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An Analysis of Import Demand in Vegetal Oil and Products Industry in Turkey

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Abstract: In this study, we investigated the economic factors which have influence on the import demand for vegetal oil and products in Turkey. The import demand for vegetal oil and products in Turkey has been influenced by the national agricultural policy and foreign trade policy applied. It was considered as a function of the factors such as the amount of delayed import, the average real price of national oil and products, the rate of exchange for US Dollar, the trend factor, the real production value of vegetal oil and products, the real value of national demand and grand national product. The parameters were estimated through regression analysis. The data for this research cover the period from 1981 to 2001. According to the findings of the research, it was determined that the import demand for vegetal oil and its products was mostly influenced by the amount of lagged import, the rate of exchange for US Dollar and trend factor.

Keys words: Vegetal oil and products industry, oil deficit, import demand, double logarithmic linear function

INTRODUCTION

Oil seeds have always been one of the important sectors of the Turkish agriculture. With the implementation of the outward oriented policy in 1980's many agroindustry establishments for export purpose were founded in Turkey and production increases were experienced. The increase in production of vegetable oils in Turkey was realized during the same period.

When we consider the level of oil consumption in Turkey, we see that the vegetal oil production cannot meet the demand. The vegetal oil deficit is gradually increasing every year compared to the previous year. To meet this deficit, various oil types such as sunflower, soybean and palm oil have been imported. This has caused an important foreign money flow abroad.

In spite of the fact that oilseed processing capacity is 4,5 million tons/year in Turkey, the percentage of capacity use is below 50%. The most important reason for this is that oilseeds production in Turkey is at a level that cannot meet the demand (Gaytancioglu *et al.*, 1999).

The refined oil supply of Turkey has been used in the following industries: 50% in liquid oil, 30% in margarine and 10% in feed, dye and soap industries. One of the most remarkable products of the vegetable oil industry is sunflower oil. Sunflower is not only economic but it's nutritive value is also equal to olive oil. Sunflower oil

forms the most important share in total raw vegetal oil supply in Turkey with 44.35%. This is followed by cotton oil with 17.23%. The most significant share in refined oil consumption also belongs to sunflower. Turkey imported 50.37% of its total 1358 thousand tons raw oil use.

When we add the total fatty seed import to this, the condition which the sector is in can be clearly seen. The most imported oils by Turkey are palm and soybean oils, and they are often used in feed, dye, soap and margarine industries. 82.10% of raw sunflower oil is used in liquid oil industry. Sunflower oil meets 71.70% of total liquid oil consumption in Turkey. The preference for sunflower oil use is followed by corn oil and olive oil (Dolekoglu, 2001).

The use of margarine is widely common for several years in Turkey. Also, having the ability to be used in daily life increased its consumption. As a result of this fact, the margarine industry has undergone various developments that reached a capacity of 1 million tons per year. The export has increased in recent years. In the year 2004, the export vegetable oil was 139 million USD (Anonymous, 2005).

Being a by-product of the processing of raw cotton, cottonseed oil is also regarded as a good source of vegetable oil, whose production has increased regularly. Also exportation of cottonseed oil has reached important amounts among the vegetable oils.

Although the production of canola oil is yet in limited amounts, it seems that it will rise due to its high potential.

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The production is particularly done in the Cukurova Region in Turkey and also be supported by the Turkish Government.

The annual vegetal oil consumption per person is 18.75 kilos in Turkey. Liquid oil forms 12.47 kilos of it (66.51%). According to the European standards, a healthy diet requires about 24 kilos oil consumption in a year for a well nourishment. The most important share in liquid oil consumption belongs to sunflower oil. While sunflower has a 79.93 share in fat seed plants oil, it has a 72.49 share in total liquid oil (Gurler *et al.*, 2000; Anonymous, 2000).

Having a different taste due to its aromatic components that is preferred by Turkish consumers, the production of corn oil has increased in the last years. Despite its increasing trend the production is still very limited, however the demand for corn oil is continuous and the exportation of this item has started few years ago.

The share of vegetal oil and products industry in the production value of food industry is 8.10% and it is 9.13% in national demand value.

The 63.89% of total import value is formed by vegetal raw oil and exported oil involves mostly refined vegetal oil and margarine (Anonymous, 2002a).

The share of vegetal oil and products industry in the export value of food industry sectors is 10.31%. It is 34.90% in the import value of total food industry. The vegetal oil and products industry is, therefore, the sector with the most import among food industry sectors (Anonymous, 2002b). The Turkish vegetable oils are exported to a wide range of countries in the world. Major export markets are the Russian Federation, Central Asia, the Middle East and some of the EU countries.

MATERIALS AND METHODS

The period investigated in the study covers the years between 1981 and 2001 in Turkey. The data used in the study were obtained from the following sources:

Grand national product: from the Basic Economic and Social Charts of State Planning Institute (Anonymous, 2003a). Exchange rates: From the reports of Central Bank (Anonymous, 2003b). Local prices of vegetal oil and products: From the records of Trakyabirlik (Anonymous, 2003c) and Karadenizbirlik (Anonymous, 2003d).

The value of import demand, the value of local production and demand: from the annual programmes of State Planning Institute (Anonymous, 2003e).

Double-Logarithmic linear function was used to determine the type of function. The evaluation tests and measurements such as R^2 and standard deviation indicated that Double-Logarithmic form was better than linear and half logarithmic forms. In addition this form also

proved to be more appropriate in that predictors were directly interpreted as flexibility coefficient. Double-Logarithmic linear type function was preferred in most import demand analysis models. (Karkacier, 2000; Lordkipanidze *et al.*, 1996; Tanyeri, Abur and Rosson, 1996; Gould *et al.*, 1991; Miller and Fratianni, 1974; Othman *et al.*, 1995; Seleka and Henneberry, 1993; Miran and Tunalıoğlu, 1996).

In economics theories, things such as the relative prices of goods, the prices of supplementary or rival goods, the level of personal income and the income flexibility of demand are important factors determining the import demand. The income flexibility of demand measures the change in the demanded amount depending on the form of demand with respect to change in income. As a result, the influence of income plays an important role on consumer expenses. The real income increase will cause the increase in demand (Karkacier, 2000).

The lagged import which is the delayed variable was included in the model. The lagged import variable has a role defining the regulator influence of the adaption of income and price changes within time on import. That's why it was included in the model (Lordkipanidze *et al.*, 1996).

The relative prices are the most important factors influencing the consumer's preferences. The measurement of relative price can be the proportion of local price to import price (Tanyeri-Abur and Rosson, 1996). However, noneconomic factors can take place in the import demand models of food. Since diet or eating habits factor can influence the change in consumer attitudes, it makes the demand function characteristic.

The exchange rate of Turkish Lira (TL)- US Dollar (USD) was included in the model. The value of TL against foreign currency influences the foreign trade. Therefore, it has an important role in the amount of import demand. Devaluation is known as a mechanism restricting the import and encouraging the export.

The trend variable has always taken place in import demand models as a variable reflecting the preferences and pleasure of consumers such as eating habits, thoughts about health and traditions. Consumer preferences are turning towards unsaturated oil day by day and it is mostly found in liquid oil.

Local production and local demand value are among factors thought to be effective on determining the direction of import demand. Therefore, they were the last variables taking place in import demand model.

The import demand model of vegetal oil and products in Turkey was considered as a function of factors such as the amount of lagged import, the average price of local oil and products, USD-TL exchange rate,

trend factor (1, 2, 3,), the production value of local vegetal oil and products, the value of local demand for local vegetal oil and products and grand national product.

The function is in general form as in the following:

$$Q_d = f(Q_{d-1}, PD_t, RER_t, T_t, PV_t, DV_t, GNP_t)$$

Here:

- Q_d : The value for the amount of import demand for vegetal oil and products (Million TL with real prices)
- Q_{d-1} : The value for the amount of lagged import (Million TL with real prices)
- Pd_t : The average price of local oil and products during t period (TL/kg with real prices)
- RER_t : TL-USD exchange rate during t period (USD currency rate) (TL/USD)
- T_t : Trend factor (1, 2, 3, 4, ... 21), n = 21
- Pv_t : The production value of vegetal oil and products (Million TL with real prices)
- Dv_t : The local demand value of vegetal oil and products (Million TL with real prices)
- GNP_t : Grand National Product during t period (TL with real prices)

RESULTS AND DISCUSSION

Table 1 presents the statistical results and parameters related to the predicted import demand equality of oil and products.

The R-square of the prediction function was 0.891 and 89.1% of the change in import demand model was explained by the variables included in the model. The adjusted R-square of the function was 0.827. The significance of the prediction function as a whole was determined with F-test. The F calculation value was 13.99 and it was significant at 1% significance level. The standart deviation related to the equation was 0.163 (s = 0.163)

The Von-Neumann (v) statistical test was used to check if there was auto-corelation in time serial, for the analyses of time serial and the use of lagged variable in the model entail testing the existence of the serial corelation (Judge, 1996).

The Von-Neumann (v) statistical calculation value of the import demand equality was 1.45 and there wasn't a auto-corelation at 5% significance level (v = 1.45, k = 7, n = 21, n' = n-k, critical values; v: 1, 27 v*: 3, 03 v < v_{value} < v*). Table 1 presents t (student's - t) statistical value and standard deviation of each import demand variable. In this respect the following significance levels were obtained: The amount of lagged import (Q_{d-1}) 2%, the

local price variable (PD_t) 93%, the rate of exchange (RER_t) 04%, trend factor variable (T_t) 2%, the production value (PV_t) 41%, the local demand value (DV_t) 92% and the Grand National Product (GNP_t) 88%.

The significance levels obtained were different from zero, that is, they were found statistically significant.

The place of oil and oil products is very important in basic food expenses. Therefore, the contribution of price and income variables is expected to be big in import demand model. The income flexibility in the time serial investigated was 0.184 (e = 0.184) and it was positive. This felexibility indicates that the increase in income is proportionally reflected to the amount of import demand and it means that a one-unit increase in income will create a one-unit increase in the amount of import demand. According to the study conducted by Lordkipanidze *et al.*, (1996) the import demand model for canola oil in the USA is influenced by the world fatty seed market, the customs charges, and the changes in the programme and policy of fatty seed involving governmental consolidation. In the study, the import demand of the USA for canola oil was considered to be a function of the factors such as the price of the product, the prices of rival vegetal oils (soybean and palm oil) and individual income. The flexibility coefficient for local price variable was positive (e = 0.0576). The price flexibility of demand in general economy approach is negative. Yet, it needs stating that the price examined is not import price, but local price, which rivals the import price. Therefore, the demand has cross-price. As a result, that the sign of local price flexibility is between 0 and 1 means foreign prices are more advantageous than local prices. That is, as the local prices increase, the amount of import demand increases depending on the flexibility. However, the increase in the amount of import demand is proportionally lower. This originates from the low demand flexibility which is a characteristics of agricultural products. In conclusion, the changes in local prices have a positive influence on the amount of import demand. In their study, Miran and Tunaltoğlu (1996) found out that liquid oil prices and the level of prosperity didn't have an influence on the demand for olive oil.

It was thought that olive oil had its own consumption characteristics. It was maintained that as olive oil was generally preferred by producers and rural consumers, it had an influence on such a progress of demand. In addition, it was stated that the case didn't change when olive oil was preferred because of anxieties about a healthy life. The coefficient of lagged import variable was negative and the flexibility coefficient was -0.6462 (e = -0.6462). The demand of previous year had a negative effect on the amount of current demand. The flexibility coefficient was -0.3700 and negative. The changes in

Table 1: The parametres and statistical values related to the predicted import demand equality of oil and products

	Fixed term	Q_{a1}	PD_t	RER_t	T_t	PV_t	DV_t	GNP_t	R^2	Adj-R ²	F-value	v
Coef	10.174	-0.6462	0.0576	-0.3700	3.8498	-1.342	0.157	0.184	89.1	82.7	13.99	1.45
t-ratio	1.14	-2.80	0.09	-3.54	3.85	-0.85	0.10	0.16				
p-value	0.276	0.016	0.930	0.004	0.02	0.411	0.920	0.875				
SD	8.914	0.2310	0.6459	0.1044	0.9991	1.576	1.520	1.149				

Table 2: The result of stepwise operation related to the equality of import demand Parametres and statistical values (1981-2001)

	Fixed term	Q_{a1}	RER_t	T_t	R^2	Adj-R ²	F	DW
Coef	5.1290	-0.5225	-0.3478	3.1639	88.3	86.1	40.37	1.21
t-ratio	9.59	-3.29	-4.77	7.94				
p-value	0.000	0.005	0.000	0.000				
St.Dev.	0.5347	0.1587	0.07294	0.3983				

USD exchange rate influenced the import demand. That devaluation was over inflation also contributed this outcome. The coefficient of trend factor in the model (1, 2, 3, ... 21) was 3.8498 ($e = 3.8498$) and positive. This factor reflects the change in the preference and taste of consumers. The positive flexibility coefficient confirmed that there was an increase in consumers' demand for imported oil and products and it continued increasing along the period examined. Turkish people prefer dairy products more than others because of traditions and eating habits and choices. However, recent anxieties about negative effects of dairy products on health have directed people to vegetal products. As a result of this, we are experiencing a considerable change in the consumption attitudes and form of consumers. It is known that, for these reasons, most people have been consuming both local and imported products recently. The flexibility coefficient of production value in the model was negative. Therefore, the production value has a negative influence on import demand.

In their study, Bulbul and Besparmak (1998) stated that the local vegetal oil production didn't meet the need, there was too much foreign money loss, and oil factories worked idle. It was maintained in the study that considering the production of fatty seeded plants important would contribute to the production of vegetal oil industry, and the import demand in this sector could be decreased. According to the study by Bahar (1998), when the vegetal oil factories were evaluated with respect to capacity, technology, the system of running, production, obtaining raw material, and marketting, it was found out that idle capacity, lack of finance and raw material were important problems and they were the factors increasing foreign dependency.

According to another study obtaining similar results (Anonymous, 2002b), it was emphasized that Turkey imported considerable amounts of fatty seed, bagasse and oil for feed and raw and refined oil industries and that the import demand would go on increasing so that it could meet the deficit of vegetal oil in Turkey.

The production of vegetal oil and products directed towards final demand can only meet the local demand. However, the local production can not meet raw oil demand which forms the raw material of refined vegetal oil. The production in the sector has important problems such as the current production capacity which is over seed production, the lack of raw material, out-dated technology, unstable sales and so on. The import of cheap fatty seed and raw oil decreases the price of fatty seed which is already cheap in Turkey and therefore the farmers give up fatty seed production. The prices of agricultural products increase comparably over world prices because the inflation and input cost in agricultural production are high in Turkey. But, these prices, thought to be high in Turkey, can not even meet the cost of production.

The reason why the global prices are low is because the farmers in foreign countries are consolidated more than the farmers in Turkey, the productivity is high, and therefore the cost is low. The low prices in other countries decrease the cost of import for fatty seed and raw oil in Turkey.

The flexibility coefficient related to local demand value was 0.157 and positive in the model. The change in the local demand value is a factor that has a positive affect on import demand. The vegetal oil deficit in Turkey which has not been met for years is stil a continuing problem because the current sources can not be made use of productively. The most important reason for this is that sufficient raw material is not produced. The increasing demand is met via imported raw material. Therefore, importing will be inevitable until the problems of local production are solved. So, the positive influence of local demand on import demand will increase depending on the flexibility of this variable. Erdem (1999) stated in his study that insufficient production of raw material caused the oil deficit to increase steadily, and vegetal oil factories not to work full capacity. He also added that the deficit was met through importing. Koc *et al.* (1999) estimated that agricultural and foreign policies were influential on the production of fatty seeds and demand in Turkey and the

importation of important vegetal oil products would increase with the simulation model which is composed of multi-produced relative balance models.

The empirical results show that per-capita income, total sunflower oil demand, lag values of domestic sunflower oil production and import quantity are statistically significant variables but import price of sunflower and soybean oil prices are not in determining import demand for sunflower oil. For the soybean oil import model, all explanatory variables: import prices of soybean and sunflower oil, per-capita income, total soybean oil demand, lag values of domestic soybean oil production and import quantity are found statistically significant (Hatırlı *et al.*, 2002).

Finally, stepwise operation was applied to determine the important factors influencing the import demand for vegetal oil and products. Table 2 presents the result of the analysis.

As shown in Table 2, the most important factors influencing the import demand for vegetal oil and products are the amount of lagged import, the exchange rate, and trend factor were found to be different from zero at all significance levels and statistically significant.

CONCLUSIONS

While Turkey had had a closed state in the import of food before 1980, it became a food importing country as a result of liberalization application.

Turkey has not had a stable policy and planning about the production of fatty plants for years. Eventually, this has made vegetal oil industry increasingly foreign dependent. Turkey has been experiencing a considerable amount of foreign money lost because of vegetal oil import.

Government may construct a supporting system to protect producers and manufacturers because of the special position of the oil industry for the country, which has shown production deficit in sunflower seed and low capacity usage in seed producing.

It can be suggested that, in Turkey, the production of the products which have no economical value and a burden to the government should be limited and the production of fatty plants in regions having a suitable ecology should be given priority through making a production planning.

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