4	83.1	83.4
Change	0.00	0.00	-0.03	-0.02	-0.01	0.05	0.02	0.01	0.02	0.02	0.02
% Change	0.00%	0.00%	-0.03%	-0.02%	-0.02%	0.06%	0.02%	0.01%	0.03%	0.02%	0.03%
Animal Protein Consumption					(Per Capita Gram / Day)						
Baseline	27.7	29.8	29.6	30.1	31.2	31.7	32.2	31.9	32.7	33.6	33.9
Scenario	27.7	29.8	29.3	29.9	31.0	31.5	32.1	31.8	32.6	33.4	33.7
Change	0.00	0.00	-0.24	-0.17	-0.21	-0.20	-0.17	-0.12	-0.15	-0.18	-0.19
% Change	0.00%	0.00%	-0.83%	-0.58%	-0.68%	-0.64%	-0.54%	-0.37%	-0.46%	-0.53%	-0.55%

Table 13. Livestock Supply and Demand with a 50 Percent Tariff Reduction

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Beef Production							(Thousand Metric Tons)				
Baseline	425	430	501	527	547	572	588	598	633	679	658
Scenario	425	430	401	419	433	455	467	475	503	539	522
Change	0	0	-100	-108	-113	-117	-121	-123	-131	-140	-136
% Change	0.00%	0.00%	-20.03%	-20.42%	-20.73%	-20.46%	-20.56%	-20.63%	-20.64%	-20.64%	-20.68%
Beef Consumption											
Baseline	380	451	594	658	705	772	808	855	954	1,029	1,072
Scenario	380	553	860	1,069	1,099	1,194	1,252	1,323	1,478	1,593	1,659
Change	0	102	266	411	394	422	444	468	525	564	587
% Change	0.00%	0.00%	44.69%	62.41%	55.91%	54.71%	54.88%	54.67%	55.05%	54.85%	54.77%
Broiler Production											
Baseline	580	600	687	695	711	742	786	839	846	865	902
Scenario	580	600	697	689	694	727	772	828	831	849	886
Change	0	0	10	-6	-17	-14	-13	-11	-15	-16	-16
% Change	0.00%	0.00%	1.45%	-0.86%	-2.40%	-1.91%	-1.71%	-1.31%	-1.77%	-1.87%	-1.75%
Broiler Consumption											
Baseline	574	588	680	687	703	734	778	832	838	857	894
Scenario	574	589	690	681	686	720	764	821	823	841	878
Change	0	0	10	-6	-17	-14	-13	-11	-15	-16	-16
% Change	0.00%	0.00%	1.47%	-0.87%	-2.43%	-1.93%	-1.73%	-1.32%	-1.79%	-1.89%	-1.77%
Mutton Production											
Baseline	245	260	270	271	271	278	285	285	284	301	310
Scenario	245	292	270	267	267	274	282	281	280	297	306
Change	0	32	0	-4	-4	-4	-4	-4	-4	-4	-4
% Change	0.00%	0.00%	0.00%	-1.36%	-1.36%	-1.37%	-1.38%	-1.38%	-1.38%	-1.39%	-1.40%
Mutton Consumption											
Baseline	243	258	263	266	270	272	281	279	282	294	303
Scenario	243	262	388	355	429	437	453	454	460	480	496
Change	0	4	126	89	159	165	172	176	178	186	193
% Change	0.00%	0.00%	47.78%	33.67%	58.70%	60.74%	61.11%	63.05%	63.13%	63.47%	63.51%

Table 14. Livestock Price with a 50 Percent Tariff Reduction

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Real Beef Retail Price						(Turkish Lira per Kilogram, 1968=100)					
Baseline	15.4	24.3	24.9	25.4	25.8	25.9	26.2	26.4	26.6	26.8	27.0
Scenario	15.4	24.3	16.4	16.7	17.0	17.0	17.2	17.4	17.5	17.6	17.8
Change	0.0	0.0	-8.5	-8.7	-8.8	-8.8	-8.9	-9.0	-9.1	-9.1	-9.2
% Change	0.00%	0.00%	-34.16%	-34.16%	-34.16%	-34.16%	-34.16%	-34.16%	-34.16%	-34.16%	-34.16%
Real Poultry Retail Price											
Baseline	7.2	7.5	7.1	7.5	7.3	7.3	7.9	8.7	8.1	7.8	7.9
Scenario	7.2	7.5	7.3	7.3	6.8	6.9	7.5	8.3	7.6	7.4	7.5
Change	0	0	0	0	-0.44	-0.37	-0.41	-0.41	-0.46	-0.46	-0.46
% Change	0.00%	0.00%	3.84%	-2.36%	-6.10%	-5.12%	-5.14%	-4.68%	-5.67%	-5.85%	-5.85%
Real Mutton Retail Price											
Baseline	14.1	16.4	18.7	20.2	21.5	21.3	21.2	20.8	20.5	20.4	20.7
Scenario	14.1	15.6	15.1	14.2	15.0	14.9	14.9	14.5	14.3	14.3	14.5
Change	0	-1	-3.6	-6.1	-6.4	-6.4	-6.4	-6.2	-6.1	-6.1	-6.2
% Change	0.00%	0.00%	-19.24%	-29.96%	-29.96%	-29.96%	-29.96%	-29.96%	-29.96%	-29.96%	-29.96%

Table 15. Household Livestock Consumption with a 50 Percent Tariff Reduction

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Beef Consumption						(Kilograms per capita)					
Baseline	5.3	4.1	4.3	4.6	4.8	5.0	5.1	5.3	5.4	5.5	5.7
Scenario	5.3	4.3	4.8	4.8	5.0	5.2	5.3	5.5	5.6	5.7	5.9
Change	0.0	0.2	0.5	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
% Change	0.00%	0.00%	11.41%	4.28%	3.92%	4.01%	4.01%	4.05%	3.94%	3.93%	3.92%
Mutton Consumption											
Baseline	3.5	4.7	4.1	4.0	3.8	3.9	4.2	4.6	4.6	4.7	4.8
Scenario	3.5	4.3	4.3	4.9	4.6	4.7	5.1	5.5	5.6	5.7	5.8
Change	0.0	-0.4	0.3	0.9	0.8	0.8	0.9	1.0	1.0	1.0	1.0
% Change	0.00%	0.00%	6.91%	22.72%	20.66%	21.13%	21.12%	21.31%	20.78%	20.69%	20.69%
Broiler Consumption											
Baseline	3.6	4.8	5.9	6.1	6.9	7.1	6.7	6.0	6.8	7.3	7.6
Scenario	3.6	5.1	3.9	3.8	4.5	4.6	4.3	3.8	4.4	4.7	4.9
Change	0.0	0.3	-2.1	-2.3	-2.4	-2.6	-2.4	-2.2	-2.4	-2.6	-2.7
% Change	0.00%	0.00%	-35.02%	-37.95%	-35.06%	-35.89%	-35.88%	-36.28%	-35.45%	-35.30%	-35.30%
Egg Consumption											
Baseline	7.6	7.7	7.9	7.7	8.0	8.2	8.1	8.0	8.4	8.5	8.7
Scenario	7.6	7.7	7.8	7.8	8.3	8.4	8.3	8.2	8.6	8.7	9.0
Change	0.0	0.0	-0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2
% Change	0.00%	0.00%	-1.58%	1.42%	3.06%	2.44%	2.48%	2.27%	2.67%	2.77%	2.75%
Milk Consumption											
Baseline	70.7	75.9	74.4	75.9	78.1	79.3	80.8	79.9	81.3	83.1	83.4
Scenario	70.7	75.9	74.4	75.8	78.1	79.3	80.9	80.0	81.4	83.1	83.5
Change	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.1	0.1
% Change	0.00%	0.00%	-0.04%	-0.02%	0.00%	0.10%	0.08%	0.05%	0.07%	0.06%	0.08%
Animal Protein Consumption						(Per Capita Gram / Day)					
Baseline	27.7	29.8	29.6	30.1	31.2	31.7	32.2	31.9	32.7	33.6	33.9
Scenario	27.7	29.8	29.1	29.7	30.7	31.3	31.8	31.6	32.4	33.2	33.5
Change	0.0	0.0	-0.5	-0.4	-0.5	-0.5	-0.4	-0.3	-0.4	-0.4	-0.4
% Change	0.00%	0.00%	-1.60%	-1.32%	-1.51%	-1.50%	-1.24%	-0.90%	-1.11%	-1.25%	-1.28%

ENDNOTES

1. The upper limit of the price is governed by WTO disciplines.
2. In addition to the single equation demand estimation of wheat, from the 1994 Household Consumption data, aggregate expenditure data from selected cities was pooled and used to estimate an AIDS demand system for bread and cereal products (Table 79).
3. Egg-broiler feed requirement is calculated as ((Egg production * Feed Conversion Ratio* Soybean Meal Share in Ration) + (Chicken production * Feed Conversion Ratio* Soybean Meal Share in Ration)).
4. To specify a complete demand system under the two-stage budgeting and weak separability, it is necessary to define a group that has to include at least three goods, because adding-up and symmetry restriction requires at least three goods.
5. Soybean domestic supply is specified before in a separate equation.
6. The aggregated demand of the vegetable oils estimate is due to the insufficient price data. The import supply of vegetable oils may be further studied using proxy price such as border price.
7. The market demand of eggs and milk are given before in the vegetable oil demand specification.
8. Equation was written for beef. The same equation can be written for mutton and chicken.
9. Feed price index computed by taking 50 percent of maize price and 25 percent of soybean price.
10. Composed feed for laying hens.
11. Producer prices of cow milk.
12. Turkey does not import mutton and chicken. Turkey exports live sheep and mutton, but export is not stable, and it has been declining since 1990. Sheep price is linked to world price through price transmission equation, likewise beef.. Chicken, eggs and milk price is determined by domestic supply and demand equation. Note: The supply and demand of livestock will also be altered by changes of the world price of corn and soybean.
13. Ln Pj is standardized by it's own arithmetic mean
14. Kesevan et. al., 1993 also provided methodology for converting conditional elasticities into unconditional elasticities, but considering to data available for researcher (particularly in developing countries), it is difficult to derive.
15. The elasticities used in this section are all unconditional elasticities. The superscripts are dropped.
16. Vegetable oils consumption data obtained from USDA, Economic Research Service, PSD database.
17. Some of the D-W statistics are in the inconclusive range. The D-W is not a formal test when lagged values of the dependent variable are in the set of regressors. In this case, Durbin (h) is an appropriate statistics.
18. In the first decomposition, a good model will have the covariance component approaching one.
19. The commodity model described here will be expanded in future work. It will be called the Turkish Agricultural Policy Analysis Model (TAPAM).
20. Baseline projections for sugar beet supply, sugar demand, and price are from Ko_ and Fuller (1998).
21. MARA prepares a data set for Producer Subsidy Equivalent (PES) and Consumer Subsidy Equivalent (CES) Calculation.

Appendix A. Data requirements

Data Requirement of Crop Component

Crop Coverage	Data Requirement Per Crop
Wheat	Area Planted
Barley	Yield
Maize	Beginning Stock
Rice	Imports
Soybean	Food Use
Sugar	Other Uses
Oil Seeds	Industrial Use
Lentils	Feeds
Chickpea	Seed
	Losses
	Exports
	Ending Stock
	World Price
	Domestic Farm Price
	Domestic Wholesale Price
	Domestic Consumer Price
	Price Margins
	Marketing Costs (e.g., Labor, Transportation, etc.)
	Conversion Factors (if needed)

Data Requirement of Livestock Component

Animal Coverage	Data Requirement per Animal Category
Beef	Production
Mutton	Beginning Stock
Poultry	Imports
Milk	Exports
Eggs	Ending Stock
	Farm Price
	Retail Price
	Border Price
	World Price
	Price of Feed

Macro Data Requirement

Variables and Policies

Variables
- Population
- Gross Domestic Product (breakdown)
- Per Capita Expenditure
- Exchange Rate
- Tariff Schedule of Major Traded Commodities
- Consumer Subsidy of Major Traded Commodities
- Consumer Price Index
- Wholesale Price Index

Policies
- Producer Support
- Consumer Support
- Trade Policies
- Other Macro Policies

Data from Household Expenditure Survey

For Each Household
- Expenditures on each good/major food groups
- Total disposable income
- Family size
- Location of the household
- Prices of non-marketed commodities

Nutrient Intake
- Recommended daily allowances of major macro- and micro-nutrients
- Food composition table

Appendix B.

Table B.1. Parameters Estimates of the First Stage Meat Demand (1970-1996)

Independent/dependent variables	Ln (per capita meat expenditure)*
Constant	-3.48
	(-16.1)
Ln (Corrected Stone Index)	-1.13
	(-33.7)
Ln (Per Capita GDP)	1.13
	(33.8)
Ln (Time Trend)	0.25
	(2.5)
DIAGNOSTIC	
R^2	0.99
Adjusted R^2	0.99
D (h)	1.43
Rho	0.40
	(2.2)**
Theil (U)	0.34

(Moscini 1995) explained Corrected Stone Price Index. Note: t-value in parentheses. *shows the cochrane-orcutt iterative procedure estimates. ** Asymptotic t ratio.

Table B.2. Parameter Estimates of Second-Stage Meat Demand, 1970 to 1996

Independent/dependent variables	**Per capita expenditure share of beef**	**Per capita expenditure share of sheep**
Constant	0.52	0.45
	(13.6)*	(17.7)*
Ln (Per capita expenditure/Corrected Stone Price Index)	0.0052	-0.022
	(0.83)	(-5.3)*
Ln (beef price)	-0.055	0.074
	(-0.46)	(0.82)
Ln (mutton price)	0.074	-0.15
	(0.82)	(-1.8)**
Ln (chicken price)	-0.019	0.081
	(-0.31)	(1.9)**
First difference of Log (Per capita expenditure/Corrected Stone Price Index)	-0.014	*0.035*
	(-0.21)	*(0.7)*
First difference of Ln (beef price)	0.24	-0.27
	(3.0)*	(-4.6)*
First difference of Ln (mutton price)	-0.17	0.26
	(-2.4)*	(4.6)*
First difference of Ln (chicken price)	-0.088	*0.016*
	(-1.4)	*(0.34)*
Dummy (D=1 for year 1976, 1977, 1987, 1995 and 1996; increase of beef consumption)	*0.062*	*-0.06*
	*(4.2)**	*(-5.4)**
Dummy (D=1 for 1977 and after; Chicken price decline)	*-0.042*	*0.10*
	*(-2.1)**	*(7.1)**
DIAGNOSTIC		
R^2	0.75	0.95
D.W	2.04	2.28

Note: t-value in parentheses
*Indicates that parameter is significant at 5 percent level and ** indicates that parameter is significant at 10 percent level.

Table B.3. Parameter Estimates of First Stage Milk, Eggs, and Vegetable OilsDemand, 1973 to 1996

Independent/dependent variables	**Ln (Per capita group expenditure)***
Constant	-0.05
	(-0.08)
Ln (Corrected Stone Index)	-0.66
	(-6.9)
Ln (Per capita GDP)	0.66
	(6.9)
Time Trend	0.20
	(6.2)
DIAGNOSTIC	
R^2	0.99
Adjusted R^2	0.99
D(h)	1.65
Rho	0.64
	(4.0)**
Theil (U)	0.25

*Shows the cochrane-orcutt iterative procedure estimates. ** Asymptotic t ratio
Note: t-value in parentheses

Table B.4. Parameter Estimates of Second Stage Milk, Eggs, and Vegetable Oils emand, 1973 to 1996

Independent/dependent variables	Per capita expenditure share of milk	Per capita expenditure share of v. oils
Constant	0.71	0.22
	(8.9)*	(2.6)*
Ln (Per capita expenditure/Corrected Stone Price Index)	-0.012	-0.014
	(-2.2)*	(-0.2)
Ln (milk price)	0.12	-0.083
	(3.59)*	(-2.4)*
Ln (egg price)	-0.08	0.036
	(-2.4)*	(0.83)
Ln (vegetable oils price)	-0.004	0.047
	(-2.5)*	(3.2)*
First difference of Ln (Per capita expenditure/Corrected Stone Price Index)	-0.20	0.29
	(-1.9)**	(2.3)*
First difference of Ln (milk price)	0.13	-0.16
	(2.4)*	(-2.6)*
First difference of Ln (egg price)	0.03	-0.055
	(0.9)	(-1.4)
First difference of Ln (vegetable oils price)	-0.003	-0.0006
	(-0.09)	(-0.02)
Ln(time trend)	0.067	-0.014
	(2.9)*	(-0.5)
Second differences of own-share	0.054	-0.019
	(3.9)*	(-0.87)
Dummy (D=1 for year 1976, 1977, 1978 and 1979)	0.052	-0.076
	(4.3)*	(-5.1)*
Dummy (D=1 for 1995 and 1996)	-0.049	0.05
	(-2.8)*	(2.4)*
DIAGNOSTIC		
R^2	0.94	0.87
D.W	1.89	1.61

P is the Corrected Stone price index (Moscini, 1995). Note: t-value in parentheses

Table B.5. Parameter Estimates of Sugar Demand, 1979 to 1995

Independent variables/Dependent variable	**Per capita consumption**
Constant	17.77
	(6.10)
Retail sugar price	-1.41
	(-2.21)
Income (Per capita GDP at 1987 price)	0.0095
	(5.73)
Dummy (D= 1 for 1985 and 1988:Complementary goods price	-2.04
index)	(-2.21)
DIAGNOSTIC	
R^2	0.76
Adjusted R^2	0.70
D.W	1.81
F	13.6
Theil (U)	0.52

Note: t-value in parentheses.

Table B.6. Parameter Estimates of Wheat Demand, 1979 to 1995

Independent variables/Dependent variable	**Ln (Per capita wheat consumption)***
Constant	5.54
	(261.4)
Wheat producer price / WPI	-0.074
	(-3.47)
Rice wholesale price / WPI	0.008
	(3.51)
Income (Per capita GDP at 1987 price)	-0.000076
	(-5.89)
Dummy (D=1 for 1996)	-0.039
	(-7.93)
DIAGNOSTIC	
R^2	0.97
Adjusted R^2	0.95
D(h)	0.63
Rho1	0.53
	(2.58)**
Theil (U)	0.26

* Shows the cochrane-orcutt iterative procedure estimates. ** Asymptotic t ratio

Note: t-value in parentheses

Table B.7. Parameter Estimates of Rice Demand, 1979 to 1995

Independent variables/Dependent variable	Ln (Per capita consumption)
Constant	0.83
	(3.27)
Income (Per capita GDP at 1987 price)	0.00061
	(3.35)
Dummy (D=1, 1980, 1982 and 1983)	-0.32
	(-8.39)
DIAGNOSTIC	
R^2	0.93
Adjusted R^2	0.92
D(h)	0.30
Rho1	0.61
	(3.2)**
Theil (U)	0.40

* Shows the cochrane-orcutt iterative procedure estimates. ** Asymptotic t ratio

Note: t-value in parentheses

Table B.8. Parameter Estimates of Bread and Cereals Demand

Independent variables/Dependent variable	S_i
Constant	0.045
	(1.33)
Log (household expenditure/Corrected Stone Price Index)	-0.058
	(-12.4)
Log (Corrected Stone Price Index)	0.062
	(2.2)
Log (household size)	0.042
	(2.3)
Log (number of adult household members/household size)	-0.07
	(-2.5)
Dummy (for low income province, Diyarbakir and Gaziantep)	0.045
	(4.4)
DIAGNOSTIC	
R^2	0.90
Adjusted R^2	0.89
S_i (budget share of bread and cereals in total consumption expenditure of household in urban Turkey)	0.081

Note: Demand model estimated from 1994 Household Consumption Expenditure Survey Data.
Model was estimated by {WLS] weight is proportion of the adult household members (18 years and older)
Price was computed using province level bread, rice, and other cereal product prices in 1994.

Table B.9. Parameter Estimates of Wheat Demand for Feed, 1979 to 1996

Independent variables	**Dependent variable (Q)**
Constant	6.28
	(57.1)
Dependent variable [t-1]	0.029
	(1.5)
T	*0.031*
	(5.3)
DIAGNOSTIC	
R^2	0.77
Adjusted R^2	0.74
D(h)	0.19
F	25.3
Theil (U)	0.74

Table B.10. Parameter Estimates of Maize Food Demand, 1979 to 1996

Independent variables/Dependent variable	**Ln (Per Capita Maize Food Use)**
Constant	3.06
	(6.91)
Dependent variable [t-1]	0.065
	(1.2)
Maize producer price / WPI	-100.2
	(-1.95)
Income (Per Capita GDP at 1987 Price)	0.00048
	(1.97)
Dummy1(D=1 for 1994, weather and Economic Shock)	-0.72 (-4.11)
DIAGNOSTIC	
R^2	0.66
Adjusted R^2	0.55
D(h)	0.59
F	6.3
Theil (U)	0.55

Note: t-value in parentheses

Table B.11. Parameter Estimates of Maize Feed Demand, 1979 to 1996

Independent variables/Dependent variable	**(Maize Feed Use)**
Constant	89.1
	(3.04)
Egg and Chicken Production	0.36
	(2.54)
Time trend	28.0
	(3.79)
DIAGNOSTIC	
R^2	0.97
Adjusted R^2	0.96
D.W	1.57
F	258.7
Theil (U)	0.61

Note: t-value in parentheses

Table B.12. Parameter Estimates of Barley Demand, 1979 to 1996

Independent variables/Dependent variable	**Ln (Domestic Barley Use)**
Constant	7.63
	(45.5)
Maize producer price/Barley producer price	-0.16
	(-1.9)
Milk production	0.00022
	(7.6)
Dummy (D=1 for 1983 and 1989; drought)	*-0.33*
	(-8.3)
Dummy (D=1 for 1993 and 1994)	*-0.23*
	(-4.7)
DIAGNOSTIC	
R^2	0.92
Adjusted R^2	0.89
D(h)	1.21
Rho1	0.25
	(1.12)**
Theil (U)	0.26

* Shows the cochrane-orcutt iterative procedure estimates. ** Asymptotic t ratio Note: t-value in parentheses.

Table B.13. Parameter Estimates of Soybean Demand, 1979 to 1994

Independent variables/Dependent variable	Ln (Domestic Soybean Use)
Constant	6.33
	(17.1)
Lag of the dependent variable [t-1]	0.08
	(2.6)
Own producer price / WPI	-0.48
	(-1.61)
Egg and Chicken Production	0.014
	(3.0)
DIAGNOSTIC	
R^2	0.68
Adjusted R^2	0.59
D(h)	1.05
F	8.3
Theil (U)	0.71

Note: t-value in parentheses.

Table B.14. Parameter Estimates of Cottonseed Meal Demand, 1979 to 1994

Independent variables/Dependent variable	Ln (Domestic Cottonseed Meal Use)
Constant	4.67
	(148.5)
Time trend	0.017
	(5.2)
Dummy (D=1, for 1990, 1995 and 1996)	0.24
	(5.2)
DIAGNOSTIC	
R^2	0.88
Adjusted R^2	0.87
D.W	2.43
F	57.6
Theil (U)	0.42

Note: t-value in parentheses.

Table B.15. Parameter Estimates of the Area Planted Share of Crops, 1970 to 1996

	Share of Wheat	Share of Cotton	Share of Sunflower	Share of Barley	Share of Lentil	Share of Chickpea
Constant	0.24	0.040	0.013	0.14	0.053	0.019
	(6.4)*	(15.8)*	(4.1)*	(3.5)*	(5.5)*	(6.2)*
Own share [t-1]	0.59		0.37	0.37	0.85	1.07
	(8.5)*		(3.6)*	(2.2)*	(7.6)*	(11.0)*
Own share[t-2]					-0.40	-0.25
					(-5.5)*	(-2.7)*
Ln GR_w [t-1]	0.055	-0.015	-0.015	-0.032	0.001	-0.0019
	(4.4)*	(-3.9)*	(-4.2)*	(-3.8)*	(0.03)	(-0.8)
Ln GR_c[t-1]	-0.015	0.016	0.001	0.0001	-0.002	-0.0008
	(-3.9)*	(6.8)*	(0.7)	(0.02)	(-1.23	(-0.9)
Ln GR_s[t-1]	-0.015	0.0012	0.004	0.009	0.0003	0.0029
	(-4.2)*	(0.7)	(2.0)*	(3.0)*	(0.2)	(3.0)*
Ln GR_b[t-1]	-0.032	0.0001	0.009	0.029	-0.085	0.0001
	(-3.8)*	(0.02)	(3.0)*	(3.4)*	(-2.7)*	(0.03)
Ln GR_l[t-1]	0.0005	-0.0018	0.0003	-0.008	0.008	-0.0018
	(0.03)	(-1.2)	(0.2)	(-2.7)	(3.2)*	(-1.9)**
Ln GR_{ch}[t-1]	-0.0019	-0.0008	0.003	0.0001	-0.0018	0.0044
	(-0.8)	(-0.9)	(3.0)*	(0.03)	(-1.9)**	(5.3)*
Time trend		-0.0005				
		(-6.8)				
Fallow land				-0.00001	-0.00001	-0.000002
(1000 hectare)				(-2.4)	(-5.5)*	(-6.7)*
Dummy	-0.021		0.007			
	(-6.73)*		(5.3)*			
Adjustment parameters	0.41		0.63	0.63	0.55	0.18
DIAGNOSTIC						
R^2	0.89	0.81	0.78	0.68	0.95	0.99
D-W		2.03				
D(h)	0.33		0.42	0.18	0.13	0.55

The crops in the table account 85 percent of the total planted crops area. In the parenthesis are t values.

Table B.16. Parameter Estimates of the Area Planted to Soybean , 1982 to 1995

Independent variables/Dependent variables	**Ln (Area sown)**
Constant	7.92
	(4.39)
Dependent variable [t-1]	0.28
	(1.75)
Ln (Soybean/Maize producer price ratio) [t-1])	0.47
	(2.7)
Dummy 1 (D= 1, for 1986 and 1987; price shock)	*0.82*
	(3.9)
DIAGNOSTIC	
R^2	0.86
Adjusted R^2	0.82
D.W	2.08
F	20.4
Theil (U)	0.55

Note: t-value in parentheses.

Table B.17. Parameter Estimates of the Area Planted to Maize, 1976 to 1995

Independent variables/Dependent variables	**Ln (Area sown)**
Constant	3.43
	(3.84)
Dependent variable [t-1]	0.49
	(3.4)
Ln (Maize producer price /WPI, [t-1])	0.14
	(2.5)
Ln (Cotton producer price / WPI, [t-1])	-0.11
	(-2.3)
Dummy (D=1 1983- and after; second cropping)	*-0.04*
	(-2.2)
Dummy (D=1 1994; whether)	*-0.14*
	(-4.6)
DIAGNOSTIC	
R^2	0.87
Adjusted R^2	0.83
D(h)	0.62
F	19.9
Theil (U)	0.48

Table B.18. Parameter Estimates of the Area Planted to Rice, 1972 to 1995

Independent variables/Dependent variables	Ln (Area sown)
Constant	1.67
	(2.54)
Dependent variable [t-1]	0.47
	(2.5)
Ln (Wholesale rice price/WPI, [t-1])	0.39
	(1.94)
DIAGNOSTIC	
R^2	0.49
Adjusted R^2	0.43
D(h)	0.06
F	9.0
Theil (U)	0.82

Table B.19. Parameter Estimates of the Area Planted to Sugar Beet, 1975 to 1995

Independent variables/Dependent variables	Ln (Area)
Constant	5.91
	(7.0)
Lag of the dependent variable[t-3]	0.53
	(8.7)
Sugar beet producer price / WPI, [t-1]	2.46
	(3.6)
Wheat producer price / WPI, [t-3]	-0.43
	(-3.1)
Dummy (D1=1, for 1995)	-0.26
	(-3.6)
DIAGNOSTIC	
R^2	0.89
Adjusted R^2	0.87
D(h)	0.24
F	33.7
Theil (U)	0.44

Table B.20. Parameter Estimates of the Area Planted to Field Crops, 1976 to 1995

Independent variabless/Dependent variables	Ln (Area Sown)
Constant	10.1
	(20.6)
Ln (Dependent variable[t-1])	0.000035
	(4.7)
Ln (Fallow Land)	-0.10
	(-2.5)
DIAGNOSTIC	
R^2	0.96
Adjusted R^2	0.95
D(h)	0.44
F	185.0
Theil (U)	0.77

Table B.21. Parameter Estimates of the Fallow Land, 1976 to 1995

Independent variables/Dependent variables	Ln (Fallow Land)
Constant	5.47
	(2.37)
Ln (Dependent variable[t-1])	0.50
	(2.44)
Ln (Time trend)	-0.37
	(-2.18)
DIAGNOSTIC	
R^2	0.91
Adjusted R^2	0.90
D(h)	1.49
F	81.4
Theil (U)	0.80

Table B.22. Parameter Estimates of the Soybean Yield, 1982 to 1995

Independent variables/Dependent variables	**Ln (Yield)**
Constant	4.03
	(13.9)
Dependent variable [t-1]	0.47
	(12.6)
Ln (Soybean producer price/WPI, [t-1])	0.25
	(3.29)
DIAGNOSTIC	
R^2	0.94
Adjusted R^2	0.92
D(h)	1.39
F	79.5
Theil (U)	0.34

Table B.23. Parameter Estimates of the Maize Yield, 197 0 to 1995

Independent variables/Dependent variables	**Ln (Yield)**
Constant	3.12
	(3.9)
Dependent variable [t-1]	0.62
	(5.9)
Ln (Maize producer price/WPI, [t-1])	0.47
	(3.7)
Dummy (D=1 for 1985 and after; seed)	0.25
	(4.2)
Dummy (D=1, for 1994 and 1995;weather and economic shock)	*-0.18*
	(-4.3)
DIAGNOSTIC	
R^2	0.98
Adjusted R^2	0.97
D(h)	0.69
F	108.0
Theil (U)	0.39

Table B.24. Parameter Estimates of the Rice Yield, 1970 to 1995

Independent variables/Dependent variables	**Log (Yield)**
Constant	0.98
	(36.9)
Time trend	0.005
	(2.7)
DIAGNOSTIC	
R^2	0.27
Adjusted R^2	0.22
D.W	1.44
F	7.1
Theil (U)	0.79

Table B.25. Parameter Estimates of the Sugar Beets Yield, 1975 to 1995

Independent variables/Dependent variables	**Ln (Yield)**
Constant	7.52
	(104.7)
Producer price/ WPI, [t-1]	2.8484
	(7.22)
Time trend	0.0048
	(3.29)
Dummy (D1=1, for 1980, 1989 and 1994; weather)	-0.164
	(-6.56)
Dummy (D1=1, for 1988; weather)	0.149
	(3.46)
DIAGNOSTIC	
R^2	0.88
Adjusted R^2	0.86
DW	1.87
F	30.0
Theil (U)	0.29

Table B.26. Parameter Estimates of the Wheat Yield, 1980 to 1995

Independent variables/Dependent variables	Ln (Yield)
Constant	7.52
	(275.7)
Time trend	0.0089
	(2.99)
Dummy (D=1, for 1989 and 1994)	-0.15
	(-3.72)
DIAGNOSTIC	0.89
R^2	0.57
Adjusted R^2	0.51
D.W	1.74
F	8.68
Theil (U)	0.44

Table B.27. Parameter Estimates of the Cotton Yield, 1980 to 1995

Independent variables/Dependent variables	Ln (Yield)
Constant	6.58
	(207.9)
Time trend	0.0247
	(7.55)
DIAGNOSTIC	2.47
R^2	0.80
Adjusted R^2	0.79
D.W	2.07
F	56.95
Theil (U)	0.66

Table B.28. Parameter Estimates of the Sunflower Yield , , 80 t to 199

Independent variables/Dependent variables	**Ln (Yield)**
Constant	7.08
	(207.1)
Time trend	0.0166
	(4.38)
Dummy (D2=1, for 1989 ;drought)	-0.18
	(-3.33)
Dummy (D3=1, for 1990 and 1994:	0.15
	(2.22)
DIAGNOSTIC	1.66
R^2	0.72
Adjusted R^2	0.66
D.W	1.93
F	10.49
Theil (U)	0.42

Table B.29. Parameter Estimates of the Barley Yield, 1980 to 1995

Independent variables/Dependent variables	**Ln (Yield)**
Constant	7.58
	(291.3)
Time trend	0.0065
	(2.42)
Dummy (D2=1, for 1989:drought)	-0.46
	(-9.04)
DIAGNOSTIC	0.65
R^2	0.87
Adjusted R^2	0.85
D.W	1.81
F	42.26
Theil (U)	0.23

Table B.30. Parameter Estimates of the Chickpea Yield, 1980 to 1995

Independent variables/Dependent variables	**Ln (Yield)**
Constant	7.03
	(152.6)
Time trend	-0.014
	(-2.94)
Dummy (D2=1, for 1989; drought)	-0.16
	(-1.78)
DIAGNOSTIC	-1.4
R^2	0.50
Adjusted R^2	0.42
D.W	1.59
F	6.4
Theil (U)	0.68

Table B.31. Parameter Estimates of the Lentils Production, 1980 to 1995

Independent variables/Dependent variables	**Ln (Production)**
Constant	5.23
	(28.4)
Dependent variables [t-1]	0.132
	(3.45)
Ln (Own producer price/WPI, [t-2])	0.78
	(3.37)
Dummy (D2=1, for 1989; drought)	-0.31
	(-1.58)
DIAGNOSTIC	
R^2	0.84
Adjusted R^2	0.80
D(h)	0.035
F	21.0
Theil (U)	0.50

Table B.32. Parameter Estimates of Eggs Supply, 1979 to 1996

Independent variables/Dependent variables	**(Production)**
Constant	224.66
	(5.6)
Dependent variable [t-1]	0.51
	(3.2)
Composed Feed Price / Eggs Producer Price, [t-1]	-614.1
	(-3.2)
Composed Feed Price / Eggs Producer Price [t]	-*446.3*
	(-2.1)
Time trend	*19.3*
	(5.1)
DIAGNOSTIC	
R^2	0.94
Adjusted R^2	0.93
D(h)	0.01
F	54.7
Theil (U)	0.76

Table B.33. Parameter Estimates of Chicken Supply, 1979 to 1996

Independent variables/Dependent variables	**Production (Q)***
Constant	240.4
	(2.8)
Feed Price Index / Chicken Producer Price	*-2496.4*
	(-3.1)
Time trend	*26.5*
	(15.2)
Dummy (D=1 for 1991: outlier)**	*-123.7*
	(-3.3)
Dummy (D=1 for 1995: economic shock)	*100.9*
	(2.6)
DIAGNOSTIC	
R^2	0.97
Adjusted R^2	0.96
D.W	2.02
Theil (U)	0.66

*2SLS estimation result with instrumental variable price ratio [t-1].
Note: Feed price index was computed as 0.55 percent of maize producer price and 0.20 percent of soybean producer price. **In this year, although the feed price index declined and producer price increased slightly relative to previous year price, there was a drop in production.

Table B.34. Parameter Estimates of Beef Supply, 1979 to 1996

Independent variables/Dependent variables	**Ln (Production)**
Constant	5.50
	(60.1)
Own producer price /WPI	0.03
	(4.7)
Own producer price/WPI, [t-1]	*0.01*
	(2.54)
Producer price (cow milk)/ WPI	*-0.20*
	(-2.25)
Time trend	*0.022*
	(7.86)
DIAGNOSTIC	
R^2	0.98
Adjusted R^2	0.97
D-W	1.79
F	129.0
Theil (U)	0.45

Table B.35. Parameter Estimates of Milk Supply 1979 to 1996

Independent variables/Dependent variables	**Ln (Production)**
Constant	8.32
	(845.6)
Ln (Own producer price/WPI, [t-2])	0.13
	(2.54)
Time trend	*0.022*
	(18.2)
DIAGNOSTIC	
R^2	0.98
Adjusted R^2	0.98
D-W	1.84
F	384.5
Theil (U)	0.51

Note: Dependent variable is 1000 metric tons and price is in kg.

Table B.36. Parameter Estimates of Mutton Supply, 1979 to 1996

Independent variables/Dependent variables	**Ln (Q)**
Constant	5.5946
	(121.3)
Ln (Mutton producer price/WPI, [t-1])	*0.045*
	(2.4)
Dummy (D=1 for 1984 and 1995)	*-0.143*
	(-4.2)
Dummy (D=1 for 1988 and 1989)	*0.142*
	(4.2)
DIAGNOSTIC	
R^2	0.76
Adjusted R^2	0.71
D.W	2.21
Theil (U)	0.39

*2SLS estimation result with instrumental variable Q[t-1], Wool price[t-1] and Time Trend.

Table B.37. Parameter Estimates of the Price Transmission for Rice, 1984/85-1996/97

Independent variables/Dependent variables	**Ln (wholesale price)**
Constant	0.87
	(4.6)
Ln (Bangkok price, FOB)	1.01
	(38.7)
DIAGNOSTIC	
R^2	0.99
Adjusted R^2	0.99
D.W	2.09
F	1493.6
Theil (U)	0.25

Table B.38. Parameter Estimates of the Price Transmission for Maize, 1981/82-1995/96

Independent variables/Dependent variables	Ln (Producer)
Constant	0.11
	(0.74)
Ln (U.S. Gulf price, FOB)	1.05
	(41.2)
DIAGNOSTIC	
R^2	0.99
Adjusted R^2	0.99
D.W	1.72
F	1695
Theil (U)	0.36

Table B.39. Parameter Estimates of the Price Transmission for Wheat, 1981/82- 1995/96

Independent variables/Dependent variables	Ln (Producer)
Constant	-0.20
	(-1.3)
Ln (U.S. Gulf price, FOB)	1.03
	(54.4)
DIAGNOSTIC	
R^2	0.99
Adjusted R^2	0.99
D.W	1.66
F	1550.3
Theil (U)	0.41

Table B.40. Paer Estrametimates of the Price Transmission for Wheat flour, 1979 to 1995

Independent variables/Dependent variables	Ln (Wheat flour)
Constant	-5.63
	(-48.1)
Ln (Wheat producer price)	0.94
	(94.7)
Dummy (D=1 for 1989; drought)	0.39
	(4.8)
DIAGNOSTIC	
R^2	0.99
Adjusted R^2	0.99
D.W	1.47
Rho2	-0.69
	(-4.01)
Theil (U)	0.19

Table B.41. Parameter Estimates of the Price Transmission for Sunflower, 1985/86- 1995/9

Independent variables/Dependent variables	Ln (Producer price)
Constant	-0.61
	(-2.7)
Ln (Rotterdam price, CIF)	1.11
	(36.9)
DIAGNOSTIC	
R^2	0.99
Adjusted R^2	0.99
D.W	1.34
F	1363.7
Theil (U)	0.19

Table B.42. Parameter Estimates of the Price Transmission for Margarin, 1980/81- 1994/95

Independent variables/Dependent variables	Log (Retail margarine price)
Constant	0.78
	(3.38)
Ln (Soy oil Rotterdam price, FOB)	1.03
	(30.4)
DIAGNOSTIC	
R^2	0.99
Adjusted R^2	0.99
D.W	1.38
F	926.2
Theil (U)	0.45

Table B.43. Parameter Estimates of the Price Transmission for Margarin, 1985/86-1995/96

Independent variables/Dependent variables	Ln (Retail margarine price)
Constant	0.51
	(3.98)
Ln (Rotterdam Price, FOB)	1.06
	(56.2)
DIAGNOSTIC	
R^2	0.99
Adjusted R^2	0.99
D.W	1.95
Rho2	-0.85
	(-6.45)
Theil (U)	0.29

Table B.44. Parameter Estimates of the Price Transmission for Sunflower Oil, 986/87-1996/97

Independent variables/Dependent variables	Ln (Retail sunflower oil price)
Constant	0.78
	(3.95)
Ln (Rotterdam Price, FOB)	1.03
	(41.6)
DIAGNOSTIC	
R^2	0.99
Adjusted R^2	0.99
D.W	1.57
F	1729.5
Theil (U)	0.22

Table B.45. Parameter Estimates of the Price Transmission for Beef, 1983 to 1996

Independent variables/Dependent variables	Ln (Producer)
Constant	-1.31
	(-5.39)
Ln (Australia export price at the U.S. port, CIF)	1.14
	(40.3)
DIAGNOSTIC	
R^2	0.99
Adjusted R^2	0.99
D.W	1.66
F	1553.7
Theil (U)	0.23

Table B.46. Parameter Estimates of the Price Transmission for Beef (1981-1996)

Independent variables/Dependent variables	Ln (Retail price)
Constant	0.12
	(1.58)
Ln (Producer price)	1.03
	(118.3)
DIAGNOSTIC	
R^2	0.99
Adjusted R^2	0.99
D.W	2.21
F	13998.3
Theil (U)	0.13

Table B.47. Parameter Estimates of the Price Transmission for Sheep, 1981 to 1996

Independent variables/Dependent variables	Ln (Istanbul live sheep market price)
Constant	0.33
	(0.82)
Ln (Australian Export price, CIF)	0.95
	(20.9)
DIAGNOSTIC	
R^2	0.99
Adjusted R^2	0.99
D.h	0.97
Rho1	0.54
	(2.49)
Theil (U)	0.48

Table B.48. Parameter Estimates of the Price Transmission for Mutton Producer 1981 to 1996

Independent variables/Dependent variables	Ln (Mutton Producer price)
Constant	0.63
	(23.7)
Ln (Sheep Price, Istanbul Commodity Market)	0.99
	(300.8)
DIAGNOSTIC	
R^2	0.99
Adjusted R^2	0.99
D.h	0.27
Rho1	-0.51
	(-2.54)
Theil (U)	0.10

Table B.49. Parameter Estimates of the Price Transmission for Mutton Rail, 1981 to 1996

Independent variables/Dependent variables	Ln (Retail price)
Constant	0.50
	(5.1)
Ln (Sheep Price, Istanbul Commodity Market)	0.47
	(3.3)
Ln (Beef retail price)	0.51
	(3.8)
DIAGNOSTIC	
R^2	0.99
Adjusted R^2	0.99
D.W	2.15
F	7118.9
Theil (U)	0.10

Table B.50. Parameter Estimates of the Price Transmission for Egg Producer, 1981 to 1996

Independent variables/Dependent variables	Ln (Egg producer price)
Constant	-0.62
	(-4.3)
Ln (Broiler producer price)	0.96
	(59.4)
DIAGNOSTIC	
R^2	0.99
Adjusted R^2	0.99
D.W	1.64
F	3525.6
Theil (U)	0.26

Table B.51. Parameter Estimates of the Price Transmission for Broiler Producer, 981 to 1996

Independent variables/Dependent variables	Ln (Broiler producer price)
Constant	0.14
	(1.6)
Ln (Chicken retail price)	1.03
	(108.4)
DIAGNOSTIC	
R^2	0.99
Adjusted R^2	0.99
D.W	2.21
F	11776
Theil (U)	0.13

Table B.52. Parameter Estimates of the Price Transmission for Retail Milk, 1981-1996

Independent variables/Dependent variables	Ln (Retail milk price)
Constant	0.66
	(5.56)
Ln (Cow milk producer price)	1.02
	(59.3)
DIAGNOSTIC	
R^2	0.99
Adjusted R^2	0.99
D.h	1.06
Rho1	0.56
	(2.73)
Theil (U)	0.19

Table B.53. Parameter Estimates of the Price Transmission for Cotton, 1980/81-1995/96

Independent variables/Dependent variables	Ln (Producer price)
Constant	-1.08
	(-7.8)
Ln (Cotlook A Index/a price)	1.01
	(60.6)
DIAGNOSTIC	
R^2	0.99
Adjusted R^2	0.99
D.W	2.15
F	3675.4
Theil (U)	0.26

Table B.54. Parameter Estimates of the Price Transmission for Barley, 1980/81-1995/96

Independent variables/Dependent variables	Ln (Producer price)
Constant	-0.12
	(-0.9)
Ln (Portland)	1.02
	(44.7)
DIAGNOSTIC	
R^2	0.99
Adjusted R^2	0.99
D.W	1.51
F	1997.8
Theil (U)	0.36

Table B.55. Parameter Estimates of the Price Transmission for Soybean 1980/81-1995/96

Independent variables/Dependent variables	**Ln (Producer price)**
Constant	0.09
	(0.35)
Ln (Rotterdam)	1.00
	(27.4)
DIAGNOSTIC	
R^2	0.99
Adjusted R^2	0.99
D(h)	1.85
Rho	0.51
	(2.38)
Theil (U)	0.41

Table B.56. Parameter Estimates of the Price Transmission for Soybean Meal, 1980/81-1995/96

Independent variables/Dependent variables	**Ln (Soybean Producer price)**
Constant	0.27
	(0.85)
Ln (Rotterdam)	1.00
	(20.8)
DIAGNOSTIC	
R^2	0.99
Adjusted R^2	0.99
D(h)	1.66
Rho	0.60
	(2.97)
Theil (U)	0.46

Table B.57. Parameter Estimates of the Price Transmission for Laying Hens Feed, 1979 to 1996

Independent variables/Dependent variables	**Ln (Feed price)**
Constant	0.25
	(2.1)
Ln (Maize and Soybean Price Index) *	1.05
	(51.5)
DIAGNOSTIC	
R^2	0.99
Adjusted R^2	0.99
D.W	1.43
F	2656.7
Theil (U)	0.35

*Feed price index was computed as 0.40 percent of maize producer price and 0.20 percent of soybean producer price.

Table B.58. Model Statistics of Fit

VARIABLES **PRODUCTION of**	**Mean Absolute Error**	**Root Mean Square Error**
Beef and Veal	0.022	0.03
Mutton and Lamb	0.052	0.06
Chicken	19.43	27.63
Milk	0.01	0.02
Egg	16.66	20.15
Feed Demand of Maize	34.99	41.10
Food Demand of Maize	0.019	0.14
Area Planted with Maize	0.02	0.02
Yield of Maize	0.03	0.04
Demand of Barley	0.04	0.04
Demand of Soybean	0.14	0.16
Area Planted with Soybean	0.15	0.21
Yield of Soybean	0.03	0.03
Demand of Sugar	0.77	0.96
Area Planted with Sugar Beets	0.05	0.06
Yield of Sugar Beets	0.03	0.03
Food Demand of Wheat	0.05	0.06
Feed Demand of Wheat	0.09	0.10
Demand of Rice	0.06	0.07
Area Planted with Rice	0.10	0.14
Yield of Rice	0.04	0.05
Total Field Crops Planted Area	0.01	0.01
Fallow Land	0.05	0.06
Meat Expenditure	0.05	0.07
Oils, Milk and Egg Expenditure	13.35	18.78
Demand of Cottonseed Meal	0.05	0.06

Table B.59. Theil Forecast Statistics

VARIABLES PRODUCTION of	**Bias**	**Variance**	**Covariance**	**Regression**	**Disturbance**
Beef and Veal	0.000	0.061	0.994	0.000	1.000
Mutton and Lamb	0.000	0.123	0.887	0.017	0.982
Chicken	0.000	0.000	0.999	0.004	0.996
Milk	0.000	0.005	0.995	0.000	1.000
Egg	0.000	0.008	0.992	0.000	1.000
Feed Demand of Maize	0.000	0.007	0.993	0.000	1.000
Food Demand of Maize	0.000	0.104	0.896	0.000	1.000
Area Planted with Maize	0.000	0.035	0.965	0.000	1.000
Yield of Maize	0.000	0.006	0.994	0.000	1.000
Demand of Barley	0.001	0.005	0.993	0.005	0.995
Demand of Soybean	0.025	0.005	0.969	0.066	0.908
Area Planted with Soybean	0.000	0.037	0.962	0.000	1.000
Yield of Soybean	0.000	0.017	0.983	0.000	1.000
Demand of Sugar	0.000	0.069	0.931	0.000	1.000
Area Planted with Sugar Beets	0.000	0.028	0.972	0.000	1.000
Yield of Sugar Beets	0.000	0.031	0.969	0.000	1.000
Food Demand of Wheat	0.012	0.103	0.885	0.038	0.950
Feed Demand of Wheat	0.000	0.065	0.935	0.000	1.000
Demand of Rice	0.008	0.037	0.955	0.000	0.992
Area Planted with Rice	0.000	0.178	0.823	0.000	1.000
Yield of Rice	0.000	0.323	0.677	0.000	1.000
Total Field Crops Planted Area	0.000	0.011	0.989	0.000	1.000
Fallow Land	0.000	0.023	0.997	0.000	1.000
Meat Expenditure	0.000	0.015	0.985	0.000	1.000
Oils, Milk and Egg Expenditure	0.021	0.021	0.977	0.000	0.998
Demand of Cottonseed Meal	0.000	0.031	0.969	0.000	1.000

APPENDIX C.

Table C.1. Long-run Conditional Expenditure and Uncompensated Elasticity of Meats

	Expenditure	Beef	Sheep	Chicken	Homogeneity $\sum e_{ij} = - e_i$	Share
Beef	1.01	-1.11	0.14	-0.04	-1.01	0.53
Sheep	0.93	0.27	-1.46	0.26	-0.93	0.32
Chicken	1.11	-0.19	0.52	-1.44	-1.11	0.15

Table C.2. Long-run Conditional Compensated Price Elasticity of Meats

	Beef	Mutton	Chicken	Homogeneity $\sum e_{ij} = 0$
Beef	-0.57	0.46	0.11	0.0
Mutton	0.77	-1.17	0.40	0.0
Chicken	0.40	0.88	-1.28	0.0

Table C.3. Long-run Unconditional Income and Uncompensated Price Elasticity of Meats

	Income	Beef	Mutton	Chicken	Homogeneity $\sum e_{ij} = - e_i$
Beef	1.14	-1.18	0.10	-0.06	-1.14
Mutton	1.05	0.21	-1.50	0.24	-1.05
Chicken	1.25	-0.27	0.47	-1.45	-1.25

Table C.4. Long-run Conditional Expenditure and Uncompensated Elasticity of Eggs, Milk and Vegetable Oils

	Expenditure	Milk	Egg	Vegetable Oils	Homogeneity $\sum e_{ij} = - e_i$	Share
Milk	0.98	-0.80	-0.13	-0.05	-0.98	0.64
Eggs	1.14	-0.49	-0.53	-0.12	-1.14	0.10
Vegetable Oils	0.99	-0.32	0.14	-0.81	-0.99	0.26

Table C.5. Long-run Conditional Compensated Elasticity of Egg, Milk and Vegetable Oils

	Milk	Eggs	Vegetable Oils	Homogeneity ($\sum e_{ij} = 0$)
Milk	-0.16	-0.03	0.19	0.0
Eggs	0.25	-0.42	0.17	0.0
Vegetable Oils	0.32	0.24	-0.56	0.0

Table C.6. Long-run Unconditional Income and Uncompensated Elasticity of Eggs, Milk and Vegetable Oils

	Income	Milk	Eggs	Vegetable Oils	Homogeneity $\sum e_{ij} = - e_i$
Milk	0.65	-0.58	-0.10	0.03	-0.65
Eggs	0.75	-0.24	-0.49	-0.02	-0.75
Vegetable Oils	0.65	-0.10	0.17	-0.72	-0.65

Table C.7. Price and Income Elasticity of Food Commodities

	Own-Price	Income	Cross-Price Elasticity with Respect to Rice Price
Sugar	-0.14	-0.49	
Wheat	-0.05	-0.10	0.03
Rice		0.83	

Table C.8. The Expenditure Elasticity of Goods and Services in Urban Turkey

Types of consumption expenditure	Elasticity	Budget share
Food, beverage and tobacco	0.51	0.365
Clothing and footwear	1.19	0.092
Housing and rent	0.86	0.248
Various goods and services	1.50	0.055
Transportation	2.08	0.073
Health	1.13	0.023
Education	2.06	0.015
Hotel, restaurant and pastry shop	1.45	0.026
Entertainment and culture	1.76	0.021
House furnishing	1.54	0.082

Note: Selected province centers consumption expenditure data used for Engel curve estimation. The data are from 'Consumption Expenditure Survey Results' of the State Institute of Statistic (SIS 1997). The aggregate data is pooled (19 cities and five income groups). The total sample is ninety-five. Engel curve was estimated in terms of share dependent variable. This functional form satisfies adding-up restriction of microeconomic demand theory. Estimation was done by SUR and adding-up imposed.

Table C.9. The Expenditure Elasticity of Goods and Services in Low Income Group

Types of consumption expenditure	Elasticity	Budget share
Food, beverage, and tobacco	0.58	0.4298
Clothing and footwear	1.34	0.0772
Housing and rent	0.97	0.2711
Various goods and services	1.56	0.0430
Transportation	1.76	0.0463
Health	1.08	0.0231
Education	2.18	0.0085
Hotel, restaurant and pastry shop	1.35	0.0214
Entertainment and culture	2.36	0.0159
House furnishing	1.95	0.0604

Table C.10. The Expenditure Elasticity of Goods and Services in High Income Group

Types of consumption expenditure	Elasticity	Budget share
Food, beverage and tobacco	0.44	0.296
Clothing and footwear	0.89	0.108
Housing and rent	0.92	0.225
Various goods and services	1.22	0.069
Transportation	1.97	0.099
Health	1.18	0.023
Education	1.86	0.022
Hotel, restaurant and pastry shop	1.44	0.030
Entertainment and culture	1.63	0.027
House furnishing	1.28	0.104

Note: The SIS expenditure group was regrouped, the first two income groups are lower and the last two income groups are higher.

Table C.11. The Expenditure Elasticity of Food Groups in Urban Turkey

Types of food group expenditure	Conditional Elasticity	Unconditional Elasticity	Share in Group Expenditure
Bread and cereals	0.69	0.35	0.215
Meat and fish	1.54	0.79	0.150
Milk, cheese, eggs, oils and fats	0.78	0.40	0.197
Vegetables and fruits	0.92	0.47	0.214
Sugar	0.25	0.13	0.031
Other food products	0.78	0.38	0.092
Beverage and cigarettes *	1.74	0.89	0.100

*Including alcoholic beverage

TableC. 12. The Expenditure Elasticity of Food Groups in Low Income Group

Types of food group expenditure	Conditional Elasticity	Unconditional Elasticity	Share in Group Expenditure
Bread and cereals	0.78	0.46	0.245
Meat and fish	1.35	0.80	0.128
Milk, cheese, eggs, oils and fats	1.04	0.61	0.202
Vegetables and fruits	0.98	0.58	0.211
Sugar	0.55	0.32	0.036
Other food products	0.69	0.41	0.091
Beverage and cigarettes *	1.53	0.90	0.087

*Including alcoholic beverages

Table C.13. The Expenditure Elasticity of Food Groups in High Income Group

Types of food group expenditure	Conditional Elasticity	Unconditional Elasticity	Share in Group Expenditure
Bread and cereals	0.48	0.21	0.183
Meat and fish	1.56	0.69	0.173
Milk, cheese, Eggs, oils and fats	0.81	0.36	0.192
Vegetables and fruits	0.89	0.39	0.215
Sugar	0.21	0.09	0.027
Other food products	0.73	0.32	0.092
Beverage and cigarettes *	1.78	0.78	0.116

*Including alcoholic beverage

Table C.14. The Expenditure Elasticity of Food Subgroups in Urban Turkey

Types of food group expenditure	Conditional Elasticity	Unconditional Elasticity	Share in Group Expenditure
Oils and fats	1.33	0.53	0.395
Milk, Cheese and other milk products	0.81	0.32	0.485
Eggs	0.67	0.27	0.120

Table C.15. The Expenditure Elasticity of Food Subgroups in Low Income Group

Types of food group expenditure	Conditional Elasticity	Unconditional Elasticity	Share in Group Expenditure
Oils and fats	1.23	0.75	0.403
Milk, Cheese and other milk products	0.91	0.56	0.471
Eggs	0.60	0.37	0.126

Table C. 16. The Expenditure Elasticity of Food Subgroups in High Income Group

Types of food group expenditure	Conditional Elasticity	Unconditional Elasticity	Share in Group Expenditure
Oils and fats	1.52	0.55	0.386
Milk, Cheese and other milk products	0.70	0.25	0.503
Eggs	0.56	0.20	0.111

Table C.17. The Expenditure Elasticity of Food Subgroups in Urban Turkey

Types of food group expenditure	Conditional Elasticity	Unconditional Elasticity	Share in Group Expenditure
Beef and veal	1.07	0.94	0.429
Mutton and lamb	0.75	0.65	0.287
Chicken	1.09	0.96	0.135
Processed meats	1.41	1.24	0.056
Meat varieties	1.07	0.94	0.022
Fish	1.09	0.96	0.072

Table C.18. The Expenditure Elasticity of Food Subgroups in Low Income Group

Types of food group expenditure	Conditional Elasticity	Unconditional Elasticity	Share in Group Expenditure
Beef, veal, mutton and lamb	0.97	0.78	0.722
Chicken	0.97	0.78	0.135
Processed meats	1.18	0.94	0.045
Meat varieties	0.95	0.76	0.024
Fish	1.18	0.94	0.074

Note: Beef, veal, mutton and lamb estimated together due to the geographic consumption habits.

Table C.19. The Expenditure Elasticity of Food Subgroups in High Income Group

Types of food group expenditure	Conditional Elasticity	Unconditional Elasticity	Share in Group Expenditure
Beef, veal, mutton and lamb	0.89	0.61	0.711
Chicken	1.21	0.83	0.135
Processed meats	1.25	0.86	0.068
Meat varieties	1.32	0.91	0.019
Fish	1.41	0.97	0.067

Table C.20. Bread and Cereals Price and Income Elasticity in Urban Turkey

Own-price elasticity	*-0.23*
Income elasticity	*0.27*
Household size elasticity	*0.52*
Elasticity with respect to adult household members within household size	-0.88

Note: Demand model estimated from 1994 Household Consumption Expenditure Survey Data.
Price was computed using 1994 province level bread, rice and other cereal product price and appropriate product weight in group expenditure.

Table C.21. Income and Uncompensated Price Elasticity in Urban Turkey

	Income	Own-price	Share in Total Expenditure
Beef and veal	0.94	-0.59	0.0235
Mutton and lamb	0.65	-1.18	0.0156
Chicken	0.96	-1.29	0.0074
Milk	0.32	-0.17	0.0349
Vegetable Oils	0.53	-0.58	0.0284
Eggs	0.27	-0.42	0.0086
Bread and cereals	0.27	-0.23	0.0780
Sugar	0.13	-0.14	0.0113

Note Elasticities are computed using formulae given in equation (3.15) in page 35.

Table C.22. Uncompensated Cross-Price Elasticity in Urban Turkey

	Beef and veal	Mutton and lamb	Chicken
Beef and veal	-0.59	0.44	0.09
Mutton and lamb	0.76	-1.18	0.39
Chicken	0.39	0.87	-1.29
	Milk	**Oils**	**Eggs**
Milk	-0.17	0.18	-0.04
Oils	0.30	-0.58	0.22
Eggs	0.23	0.15	-0.42

Table C.23. Price Elasticity of Feed Commodities

MAIZE for FOOD and INDUSTRY	**Elasticity**
Short-run own price elasticity (maize)	-0.69
Long-run own price elasticity	-0.74
Short-run income elasticity	0.66
Long-run income elasticity	0.71
MAIZE for FEED	
Price elasticity with respect to eggs and broiler production	*0.38*
BARLEY for FEED and INDUSTRY	
Price elasticity with respect to price ratio (Maize/Barley)	*-0.21*
Elasticity with respect to milk production	1.15
SOYBEAN	
Adjustment coefficient	0.92
Short-run own-price elasticity	-0.60
Short-run elasticity with respect to eggs and broiler production	0.38
Long-run own-price elasticity	-0.65
Long-run elasticity with respect to eggs and broiler production	0.41

Table C.24. Long-run Area Response Elasticity of Crops with Respect to Gross Return, 1970 to 1995

	Wheat	Cotton	Sunflower	Barley	Lentil	Chickpea
Wheat	0.26	-0.07	-0.07	-0.15	+	-
Cotton	-0.45	0.47	+	+	-	-
Sunflower	-0.75	+	0.22	0.47	+	0.15
Barley	-0.28	+	0.25	0.25	-0.07	+
Lentil	+	-	+	-0.41	0.39	-0.09
Chickpea	-	-	*0.38*	+	*-0.24*	0.57
Share 1	0.531	0.039	0.027	0.174	0.022	0.019
Share 2	0.515	0.033	0.031	0.186	0.038	0.043

Note: Elasticity was calculated from last five years sample average.
Share 1: average of sample periods, Share 2: average of last five years.

Table C.25. Area Planted Elasticity

Soybean	**Elasticity**
Adjustment coefficient	0.28
Short-run cross price elasticity with respect to price ratio (soybean/maize)	0.46
Long-run cross price elasticity with respect to price ratio	0.64
Maize	
Adjustment coefficient	0.51
Short-run own price elasticity	0.14
Short-run cross price elasticity with respect to cotton	-0.11
Long-run own price elasticity	0.27
Long-run cross price elasticity with respect to cotton	-0.22
Rice	
Adjustment coefficient	0.53
Short-run own price elasticity	0.39
Long-run own price elasticity	0.74
Sugar Beets	
Short-run own-price elasticity	0.42
Long-run own-price elasticity	0.88
Short-run cross-price elasticity with respect to wheat	-0.29
Long-run cross-price elasticity with respect to wheat	-0.62

Table C.26. Yield Elasticity

Soybean	**Elasticity**
Adjustment coefficient	0.53
Short-run own price elasticity	0.25
Long-run own price elasticity	0.47
Maize	
Adjustment coefficient	0.38
Short-run own price elasticity	0.47
Long-run own price elasticity	1.25
Sugar Beets	
Own-price elasticity of yields	0.48

Table C.27. Lentils Supply Elasticity

Adjustment coefficient	0.77
Short-run own price elasticity	0.78
Long-run own price elasticity	1.01

Table C.28. Livestock Supply Elasticity

	Elasticity
Eggs	
Elasticity with respect to price ratio [t-1], (Feed/Own)	-0.43
Elasticity with respect to price ratio (Feed/Own)	-0.42
Chicken	
Elasticity with respect to price ratio(Feed/Own)	-0.99
Beef	
Own-price elasticity [t-1]	0.33
Cross-price elasticity with respect to milk price	-0.26
Milk	
Own-price elasticity (Cow milk price [t-2])	0.13
Mutton	
Own-price elasticity with respect to producer price [t-1]	0.05

Table C.29. Price Transmission Elasticity

Rice (from world to wholesale)	1.01
Maize (from world to producer)	1.05
Wheat (from world to producer)	1.03
Wheat flour (from wheat producer to wholesale flour)	0.94
Sunflower (from world to producer)	1.11
Margarine (from world to retail)	1.06
Sunflower oil (from world to retail)	1.06
Beef (from world to producer)	1.14
Beef (from producer to retail)	1.03
Sheep(from world to mercantile market Istanbul)	0.95
Mutton (from mercantile market to producer)	0.99
Chicken (from retail to producer)	1.03
Eggs (from broiler producer to Eggs producer)	0.96
Milk(from cow milk producer to retail)	1.02
Cotton (from world to producer)	1.01
Barley (from world to producer)	1.02
Soybean (from world to producer)	1.00
Soybean meal (from world to producer)	1.00
Laying Hens Feed (from Maize and Soybean Price Index to feed)	1.05

Note: In the classical free trade model with zero transportation cost, Turkey and foreign price would be equal. In this case, the price transmission elasticity would equal one. The price transmission elasticity, also, will be one, if the foreign price varies proportionally with Turkey price. Fore reference see the paper of Bredalh E M., W H. Meyers, and K J. Collins, (1979). The Elasticity of Foreign Demand for U.S. Agricultural Products: The Importance of the Price Transmission Elasticity. Amer. J. Agr. Econ. February (1979)58-63.

APPENDIX D.

Table D.1. Parameter Estimates of Food (SUR)

Variables	**Average**	**Low Income Group**	**High Income Group**
Expenditure Share of Food			
Constant	.476	.468	.426
	(21.6)	(9.49)	(9.38)
Ln (Consumption expenditure)	-.180	-.165	-.178
	(-37.4)	(-16.6)	(-12.1)
Household size	.19	.17	.23
	(12.6)	(7.41)	(8.76)
Log of Likelihood Function	2490.0	981.06	1080.72
Likelihood Ratio Test	160.48	85.75	67.01

Note: To satisfy adding-up restriction, house-furnishing expenditure is excluded from the system.

Table D.2. Parameter Estimates of Clothing and Foot Wear (SUR)

Variables	**Average**	**Low Income Group**	**High Income Group**
Expenditure Share of Clots and Foot Wear			
Constant	-.039	-.081	-.047
	(-2.28)	(1.76)	(1.75)
Ln (Consumption expenditure)	-.017	-.011	.026
	(-4.71)	(-1.14)	(3.07)
Household size	.063	.037	.056
	(5.29)	(1.60)	(3.63)

Table D.3. Parameter Estimates of Housing (SUR)

Variables	**Average**	**Low Income Group**	**High Income Group**
Expenditure Share of Housing			
Constant	.404	.197	.401
	(11.87)	(2.08)	(7.60)
Ln (Consumption expenditure)	-.034	-.017	-.007
	(-4.45)	(-0.90)	(-0.43)
Household size	-.055	0.047	-0.085
	(-2.32)	(1.06)	(-2.79)

Table D.4. Parameter Estimates of Others (SUR)

Variables	Average	Low Income Group	High Income Group
Expenditure Share of Others			
Constant	.017	.075	.031
	(1.41)	(2.25)	(1.64)
Ln (Consumption expenditure)	.027	.015	.024
	(10.73)	(2.21)	(4.07)
Household size	-.015	-.029	-.022
	(-1.82)	(-1.89)	(-2.05)

Table D.5. Parameter Estimates of Transportation (SUR)

Variables	Average	Low Income Group	High Income Group
Expenditure Share of Transportation			
Constant	.055	.015	.105
	(1.59)	(0.14)	(3.20)
Ln (Consumption expenditure)	.078	.097	.035
	(10.33)	(4.32)	(3.31)
Household size	-.11	-.11	-.088
	(-4.36)	(-2.13)	(-4.62)

Table D.6. Parameter Estimates of Health (SUR)

Variables	Average	Low Income Group	High Income Group
Expenditure Share of Health			
Constant	.044	.035	.050
	(5.15)	(1.47)	(2.66)
Ln (Consumption expenditure)	.0029	.0039	.0019
	(1.54)	(0.83)	(0.32)
Household size	-.019	-.015	-.022
	(-3.23)	(-1.33)	(-2.03)

Table D.7. Parameter Estimates of Education (SUR)

Variables	Average	Low Income Group	High Income Group
Expenditure Share of Education			
Constant	-.0057	-.0075	-.0038
	(-0.55)	(-0.22)	(-0.37)
Ln (Consumption expenditure)	.016	.018	.010
	(6.91)	(2.67)	(3.07)
Household size	-.0093	-.0023	-.0038
	(-1.31)	(-1.40)	(-0. 66)

Table D.8. Parameter Estimates of Restaurant and Hotel (SUR)

Variables	Average	Low Income Group	High Income Group
Expenditure Share of Restaurant and Hotel			
Constant	.020	.021	.024
	(2.27)	(0.88)	(1.68)
Ln (Consumption expenditure)	.012	.013	.008
	(6.1)	(2.81)	(1.67)
Household size	-.013	-.017	-.011
	(-2.17)	(-1.50)	(-1.39)

Table D.9. Parameter Estimates of Entertainment and Culture (SUR)

Variables	Average	Low Income Group	High Income Group
Expenditure Share of Entertainment and Culture			
Constant	.0086	-.0040	.0016
	(1.00)	(-0.17)	(0.10)
Ln (Consumption expenditure)	.016	.017	.021
	(8.62)	(3.53)	(4.35)
Household size	-.0016	-.0089	-.017
	(-2.60)	(-0.79)	(-1.93)

Table D.10. Parameter Estimates of Bread and Cereals (SUR)

Variables	Average	Low Income Group	High Income Group
Expenditure Share of Bread and Cereals (within food)			
Constant	.167	0.18	0.168
	(8.25)	(5.38)	(4.72)
Ln (food expenditure)	-.0677	-0.095	-0.054
	(-4.17)	(-4.29)	(-1.74)
Household size	-.0027	0.028	0.031
	(-0.34)	(4.30)	(2.67)
Ln (Number of Income Recipient in Household /Household Size)	-.129		
	(-5.91)		
Dummy (Low Income Provinces)	-.0081	0.0061	0.013
	(-0.78)	(0.43)	(0.65)
Log of Likelihood Function	1367.71	548.25	538.88
Likelihood Ratio Test	136.67	33.00	79.42

Note: To satisfy adding-up restriction, Tobacco and Beverages expenditure is excluded from the system.

Table D.11. Parameter Estimates of Meat and Fish (SUR)

Variables	**Average**	**Low Income Group**	**High Income Group**
Expenditure Share of Meat and Fish (within food)			
Constant	.078	0.069	0.098
	(4.9)	(2.57)	(3.92)
Ln (food expenditure)	.081	0.096	0.044
	(6.4)	(5.45)	(2.04)
Household size	.0029	-0.069	-0.0031
	(-0.46)	(-1.27)	(-0.38)
Ln (Number of Income Recipient in Household /Household Size)	.001		
	(.61)		
Dummy (Low Income Provinces)	.018	0.011	0.016
	(2.26)	(0.94)	(1.12)

Note: Low income provinces are Diyarbakır and Gaziantep.

Table D.12. Parameter Estimates of Eggs, Milk, Cheese and Oils (SUR)

Variables	**Average**	**Low Income Group**	**High Income Group**
Expenditure Share of Eggs, Milk ,Cheese and Oils (within food)			
Constant	.239	0.20	0.24
	(14.99)	(6.18)	(9.40)
Ln (food expenditure)	.-.044	-0.037	0.0078
	(-3.46)	(-1.69)	(0.36)
Household size	.013	0.092	-0.096
	(2.13)	(1.38)	(-1.19)
Ln (Number of Income Recipient in Household /Household Size)	.045		
	(2.59)		
Dummy (Low Income Provinces)	-.023	-0.032	-0.016
	(-2.88)	(-2.29)	(-1.16)

Table D.13. Parameter Estimates of Vegetable and Fruits (SUR)

Variables	**Average**	**Low Income Group**	**High Income Group**
Expenditure Share of Vegetable and Fruits (within food)			
Constant	.275	0.318	0.25
	(17.91)	(10.99)	(9.68)
Ln (food expenditure)	-.016	-0.023	-0.048
	(-1.33)	(-1.20)	(-0.22)
Household size	.0032	-0.015	-0.075
	(0.53)	(-2.73)	(-0.92)
Ln (Number of Income Recipient in Household /Household Size)	.056		
	(3.36)		
Dummy (Low Income Provinces)	.029	0.035	0.014
	(3.70)	(2.87)	(0.99)

Table D.14. Parameter Estimates of Others (SUR)

Variables	**Average**	**Low Income Group**	**High Income Group**
Expenditure Share of Others (within food)			
Constant	.10	0.111	0.112
	(9.08)	(5.15)	(6.48)
Ln (food expenditure)	-.027	-0.032	-0.039
	(-3.07)	(-2.27)	(-2.60)
Household size	.0091	0.012	0.013
	(2.08)	(2.73)	(2.35)
Ln (Number of Income Recipient in Household/Household Size)	-.015		
	(-1.28)		
Dummy (Low Income Provinces)	-.023	-0.022	-0.025
	(-4.16)	(-2.36)	(-2.50)

Table D.15. Parameter Estimates of Sugar (OLS)

Variables	**Average**	**Low Income Group**	**High Income Group**
Expenditure Share of Sugar (within food)			
Constant	.026	.024	0.019
	(5.34)	(3.05)	(1.75)
Ln (food expenditure)	-.023	-0.016	-0.021
	(-10.83)	(-3.14)	(-3.68)
Ln (Household size)	.022	0.019	0.024
	(5.67)	(3.03)	(3.88)
R2	0.56	0.28	0.40
Adjusted R2	0.55	0.24	0.37
F	58.7	6.90	11.78
B-P-G (Based on R2)	4.32	3.84	3.12

Table D.16. Parameter Estimates of Milk, Yogurt and Cheese (SUR)

Variables	**Average**	**Low Income Group**	**High Income Group**
Expenditure Share of Chicken (within eggs, milk, yogurt, cheese and oils)			
Constant	.47	.36	.30
	(5.7)	(6.2)	(3.0)
Ln (egg, milk, yogurt, cheese and oils expenditure)	.13	.20	.09
	(4.3)	(4.4)	(2.2)
Ln (Household size)	-.198		-.105
	(-3.22)		(-1.25)
Dummy (Low Income Provinces)	-.091		-.146
	(-4.40)		(-4.67)
Ln (Dependency rate in Household)	-.27		-.29
	(-7.76)		(-4.58)
Ln (Number of Child in Household [04]/Household size)		-.0132	
		(-1.44)	
Log of Likelihood Function	447.1	184.29	
Likelihood Ratio Test	198.39	111.58	

Table D.17. Parameter Estimates of Oils (SUR)

Variables	**Average**	**Low Income Group**	**High Income Group**
Expenditure Share of Oils (within egg, milk, yogurt, cheese and oils)			
Constant	.43	.56	.60
	(5.01)	(8.56)	(5.94)
Ln (egg, milk, yogurt, cheese and oils expenditure)	-.009	-.15	-.042
	(-2.89)	(-3.03)	(-1.01)
Ln (Household size)	.197		.096
	(3.09)		(1.16)
Dummy (Low Income Provinces)	.094		.151
	(4.40)		(4.85)
Ln (Dependency rate in Household)	.27		.27
	(7.53)		(4.35)
Ln (Number of Child in Household [04]/Household size)		.038	
		(1.58)	

Table D.18. Parameter Estimates of Beef and Mutton (SUR)

Variables	**Average**	**Low Income Group**	**High Income Group**
Expenditure Share of Beef and Mutton (within meat and fish expenditure)			
Constant	.596	.351	.466
	(13.87)	(2.45)	(4.32)
Ln (food meat and fish expenditure)	-.0024	-.079	-.016
	(-.15)	(-1.99)	(-.36)
Ln (Household size)		.215	
		(2.34)	
Ln (Number of Person in Household [18+]/Household size)	-.246		-.46
	(-2.83)		(-2.74)
Dummy (Low Income Provinces)	-.0034	.0021	-.15
	(-1.17)	(0.055)	(-2.51)
Dummy (High Income Provinces)	-.062		
	(-3.16)		
Log of Likelihood Function	851.98	375.20	309.27
Likelihood Ratio Test	109.5	61.23	41.67

Table D.19. Parameter Estimates of Chicken (SUR)

Variables	Average	Low Income Group	High Income Group
Expenditure Share of Chicken (within meat and fish expenditure)			
Constant	.165	.294	.232
	(5.89)	(3.13)	(3.13)
Ln (food meat and fish expenditure)	-.0092	.028	-.004
	(-.93)	(1.08)	(-.13)
Ln (Household size)		-.10	
		(-1.66)	
Ln (Number of Person in Household [18+]/Household size)	.091		.20
	(1.60)		(1.76)
Dummy (Low Income Provinces)	.054	.042	.11
	(2.82)	(01.64)	(2.56)
Dummy (High Income Provinces)	.051		
	(3.96)		

Table D.20. Parameter Estimates of Meat Products (SUR)

Variables	Average	Low Income Group	High Income Group
Expenditure Share of Meat Products (within meat and fish expenditure)			
Constant	.135	.199	.127
	(8.76)	(3.27)	(3.54)
Ln (food meat and fish expenditure)	.0016	.017	.0078
	(3.02)	(1.02)	(.52)
Ln (Household size)		-.078	
		(-2.00)	
Ln (Number of Person [18+] in Household/Household size)	.129		.13
	(4.12)		(2.44)
Dummy (Low Income Provinces)	-.023	-.0041	-.007
	(-2.19)	(-2.50)	(-.35)
Dummy (High Income Provinces)	.019		
	(2.72)		

Table D.21. Parameter Estimates of Fish (SUR)

Variables	**Average**	**Low Income Group**	**High Income Group**
Expenditure Share of Fish (within meat and fish expenditure)			
Constant	.011	-.0034	.031
	(1.56)	(-0.16)	(1.88)
Ln (food meat and fish expenditure)	-.003	.006	-.0012
	(-1.24)	(1.06)	(-.18)
Ln (Household size)		.016	
		(1.20)	
Ln (Number of Person in Household [18+]/Household size)	-.015		.018
	(-1.12)		(.71)
Dummy (Low Income Provinces)	.0058	-.0029	.022
	(1.24)	(-0.50)	(2.34)
Dummy (High Income Provinces)	.0008		
	(0.26)		

APPENDIX E.

Table E.1. Per Capita Annual Meat Consumption of Selected Countries (Kilograms, Carcass Weight Basis)

	1995	1996	1997	1998
Turkey				
-Beef	9.6	10.2		
-Broiler	7.8	8.5		
-Lamb-Mutton	3.9	4.1		
Argentina				
-Beef		60.1	60.1	57.2
Australia				
-Beef		36.6	39.6	39.1
-Poultry		26.6	27.2	27.4
-Lamb-Mutton		16.2	17.9	18.2
-Total		97.5	102.7	103.1
Brazil				
-Beef		28.2	36.4	35.1
-Poultry		21.4	22.9	23.9
-Total			68.3	68.2
European Union				
-Beef		17.6	19.0	19.2
-Broiler		20.0	13.8	14.1
-Lamb-Mutton			3.6	3.6
-Total		77.7	77.6	78.9
Japan				
-Beef		11.4	7.9	7.9
-Poultry		14.2	10.9	11.0
-Total		42.4	30.3	30.7
Korea, Shout				
-Beef		9.5	10.4	10.9
-Poultry		10.1	11.3	11.8
-Total		38.6	40.8	42.0
New Zealand				
-Beef			33.0	33.5
-Poultry			26.0	26.6
-Lamb-Mutton			26.8	29.0
-Total			103.9	105.4
United State				
-Beef		44.8	43.3	43.3
-Broiler		36.9	37.9	39.9
-Total		110.4	109.7	113.5

Source: FAPRI 1998 World Agricultural Outlook, Iowa State University and University of Missouri-Columbia, Staff Report 2-98, January 1998. Note: Turkey consumption data for 1995 and 1996 are from Ministry of Agriculture and Rural Affairs.

Table E.2. Per Capita Annual Dairy Consumption of Selected Countries (Kg)

	1995	1996	1997	1998
Turkey				
-Total Milk Equivalent	100.3	98.6		
Argentina				
-Fluid Milk			61.1	61.4
-Butter			1.3	1.3
-Cheese			10.8	10.8
-NFD Milk			0.5	0.5
Whole Milk Powder			2.9	3.0
Australia				
-Fluid Milk			106.8	108.4
-Butter			3.3	3.2
-Cheese			10.2	10.3
-NFD Milk			2.5	2.2
Whole Milk Powder			1.2	1.2
European Union				
-Fluid Milk			95.3	95.0
-Butter			4.6	4.5
-Cheese			14.9	15.2
-NFD Milk			2.4	2.4
Whole Milk powder			1.1	1.1
Japan				
-Fluid Milk			40.9	40.9
-Butter			0.7	0.7
-Cheese			1.6	1.7
-NFD Milk			2.2	2.2
Russia				
-Fluid Milk			94.7	94.4
-Butter			3.5	3.5
-Cheese			2.3	2.6
-NFD Milk			1.3	1.3
United State				
-Total Fluid Milk			95.3	95.3
a)Whole Fluid Milk			33.6	32.7
b)Low Fat Fluid Milk			61.7	62.6
-Butter			1.9	1.9
-Cheese			12.8	13.0
-NFD Milk			1.5	1.5

Source: FAPRI 1998 World Agricultural Outlook, Iowa State University and University of Missouri-Columbia, Staff Report 2-98, January 1998. Note: Turkey consumption data for 1995 and 1996 are from Ministry of Agriculture and Rural Affairs.

Table E.3. Per Capita Nutrient Intake in Turkey (1984)

	Rural	Urban
Energy (K cal)	2304.00	2257.00
Total protein (g)	68.80	67.40
Animal protein (g)	15.60	26.00
Fat (g)	56.20	66.90
Calcium (mg)	435.00	384.00
Iron (mg)	20.40	15.30
Vitamin A (IU)	4070.00	5266.00
Vitamin C (mg)	96.00	130.00
Thiamin (mg)	1.85	1.58
Riboflavin (mg)	0.96	1.04
Niacin (mg)	16.90	16.10

Source: The Ministry of Agriculture and Rural Affairs, 1987, Ankara.
Note: Adult equivalent scale (Consumer Unit "CU") was calculated as 0.73 in Turkey in 1984.

Table E.4. Nutrient Elements Limits for Turkey (1984)

	Insufficient	At the Threshold	Sufficient	Excess
Energy (K cal)	2000	2001-2500	2501-3000	3001
Total protein (g)	47	50-69	70-89	90
Animal protein (g)	10	11-15	16-20	21
Fat (g)	44	45-64	65-119	120
Calcium (mg)	300	301-400	401-500	501
Iron (mg)	10	10.1-15	15.1-20	20.1
Vitamin A (CU)	3000	3001-4000	4001-5000	5001
Vitamin C (mg)	25	26-50	51-75	76
Thiamin (mg)	0.80	0.81-1.00	1.10-1.20	1.21
Riboflavin (mg)	1.00	1.01-1.20	1.21-1.50	1.51
Niacin (mg)	10.0	10.1-12.0	12.1-14.0	14.1

Source: The Ministry of Agriculture and Rural Affairs, 1987, Ankara.

Table E.5. Per Capita Annual Food Intake in Turkey in 1984 (Kg or Liters)

	Rural	Urban
Bread	139.43	123.01
Cereals and Cereal Products	36.14	31.39
Dry Beans and Oil Seeds	12.41	13.87
Milk and Yogurt	25.92	24.46
Cheese	8.03	8.76
Red Meat	9.49	18.25
Poultry	1.46	1.46
Fish and Other Sea Products	2.56	2.56
Egg	4.38	5.11
	82.86	89.43
Fruits	60.59	65.70
Refined Liquid Oil	8.03	7.67
Fats	5.48	8.40
Sugar and Sugar Products	15.70	15.00
Alcoholic Beverage	3.29	3.29

Source: The Ministry of Agriculture and Rural Affairs, 1987, Ankara.

Table E.6. Per Capita Annual Food Consumption (Kg)

Year	Beef	Mutton	Chicken	Egg	Milk	V.Oil	Rice	Sugar
1979	6.5	6.0	1.9	5.1	94.4	13.6	4.7	26.4
1980	6.7	6.1	1.6	4.7	96.0	13.4	3.2	22.7
1981	6.6	5.2	1.5	5.1	96.3	13.9	4.6	22.6
1982	5.8	4.4	1.3	5.3	96.6	14.0	3.7	26.2
1983	5.8	4.4	1.7	5.0	97.7	15.0	3.3	25.7
1984	6.0	3.0	2.2	5.0	99.5	16.1	4.9	26.8
1985	6.9	4.1	2.6	5.3	102.2	15.1	4.7	24.7
1986	6.8	4.1	3.2	5.6	98.8	15.4	4.7	26.5
1987	8.1	3.7	4.6	6.0	99.8	16.3	4.7	29.0
1988	7.5	4.8	5.7	5.8	102.8	17.8	4.8	26.3
1989	6.6	4.6	5.4	5.4	98.2	18.5	5.1	27.5
1990	7.4	4.6	5.1	6.1	96.5	19.5	6.0	28.1
1991	8.4	4.8	4.8	6.2	102.7	17.1	6.2	26.3
1992	8.5	5.1	5.6	6.9	103.5	17.2	6.3	27.8
1993	8.5	4.2	6.9	7.2	102.4	16.3	6.3	28.2
1994	7.4	4.1	7.5	8.4	100.6	17.3	6.2	28.9
1995	9.6	3.9	7.8	8.9	100.3	18.7	6.3	30.0
1996	10.2	4.1	8.5	9.6	98.6	18.1	6.5	30.7

Table E.7. Per Capita Annual Food Intake in Urban Turkey in 1994 (Kg)

Types of Food Item	Average	Low Income	High Income
Beef and Veal	4.78	3.22	6.42
Mutton and Lamb	3.41	2.36	4.46
Chicken	2.81	2.03	3.58
Meat varieties	0.55	0.48	0.62
Processed meat	0.27	0.15	0.41
Fish	2.69	2.35	2.88
Egg	7.00	6.59	7.39
Fresh Milk (Liters)	23.13	20.45	26.4
Yogurt	10.45	9.54	11.11
Cheese	5.09	4.14	6.09
*Milk equivalent of cheese	33.1	27.0	39.6
Oils and Fat	13.12	11.66	14.71
Bread	107.82	109.98	104.31
*Wheat flour equivalent of bread	70.08	71.49	67.8
*Wheat equivalent of bread	100.3	102.28	97.00
Rice	6.28	5.76	6.83
Boiled and Pounded Wheat	3.47	3.03	3.88
Sugar	15.28	15.07	15.69
Beans and Lentils	3.29	3.13	3.50
Potatoes	21.10	21.17	20.72
Household size	4.42	4.02	4.72
Age distribution (%)			
4 and <	9.3	10.4	8.7
5-12 years old	19.3	20.0	17.2
13-17 years old	13.6	11.7	13.3
18 and >	57.8	57.9	60.8

Source: Calculated from the 1994 Household Consumption Expenditure Survey of State Institute of Statistics Prime Minister Republic of Turkey (SIS, 1997). * It is assumed that 6.5 liters milk equals 1 Kg cheese, 1 Kg bread equals 0.65 Kg wheat flour and 1 Kg bread equals 0.93 Kg Wheat.

Table E.8. Meat Price of Selected Countries

Countries and Prices	1997	1998
Turkey		
Producer Prices (U.S. Dollars per Kilogram)		
-Live Cattle	1.72	
-Live Sheep	2.12	
-Live Hens (U.S. Dollars per Head in 1996)	3.66*	
Retail Prices (U.S. Dollars per Kilogram)		
-Beef and veal	4.73	
-Lamb and mutton	4.32	
-Broiler	2.21	
United State		
Producer Prices (U.S. Dollars per Metric Ton)		
-Nebraska Direct Fed Steers	1,462	1,528
-12-City Broiler Wholesale	1,296	1,218
Retail Price (U.S. Dollars per Kilogram)		
-Beef	6.17	6.31
-Broiler	3.34	3.11
Australia		
Producer Prices (Australian Dollars per 100 Kilogram)		
-Beef	161	177
-Lamb	213	189
-Wool	409	441
Retail Prices (Australian Dollars per 100 Kilogram)		
-Beef	1,020	1,039
-Broiler	318	321
-Lamb	704	691
Canada		
Retail Prices (Canadian Dollars per 100 Kilogram)		
-Beef and veal	3.18	3.61
-Poultry	1.75	1.43
European Union		
Producer Prices (ECUs per 100 Kilogram)		
-Beef	239	245
-Poultry	109	107
-Sheep	338	355
New Zealand		
Producer Prices (New Zealand Dollars per 100 Kilogram)		
-Beef and veal	140.24	125.14
-Poultry	181.26	171.92

Source: FAPRI 1998 World Agricultural Outlook, Iowa State University and University of Missouri-Columbia, Staff Report 2-98, January 1998. * Indicates 1996 price.

Table E.9. Dairy and Wool Price of Selected Countries

Countries and Prices	1997	1998
Turkey (U.S. Dollars per Liter)		
Cow Milk Producer (in 1996)	0.33	
Sheep Milk Producer (in 1996)	0.41	
Wool Producer (in 1996)	1.64	
-Fluid Milk Retail	1.01	
-Butter Retail	7.70	
United State (U.S. Dollars per Metric Ton)		
Milk Support	225	222
Butter Wholesale	2,355	2,206
Cheese Wholesale	2,919	2,927
Nonfat Dry Milk Wholesale	2,422	2,262
Australia (Australian Cents per Liter)		
-Industrial Milk Farm Prices	25	25
-Fluid Milk Farm Prices	52	52
-Retail Milk Prices	130	131
-**Wool** (Australian Dollars per 100 Kg)	409	441
Export Prices (Australian Dollars per Metric Ton)		
-Butter	2,217	2,433
-Cheese	3,702	3,958
-NFD Powder	2,470	2,141
Canada (Canadian Dollars per Hectoliter)		
Industrial Milk Target	54.23	55.04
Fluid Milk	60.62	61.60
Retail Milk (Liter)	1.42	1.43
Butter Support	5.32	5.39
NFD Support	4.20	4.33
Butter Retail	6.35	6.43
Cheese Retail	11.93	12.01
NFD Retail	9.59	9.98
European Union (ECUs per 100 Kilogram)		
Milk Producer	29.40	28.80
Butter Intervention	328	328
Butter Domestic	355	358
Cheese Domestic	451	445
FOB Price N. Europe (U.S. Dollars per Metric Ton)		
Butter	1,724	1,851
Cheese	2,425	2,473
Nonfat Dry Milk	1,740	1,628
Whole Milk Powder	1,829	1,866

Source: FAPRI 1998 World Agricultural Outlook, Iowa State University and University of Missouri-Columbia, Staff Report 2-98, January 1998.

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