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# TURKISH AGRICULTURAL IMPORT AND EXPORT DEMAND FUNCTIONS: ESTIMATES FROM BOUNDS TESTING APPROACH

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**Abstract:** This paper estimates the import and export demand functions for Turkish Agriculture based on the annual data for 1970-2003.The bounds testing approach to the cointegration and the error correction modeling is employed. We, however, adopt a new strategy in the model selection phase and select the optimal model from those models that satisfy both diagnostics and cointegration, thus, unlike the previous literature, ensuring that a statistically reliable and cointegrated model is picked up. Results indicate that for the import demand, relative price is a significant determinant in both short-run and long-run, nominal effective exchange rate matters only in the long-run, but domestic income is not at all a significant determinant for Turkish agricultural import demand.As for the export demand, while all determinants affect the export demand significantly in the short-run, given the relatively small share of Turkish agricultural exports within the world agricultural exports, none individually matters in the long-run.

**Keywords:**

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# I. INTRODUCTION

Elasticities in economics are undoubtedly important. Those ones in the field of International trade are no exception. Trade elasticities are, for example, needed to assess the impact on trade volumes of various policies that affect prices and /or income such as the removal of a tariff. Besides the assessment of the impact of certain policies, trade elasticities will also be needed to find out whether or not devaluation or currency depreciation will improve trade balance, i.e. Marshall-Lerner condition, which states that in order for devaluation to improve trade balance, the sum of import and export demand price elasticities must be greater than one in absolute value. Elasticities are also used to analyze welfare implications of structure of trade protection across different industries. For example, Grossman and Helpman (1994) argue that industries with high demand elasticities are given less protection because trade diversion leads to a greater deadweight loss in such industries. For these reasons as well as the academic curiosity, a great deal of emphasis has been placed on trade elasticities. Therefore, international trade economists have long been interested in obtaining them by estimating import and export demand functions.

There are numerous studies on the estimation of import and export demand functions. Examples include Orcutt (1950), Khan (1974), Stone (1979), Warner and Kreinin (1983), Bahmani-Oskooee (1986), Shiells *et al* (1986), Marquez (1990), Asseery and Peel (1991), Bahmani-Oskooee and Niroomand (1998) and Bahmani-Oskooee (1998). The examples given above, however, involve estimates of import and export demand functions either at the aggregate level or bilateral level or disaggregate level based on certain classifications such as Standard International Trade Classification (SITC). As far as the estimation of import and export demand functions for agriculture is concerned, the number of studies is very limited. Khan (1975), Islam and Subramanian (1989) and Niemi (2004) are some examples.

Regarding the estimation of import and export demand functions for Turkey, there are several studies. Examples include Tansel and Togan (1987), Thomakos and Ulubasoglu (2002) and Yavuz and Guris (2006). These studies, however, don't deal with the estimation of import and export demand functions. Given the importance of trade elasticities and the lack of work in the area, this paper attempts to fill this gap in the literature by estimating import and export demand functions for Turkish agriculture.

Recent data reveals that agriculture in GDP of Turkish economy accounts for 7.6 percent in 2008. Shares of agricultural trade in total exports and imports in the same year are 3 percent and 3.2 percent, respectively. Despite these relatively small shares in GDP and total trade, 24.7 percent of labor is employed in agriculture sector.[2] Real export and import of Turkish agriculture over time is shown in Figure 1. Real imports appear to be more stable than real exports. As far as real trade balance is concerned, there is not a specific pattern, sometimes displaying deficit sometimes surplus.

[2] *These figures are obtained from Statistics Office of Turkey.*


**FIGURE 1. REAL AGRICULTURAL EXPORTS AND IMPORTS OF TURKEY**

Econometric methodology that we've employed is the bounds testing approach to the cointegration and the error correction modeling. The bounds testing approach, recently developed by Peseran *et al.* (2001), is one of econometric techniques widely used in the empirical investigation.[3] This approach is commonly employed due to the following advantages it offers; i) Unlike other cointegration techniques such as Johansen-Juselius (1990) method, the bounds testing approach can be applied regardless of whether model variables have the same order of integration or not and hence the need for pretesting to find out whether or not model variables have the same order of integration is eliminated, ii) It has better small sample properties (Mah 2002), iii) the short-run and long-run parameters of the model can be estimated simultaneously.

The papers that have employed the bounds testing approach first select the optimum model using a certain model selection criterion such as Akaike Information Criterion (AIC) and then apply the cointegration and diagnostic tests to the selected model. Whatever results come up regarding the cointegration and diagnostics are reported in the end. However, some or all of the diagnostics may not be satisfied and/or cointegration may not exist in the selected model, thus making the reported model unreliable. In this paper we follow a new strategy in the model selection phase. Specifically, we first apply the cointegration and diagnostic tests to all possible models, given a maximum lag length, and then determine the subset of models satisfying both the cointegration and the diagnostics. Finally, we apply model selection criterion to this subset in order to come up with the optimal model for estimation. Unlike the previous work, our strategy

[3] *See, for example, Arora et al. (2003) and Bahmani-Oskooee and Ratha (2004).*

of model selection ensures that the estimated optimum model is co-integrated and passes the diagnostics, thus enabling us to have reliable statistical inferences from the estimated model.

The purpose of this paper is to estimate import and export demand functions for Turkish agriculture using bounds testing approach with the new strategy in the model selection phase we propose incorporated. The contribution of the present paper to the literature is twofold. First, it provides the estimates of import and export demand functions, and thus those of trade elasticities, for a case not considered before, namely Turkish agriculture. Second, a new strategy in the model selection phase of the bounds testing approach is adopted ensuring that a statistically reliable and cointegrated model is selected.

The rest of the paper is organized as follows. In the following section import and export demand models are set out, then the sources of data are described, the next section presents the empirical results, and the last section contains the key findings and the concluding remarks.

## II. MODEL

The model we use in estimating the import demand function is adopted from Wilson and Takacs (1979) and Bahmani-Oskooee (1986) where relative price and exchange rate variables are split. Such a specification has the advantage of allowing import demand to respond in a differential way to changes in relative prices and exchange rate. It is expressed in log-linear form so that coefficients represent the elasticities. More specifically, the import demand function employed in this paper is given in the following equation.

$$\ln M_t = a + b \ln Y_t + c \ln(PM/PD)_t + d \ln NEER_t + \varepsilon_t \qquad (1)$$

Where M is real imports, Y is real domestic income, PM is price of imports, PD is price of domestic goods, NEER is the nominal effective exchange rate, and $\varepsilon$ is the error term.

As far as the expected signs of the variable coefficients are concerned, since an increase in the real domestic income will stimulate imports, the coefficient of the domestic income is expected to be positive. If, however, the rise in the real domestic income is resulting from the increase in the production of the import substitutes, the relationship between imports and domestic income will be negative. An increase in the ratio of import prices over domestic prices will make the imports less attractive, therefore the coefficient c is expected to have a negative sign. As for the impact on the imports of the nominal effective exchange rate, given that exchange rate is defined as the number of foreign currency per domestic currency, a rise in the exchange rate will make the imports cheaper and therefore lead to more imports.

In order to incorporate short-run dynamics into the estimation of the import demand function in (1), following Peseran *et al* (2001), we have expressed it in the following error-correction modeling format, known also as Autoregressive Distributed Lag (ARDL) format.

$$\Delta \ln M_t = \alpha + \sum_{i=0}^{k} \beta_i \Delta \ln Y_{t-i} + \sum_{i=0}^{l} \gamma_i \Delta \ln(PM/PD)_{t-i} + \sum_{i=0}^{m} \lambda_i \Delta \ln NEER_{t-i} +$$
$$\sum_{i=1}^{n} \theta_i \Delta \ln M_{t-i} + \delta_1 \ln Y_{t-1} + \delta_2 \ln(PM/PD)_{t-1} + \delta_3 \ln NEER_{t-1} + \delta_4 \ln M_{t-1} + u_t \qquad (2)$$

In this format, unlike the standard error-correction modeling format, instead of lagged error-correction term, a linear combination of lagged level variables is used based on the fact that from equation (1), error term is equal to a linear combination of level variables.

Export demand function employed here is also adopted from Wilson and Takacs (1979) and Bahmani-Oskooee (1986) and it takes the following form;

$$\ln X_t = a' + b' \ln YW_t + c' \ln (PX/PXW)_t + d' \ln NEER_t + \omega_t \qquad (3)$$

Where X is real exports, YW is real world income, PX is domestic price of exports, PXW is the price of world exports, NEER is the nominal effective exchange rate, and $\omega$ is the error term.

Since an increase in the real income of the rest of the world will induce more spending, they will import more from us as well and therefore, our exports will increase. If, however, the rise in the world income is due to an increase in the production of their import substitutes, our exports will be expected to decline as a result of the rise in the world income. A rise in the ratio of our export prices over world export prices will mean that our exports are relatively more expensive, and therefore, exports will be expected to fall. As for the impact of the nominal effective exchange rate on the exports, given the definition of the exchange rate, a rise in the nominal effective exchange rate (an appreciation of the domestic currency) will make the domestic exports less attractive for foreigners, and therefore, exports will be expected to decline.

Like in the case of import demand, export demand function in (3) is expressed in error-correction modeling format as follows in order to incorporate short-run dynamics into estimation.

$$\Delta \ln X_t = \mu + \sum_{i=0}^{k'} \varphi_i \Delta \ln YW_{t-i} + \sum_{i=0}^{l'} \psi_i \Delta \ln (PX/PXW)_{t-i} + \sum_{i=0}^{m'} \xi_i \Delta \ln NEER_{t-i} +$$

$$\sum_{i=1}^{n'} \eta_i \Delta \ln X_{t-i} + \rho_1 \ln YW_{t-1} + \rho_2 \ln (PX/PXW)_{t-1} + \rho_3 \ln NEER_{t-1} + \rho_4 \ln X_{t-1} + \nu_t \quad (4)$$

Estimation of equations (2) and (4) involves two steps. In the first step, to justify retaining lagged level variables in the equation, cointegration among model variables is to be established. For this purpose, following Peseran *et al* (2001), the F-test with new critical values is employed. Through a Monte Carlo experiment, Peseran *et al* (2001) provides upper and lower bound critical values. If the calculated F-statistic is found to be greater than the upper bound critical value, the null of no-cointegration ( $H_0 : \delta_1 = \delta_2 = \delta_3 = \delta_4 = 0$ for equation (2), $H_0 : \rho_1 = \rho_2 = \rho_3 = \rho_4 = 0$ for equation (4)) is rejected and the alternative of cointegration ( $H_1 : \delta_1 \neq \delta_2 \neq \delta_3 \neq \delta_4 \neq 0$ for equation (2), $H_1 : \rho_1 \neq \rho_2 \neq \rho_3 \neq \rho_4 \neq 0$ for equation (4)) is accepted. In the second step, the model to be estimated, i.e. the lag length on each first-differenced variable is to be determined using a certain information criterion. Once the model for estimation is selected, then it is estimated by the ordinary least squares method (OLS).

## III. DATA

The frequency of our data is yearly and it covers the period from 1970 to 2003. Data for model variables are compiled from several sources. Source of data for import quantity index, export quantity index, import unit value index and export unit value index is Food and Agriculture

Organization (FAO).[4] We have obtained the data for national real income and world real income from UN Statistics Division. Nominal effective exchange rate for Turkey is calculated using 1995-trade volume with largest 19 trading partners as weights.[5] The bilateral exchange rate between Turkey and each of these 19 trading partners used in this calculation is also obtained from UN Statistics Division. Data for GDP deflators as domestic price indices come from IMF-IFS country tables.

## IV. RESULTS AND DISCUSSION

In the present paper, we follow a new strategy in finding the model for the estimation. We believe that in order for inferences to be statistically reliable and therefore meaningful, the estimated model, from which test statistics for inferences are obtained, must well behave, i.e. it must satisfy the basic assumptions of OLS. Therefore, instead of applying a model selection criterion to the set of all possible models, as done in previous literature, we apply the criterion to that subset which both satisfy diagnostics and indicate a cointegration.

Having adopted this new strategy, we have proceeded in the following manner.[6] First, the maximum lag length on each first differenced variable in equation (2) and (4) is set as 3. The model corresponding to each possible lag combination has been estimated and then those combinations that satisfy the diagnostic tests of normality, no serial correlation and no heterescodasticty at least at 10 % level have been selected. For each of these selected combinations, it is checked whether there exists a cointegration or not, based on F-test.[7] In case no cointegration is established for a combination, it is discarded. Then, to determine the optimal model, AIC has been applied to the set of those lag combinations that satisfy diagnostic tests and at the same time indicate a cointegration.

Once we have followed this procedure, we have come up with optimal lag combinations ($k=0$, $l=3$, $m=3$, $n=1$) and ($k'=3$, $l'=1$, $m'=3$, $n'=2$) for import demand function in equation (2) and export demand function in equation (4), respectively.[8] We have then proceeded to estimate the model in equation (2) and in equation (4) corresponding to these optimal lag combinations based on annual data for 1970-2003.

**Import Demand Function:** Short-run estimation results for Turkish agricultural import demand are reported in Table 1. Looking at Table 1 reveals that only relative price variable carries some significant coefficients. None of the other variables has any statistically significant coefficient. This means that only relative price matters in the short run for import demand and the other variables, namely domestic real income and the nominal effective exchange rate don't significantly affect Turkish agricultural import demand. Short-run relative-price elasticity of import demand is –1.81, indicating that import demand is elastic with respect to relative price.

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[4] *World export unit value index is calculated by multiplying export unit value index of each country in the world with its share in world agricultural exports in 1985 and then summing them up for all countries.*

[5] *These trading partners and their weights in order of importance are Germany (0.227), US (0.153), Italy (0.131), France (0.082), UK (0.075), Japan (0.057), Netherlands (0.044), Belgium & Luxemburg (0.037), Switzerland (0.033), Iran (0.028), Spain (0.024), S. Korea (0.023), China (0.022), Sweden (0.021), Austria (0.012), Canada (0.012), Brazil (0.011), Greece (0.008).*

[6] *An algorithm developed by Dr. M. Qamarul Islam is used for this purpose.*

[7] *The upper bound critical value for the F-statistic at 10% significance level is 3.77 (Peseran et al. (2001), Table CI, Case III, p.300).*

[8] *The optimal lag combinations that would have been selected if the method of the previous literature was adopted are ($k=3$, $l=2$, $m=3$, $n=2$) and ($k'=3$, $l'=2$, $m'=3$, $n'=2$) for import demand and export demand functions, respectively. When compared with our strategy, however, no serial correlation assumption fails in both these cases.*

Long-run estimation results for Turkish agricultural import demand are presented in Table 2.[9] We see from Table 2 that, as indicated by signs of variable coefficients, all variables affect import demand as expected. Even though it has the expected negative effect, because its coefficient is not statistically significant, real domestic income does not matter in the long-run for agricultural import demand of Turkey.

***TABLE 1. SHORT-RUN ESTIMATES AND DIAGNOSTIC TESTS FOR IMPORT DEMAND. Dependent Variable:*** $\Delta \ln M_t$

| **Regressors** | **Coefficient** | **t-value** |
|---|---|---|
| Constant | -8.59 | -0.73 |
| $\Delta \ln M_{t-1}$ | 0.14 | 0.46 |
| $\Delta \ln Y_t$ | 3.18 | 1.63 |
| $\Delta \ln (PM/PD)_t$ | -1.81*** | -6.63 |
| $\Delta \ln (PM/PD)_{t-1}$ | 0.94 | 1.70 |
| $\Delta \ln (PM/PD)_{t-2}$ | 0.63** | 2.49 |
| $\Delta \ln (PM/PD)_{t-3}$ | 0.24 | 1.12 |
| $\Delta \ln NEER_t$ | 0.35 | 0.58 |
| $\Delta \ln NEER_{t-1}$ | -1.32 | -1.74 |
| $\Delta \ln NEER_{t-2}$ | -0.86 | -1.39 |
| $\Delta \ln NEER_{t-3}$ | -0.65 | -1.51 |
| **Diagnostic Tests** | **Value of Statistic** | **p-value** |
| Normality[1] | 0.71 | 0.70 |
| No Serial Correl.[2] | 5.94 | 0.20 |
| No Heteroscedas.[3] | 0.01 | 0.93 |
| F(14,15) | 8.94 | 0.00 |
| F (Wald)[4] | 4.07 | |
| $Adj. R^2$ | 0.79 | |
| AIC | 0.85 | |

***Notes:*** *, **, *** indicate significance levels at 10%, 5%, and 1%, respectively.1: Jarque-Bera test statistic with a $\chi^2(2)$ distribution. 2: LM test statistic with a $\chi^2(4)$ distribution. 3: LM test statistic with a $\chi^2(1)$ distribution. 4: The upper bound critical value for the F-statistic at 10% significance level is 3.77 (Peseran *et al.* (2001), Table CI, Case III, p.300).

[9] *In bounds testing approach, long-run coefficients are not separately obtained, rather they are derived from short-run estimation results of equation (2) by dividing the coefficient of each lagged independent variable by the coefficient of the lagged dependent variable and multiplying with a minus sign.*

Given their significant coefficients, long-run determinants of Turkish agricultural import demand are relative price and nominal effective exchange rate variables. Sizes of coefficients of these two variables (-4.07 and 4.27, respectively) tell us that agricultural import demand is highly elastic with respect to relative price and exchange rate. This high elasticity can be attributed to the availability of domestic substitutes for imported products. We also observe that long-run relative price and nominal exchange rate elasticities of import demand are greater than short-run ones. This finding can be explained by the fact that consumers have more time in the long-run to adjust to changes in these variables.

***TABLE 2. LONG-RUN ESTIMATES FOR IMPORT DEMAND FUNCTION. Dependent Variable:*** $\ln M_t$

| Regressors | Coefficient | t-value |
|---|---|---|
| Constant | -19.85 | -1.02 |
| $\ln Y_t$ | 0.53 | 0.11 |
| $\ln(PM/PD)_t$ | -4.07** | -2.17 |
| $\ln NEER_t$ | 4.27** | 2.25 |

***Notes:*** *, **, *** indicate significance levels at 10%, 5%, and 1%, respectively.

**Export Demand Function:** Short-run estimation results for export demand for Turkish agriculture are presented in Table 3. Short run results in Table 3 indicate that all three variables have some statistically significant coefficients. This means that all matter in the short run for export demand for Turkish agricultural products. Short-run relative price elasticity for export demand is -1.14, which is greater than 1 in absolute value so export demand is relative-price elastic. Note also that nominal effective exchange rate has a longer lag than the relative price, implying that the effect of exchange rate changes on export demand lasts longer.

Long-run results for export demand for Turkish agriculture are reported in Table 4. We observe from the table that none of variables carries a statistically significant coefficient. This means that none is individually a significant determinant of export demand for Turkish agriculture. This result isn't surprising given the relatively small share of Turkish agricultural exports in world agricultural exports.[10] On the other hand, F-test for joint significance of variables indicates that variables together matter.

[10] *For example, based on the data from FAO, in 2006 the share of Turkish agricultural exports (6.07 billion US dollars) in total world agricultural exports (721.7 billion US dollars) was only 0.84 percent, which is not even 1 percent.*

**TABLE 3.** SHORT-RUN ESTIMATES AND DIAGNOSTIC

***TESTS FOR IMPORT DEMAND. Dependent Variable:*** $\Delta \ln X_t$

| Regressors | Coefficient | t-value |
|---|---|---|
| Constant | -6.55 | -1.03 |
| $\Delta \ln X_{t-1}$ | -0.47* | -1.98 |
| $\Delta \ln X_{t-2}$ | -0.23* | -2.15 |
| $\Delta \ln YW_t$ | 0.49 | 0.26 |
| $\Delta \ln YW_{t-1}$ | -3.34* | -1.79 |
| $\Delta \ln YW_{t-2}$ | -2.02 | -1.02 |
| $\Delta \ln YW_{t-3}$ | -3.08 | -1.53 |
| $\Delta \ln (PX/PXW)_t$ | -1.14*** | -6.04 |
| $\Delta \ln (PX/PXW)_{t-1}$ | -0.63* | -2.03 |
| $\Delta \ln NEER_t$ | 0.08 | 0.65 |
| $\Delta \ln NEER_{t-1}$ | -0.02 | -0.12 |
| $\Delta \ln NEER_{t-2}$ | -0.47*** | -3.35 |
| $\Delta \ln NEER_{t-3}$ | -0.36** | -2.47 |
| **Diagnostic Tests** | **Value of Statistic** | **p-value** |
| Normality[1] | 0.58 | 0.75 |
| No Serial Correl.[2] | 5.76 | 0.22 |
| No Heteroscedas.[3] | 1.45 | 0.23 |
| F(16,13) | 14.31 | 0.00 |
| F (Wald)[4] | 7.84 | |
| $Adj. R^2$ | 0.88 | |
| AIC | -1.38 | |

***Notes:*** *, **, *** indicate significance levels at 10%, 5%, and 1%, respectively.1: Jarque-Bera test statistic with a $\chi^2(2)$ distribution. 2: LM test statistic with a $\chi^2(4)$ distribution. 3: LM test statistic with a $\chi^2(1)$ distribution. 4: The upper bound critical value for the F-statistic at 10% significance level is 3.77 (Peseran *et al.* (2001), Table CI, Case III, p.300).

**TABLE 4. LONG-RUN ESTIMATES FOR EXPORT DEMAND FUNCTION. Dependent Variable:** $\ln X_t$

| Regressors | Coefficient | t-value |
|---|---|---|
| Constant | -8.97 | -0.78 |
| $\ln YW_t$ | 2.76 | 1.16 |
| $\ln(PX/PXW)_t$ | -0.83 | -1.68 |
| $\ln NEER_t$ | 0.15 | 0.94 |

***Notes:*** *, **, *** indicate significance levels at 10%, 5%, and 1%, respectively.

## V. CONCLUSION

This paper has estimated Turkish agricultural import and export demand functions using bounds testing approach with a new strategy adopted in model selection phase based on the annual time series data over 1970-2003 period. There are many studies estimating import and export demand functions either aggregate level or bilateral level or disaggregated level but the number of studies considering the agriculture in this context is very limited.

The present paper contributes to a part of the literature very little explored, agricultural trade elasticities, by estimating Turkish agricultural import and export demand functions. Another contribution of this paper, as explained in detail earlier, is the adoption of a new strategy in the model selection stage of the bounds testing approach. More specifically, the optimal model for the estimation is selected from the set of those models that satisfy both diagnostic requirements and the cointegration, thus the statistical reliability of inferences obtained from the estimation and the cointegration are ensured.

Results indicate that even though the determinants of export demand affect Turkish agricultural export demand in the short-run, those effects don't carry over into long-run. An implication of this result is that Turkish agricultural exports will neither benefit from world economic growth nor be hurt from world economic slowdown. Such a result is not surprising in light of the fact that Turkish agriculture constitutes less than 1 percent share in total world agricultural exports. Regarding import demand, domestic income is not at all a significant determinant, nominal exchange rate matters only in the long-run but the relative prices do matter in both short-run and long-run. So the relative price variable is the most important determinant for Turkish agricultural imports. Policies that will improve efficiency in agricultural sector will help reduce import demand and divert the demand to domestically produced import substitutes. Also monetary and fiscal policies aiming at reducing domestic inflation can be used to reduce the import demand and thus improve agricultural trade balance. Another implication of these results is that exchange rate policy can be used to influence the agricultural import demand in the desired way and given the size of the coefficient of the nominal exchange rate, the impact of the exchange rate policy will be more than proportionate.

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## FUNKCIJE UVOZNE I IZVOZNE POTRAŽNJE TURSKE POLJOPRIVREDE: PROCJENE PRISTUPOM GRANIČNOG TESTA

**Sažetak:** Ovaj rad procjenjuje funkcije uvozne i izvozne potražnje u turskoj poljoprivredi na osnovu godišnjih podataka za period od 1970-2003. Za kointegraciju se koristio pristup graničnog testa i model ispravljanja pogreške. Ipak, primijenili smo novu strategiju u fazi odabira modela te odabrali optimalni model među onima koji su na najbolji način zadovoljili kako dijagnostiku tako i kointegraciju te tako, za razliku od prethodne literature, osigurali odabir statistički pouzdanog i kointegriranog modela. Rezultati procjene ukazuju na to da je relativna cijena značajna determinanta za uvoznu potražnju, kako kratkoročno tako i dugoročno, nominalni efektivni tečaj ima utjecaja samo dugoročno dok domaći dohodak uopće nije značajna determinanta za tursku poljoprivrednu uvoznu potražnju. Što se tiče izvozne potražnje, dok kratkoročno sve determinante značajno utječu na izvoznu potražnju, s obzirom na relativno mali udjel turskog poljoprivrednog izvoza u svjetskom poljoprivrednom izvozu, niti jedna zasebno nema dugoročni utjecaj.

**Ključne riječi**: uvozna potražnja, izvozna potražnja, trgovinski elasticiteti, turska poljoprivreda, pristup graničnog testa