

# The Impact of Trade Liberalization on Import Demand\*

Dimitrios D. Thomakos<sup>§</sup> & Mehmet A. Ulubaşoğlu<sup>§§</sup>

**Abstract.** In this paper, we empirically analyze the effects of trade reforms on import demand and derive their implications on economic development in Turkey, a country that underwent sudden and substantial trade liberalization in the mid-1980s. The tool for this analysis is the estimation of disaggregated import demand elasticities. The adoption of a more liberal trade regime as well as radical attempts to foster economic development makes the Turkish experience particularly interesting for analysis. Almost all of our elasticities are estimated to be significant, unlike those of most previous studies in the literature on other countries. We test for different elasticities over “closed” and “open” economy periods, and find that the effects of the trade reforms of the 1980s were significant for a number of industries that form the backbone of the Turkish economy. We also compare our results with elasticity estimates from past studies for developed countries.

**JEL Classification Codes :** F10, F13, F14.

**Key Words :** Trade Liberalization; Import Demand.

## 1. Introduction

This paper presents econometric estimates of import demand elasticities for Turkey for the period 1970-1995 using disaggregated, 3-digit Standard International Trade Classification (SITC), industry-level data. In the context of Turkey, a developing country and a potential member of the European Union, our main focus is on analyzing the impact of the 1980s’ trade reforms on the disaggregated import demand, as seen through the import demand elasticities. The economic intuition predicts that if the number of product varieties in an economy is high, which may be due to liberal trade regime or developed industrial structure, the (absolute value of) import demand elasticities will be

---

\* We have benefitted from useful discussions with Devashish Mitra. Usual disclaimer applies.

<sup>§</sup> Department of Economics, Florida International University.  
e-mail: thomakos@fiu.edu.

<sup>§§</sup> Corresponding author: School of Economics, Deakin University, Australia.  
e-mail: maulubas@deakin.edu.au.

high as well. This is due to the fact that should the consumers be faced with higher import prices for a certain product, they can easily switch to other commodity types, whether imported or domestic. The extent of the rise in the substitution possibilities between many product categories due to increased outward-orientation of the economy, for example, can easily be seen through these elasticities.

In this paper, we also compare our elasticity estimates with those of developed economies. In particular, for developed countries, we refer to previous estimates of Stone (1979) for the cases of U.S., European Economic Union (E.E.U) and Japan, and Shiells, Stern and Deardorff (1986) for the US only. We find that the trade reforms of the 1980s deepened the industrial base in certain sectors in Turkey by increasing the product varieties available to the consumers. This can be inferred from the changes in the magnitudes of import demand elasticities.<sup>1</sup>

The availability of import demand elasticities is needed for the implementation and monitoring of trade-related policies and the study of international linkages. For developing countries in particular, estimates of secular elasticities are of practical importance for examining the effects of trade on employment and for any debt rescheduling and the terms-of-trade gains from tariffs as well as for analyzing the welfare implications of the cross-sectional structure of trade protection. For instance, Grossman and Helpman (1994), in the endogenous trade policy context, predict that the industries with high import demand elasticities are given less protection since the deadweight loss from trade diversion in those industries is higher. This sort of welfare analysis heavily depends on the availability of these elasticities.

We should emphasize that our paper is not a case study. While our estimates of import demand elasticities are useful in their own right, Turkey underwent, during the 1980s, a sudden and substantial trade liberalization. This gives a rare opportunity for examining the effects of trade reforms on the import structure of a developing country and the political economy implications of trade-policy changes. By concentrating on two different liberalization attempts of the Turkish economy in 1980 and in 1984 we analyze these elasticities across structurally-different sub-samples and observe the impacts of the policy instruments on the import demand function.

---

<sup>1</sup> Throughout the paper, when we refer to the magnitude of the import demand elasticities, we refer to their absolute values, unless otherwise stated.

To address the issue of possible endogeneity of import and domestic prices, we estimate the import demand equations using instrumental variables (two-stage least squares with autoregressive correction). The exogenous variables of the model of Shiells, Stern and Deardorff (1986), which we follow, are used as instruments. To capture most of the variation of the explanatory variables (import prices, domestic prices and expenditures) with the instruments, we select the exogenous variables from the three largest trading partners of Turkey for each product group. The specification of the estimated equations is extensively tested with residual diagnostics and tests for endogeneity and structural stability.

The rest of the paper is organized as follows: in section 2, we present a brief review of the literature on import demand elasticities. In section 3 we provide an overview on the liberalization policies implemented in Turkey; in section 4 we describe the model, the import demand equation to be estimated, hypotheses of interest, the method of estimation and specification tests are applied; in section 5 we discuss the data used in our study; in section 6 we discuss our results, including a comparison of elasticities between sectors in the U.S., E.E.C., Japan and Turkey. Section 7 offers some concluding remarks.

## **2. Brief Literature Review**

Our theoretical model follows Shiells, Stern and Deardorff (1986). The methodology of Shiells *et.al* has recently become a point of focus to researchers that conduct analyses on import-demand elasticities at disaggregated level. Its main attraction is that it treats different product groups symmetrically so that import demand functions derived for one product group are consistent with import demand functions in other product groups. It also accounts for the effects of changes in relative prices on the consumer's allocation of expenditures between imported and domestic product groups. Such changes may come from a variety of sources, like changes in tariffs, non-tariff barriers, exchange rates, domestic prices and wages, for which trade liberalization may be a basic stimulus. These are desirable qualifications to obtain reliable elasticity estimates. The estimates of Shiells *et. al.* have widely been used in the literature, especially in testing the political economy and trade models: Goldberg and Maggi (1999) and Gawande and Bandhopadhyay (2000) are the recent studies. Our elasticity estimates obtained in this paper have been used in Mitra, Thomakos and Ulubaşoğlu (2002) due to the reliability and precision of our estimates.

A research similar to ours on estimating the elasticities for Turkey, for the period 1960-1983 (a pre-reform period), has previously been done by Tansel and Togan (1987), but with aggregate level data. We are aware of another study by Esfahani and Leaphart (1999) that estimates the Turkish import demand elasticities at the disaggregated level by using a different econometric methodology.

Other studies that dealt with trade elasticities for different countries can be summarized as follows: Stone (1979) estimated price elasticities of disaggregated export and import demand for the U.S., the European Union and Japan. Marquez and McNeily (1986, 1988) obtained income and price elasticities for exports of developing countries, while Marquez (1988) used a frequency domain approach to identify cyclical and secular trade elasticities for exports of LDCs. Marquez (1990) obtained income and price elasticities for bilateral trade flows for Canada, Germany, Japan, the UK the U.S. and (combined) rest of the OECD countries and all the LDCs. Asseery and Peel (1991) estimated aggregate import demand models for the U.S., Canada, UK, Japan and Germany. Kabir (1988), Sarmad (1989), Arize and Spalding (1991), Mweza (1993) and Sinha (1996) have all estimated aggregated import demand functions for Bangladesh, Pakistan, South Korea, Kenya and India respectively.

Stern, Baum and Green (1979) is an early reference for evidence on structural change in the aggregate U.S. export and import demands. Thursby and Thursby (1984) considered the reliability of import demand estimates from single equation specifications. Deyak, Sawyer and Sprinkle (1989) and Ziets and Pemberton (1993) examine parameter instability in the disaggregated and aggregate U.S. import demand respectively, while Ceglowski (1997) considered the same question in the case of Japan. Marquez (1993) used a simultaneous equations model to jointly model trade elasticities among Canada, Japan and the U.S. while Marquez (1994) used a simultaneous equations model and bilateral data to examine the behavior of U.S. imports.

### **3. Turkey 1970-1995: An Overview <sup>2</sup>**

During the period 1950-1980 Turkey experienced three economic crises that had almost similar reasons: inflationary pressures due to aggregate demand shocks, the supply shocks from the oil crises and inconsistent and irrational economic policies. Due to overvalued currency, the economy was nearly

---

<sup>2</sup> This part heavily relies on Krueger and Aktan (1992).

unable to export. This led to a shortage of foreign receipts, and became the basic reason for the sharp deterioration in the balance of payments. Industrialization through import substitution was another driving force for the economy: this strategy, for which the governments insisted on inefficient State Economic Enterprises (SEEs) to meet the domestic demand, was never questioned at large until 1980. Under this trade regime, drastic restraints on imports were imposed, which led to shortages of parts and raw materials, and resulted in low industrial output and growth.

Among three major stabilization packages, in 1958, 1970 and 1980, the first two were similar, whereas the one in 1980 was different in content and implementation; it was a stabilization *cum* liberalization. The package aimed at rationalizing the exchange rate regime.<sup>3</sup> Exporters were given a number of incentives and subsidies while the import regime was liberalized: large number of goods had been restricted/prohibited previously for importation. Exports increased extensively in spite of the worldwide recession. The balance of payments and current account improved swiftly and the growth rate of real GNP was quite high, an average of 4% in the decade of 1980s.

Policy changes in 1984 re-structured the economy and increased the outward-orientation further. The country experienced a fundamental structural change and rapid economic growth during the period 1984-1991. This second stage of major policy changes started with additional reforms in the trade and balance of payments regime. The January 1984 import program established lists containing a large number of importable goods: specifically, Turkey switched to a negative list in 1984 as compared to the positive list that prevailed before, meaning, the new lists specified those non-importable goods whereas previous lists only had importable commodities. This step towards openness was supplemented with lower tariff rates and import duties as well as with simpler import procedures. Imports were about 20% of total GNP in the period of 1980-1989. During the 1990s the trade balance deteriorated sharply, with a deep crisis in 1994. Nevertheless, the export and import levels remained high in comparison to the levels in the previous decade.

---

<sup>3</sup> Starting on 1981 the exchange rate was subject to daily adjustments.

#### 4. The Model: Specification and Estimation

Let there be  $i=1,2,\dots,k$  product groups. Import demand for product group  $i$ ,  $Q_i^m$ , is a function of import price  $P_i^m$ , domestic price  $P_i^d$  and expenditure  $E_i$ . Domestic demand and expenditures are similarly functions of import and domestic prices. Import supply is given as a function of the price received in the foreign market for the imported good, foreign output prices, foreign factor prices, wages and capital rents, all measured in foreign currency (thus the nominal exchange rate enters the import supply equation). Domestic supply is given as a function of the price of domestic output as well as domestic factor prices, wages and capital rents. As usual, an interest rate is used to approximate capital rents.

As commonly employed in previous studies, a log-linear specification will be taken to be an adequate approximation of the functional form of the import demand equation. The treatment of expenditure shares is more problematic; ideally, we would like to have had data on expenditure shares but since they are not available we will assume that expenditure shares are a constant fraction  $E_i=\alpha_i E$ ,  $0<\alpha_i<1$ , of total expenditures  $E$ . With these assumptions the import demand equation to be estimated, for product group  $i$ , is given by:

$$q_{it}^m = \beta_{i0} + \beta_{i1} p_{it}^m + \beta_{i2} p_{it}^d + \beta_{i3} e_{it} + u_{it} \quad (1)$$

where lower-case letters denote natural logarithms and  $\beta_{i0} = c_i + \ln \alpha_i$ , for some constant  $c_i$ . The approximation error term  $u_{it}$  is assumed to follow a stationary autoregressive process:

$$u_{it} = \sum_{j=1}^p \rho_j u_{i,t-j} + \varepsilon_{it}, \varepsilon_{it} \sim N(0, \sigma^2) \quad (2)$$

where some of the  $\rho_j$ 's can be zero. The use of an autoregressive approximation captures lagged adjustment effects without the need for any particular adjustment assumption for import demand. In this sense, the methodology produces the elasticities in static demand equilibrium in the long run. It must be stressed that our motivation is economic-theoretic, and the dynamics prevalent in the model, if any, are captured in the residuals. The same dynamics, if they exist, may well be captured within the structural model, if one

uses another methodology for estimation.<sup>4</sup> However, for the type of analysis that we intend to do in the context of liberalization and development in this paper (or in any extension), the methodology of Shiells *et.al.* is the best to employ where the dynamics in the residuals are an intrinsic feature of the model.

In our analysis we tested whether the import price  $\beta_{i1}$ , domestic price  $\beta_{i2}$  and expenditure elasticities  $\beta_{i3}$  are equal to -1, 1 and 1 respectively. We write these hypotheses as:

$$H_0(j) : |\beta_{ij}| = 1, j = 1, 2, 3 \quad (3)$$

We also tested for absence of money illusion that the sum of the three elasticities  $\beta_{i1} + \beta_{i2} + \beta_{i3}$  is equal to zero. We write:

$$H_0(4) : \sum_{j=1}^3 \beta_{ij} = 0 \quad (4)$$

This last hypothesis was tested only for those product groups where data were available for all import prices, domestic prices and income.

All variables appearing in equation (1),  $q_{it}^m$ ,  $p_{it}^m$ ,  $p_{it}^d$  and  $e_t$  are treated to be as endogenous. One can make an argument that, for some of the product groups examined, the import price  $p_{it}^m$  should be taken as given; while this small country-price taking assumption is certainly plausible for Turkey, we prefer to actually test it rather than impose it *a priori* in estimation. With endogenous right hand side variables, estimation is carried out using instrumental variables. Our choice of instruments specifies the following exogenous variables: domestic wages, rental fees and exchange rates, output prices, wages and rental fees of Turkey and its trading partners. To capture most of the variation in the explanatory variables with chosen instruments, we select the three largest trading partners. With this instrument specification, the import demand equation is easily seen to be (over)identified. The estimation method employed was two stage least squares with autoregressive correction, A2SLS.<sup>5</sup>

<sup>4</sup> See Esfahani and Leaphart (1999) for a different methodology.

<sup>5</sup> The degree  $p$  of the error autoregression of equation (2) was determined using an  $F$ -type test on the estimated 2SLS residuals of equation (1). Autoregressive terms that

A variety of specification tests was applied to the estimated equation (1) for all products groups. These tests deal with certain issues that have previously been mentioned in this line of the literature. Most prominent among these are the method of estimation employed and the structural stability of the estimated elasticities. We also tested for endogeneity of both domestic as well as import prices using a Durbin-Wu-Hausman (DWH) statistic (Davidson and McKinnon, 1993, ch. 7).

While we performed the standard tests for unit roots, we note that our sample sizes are relatively small that make unit root inferences problematic. It is rather hard to distinguish between trend-stationarity and difference-stationarity in this type of situation. Moreover, in a preliminary analysis (available upon request) we found no significant changes in the size and magnitude of the estimated elasticities when non-stationarity was incorporated in the models. Additionally, it is a matter of belief that whether Turkey, a developing country, grew constantly with exogenous shocks over time or around a certain deterministic growth trend. Because the latter seemed more sensible to us, we feel relatively better off in this issue and do not pursue the matter formally.<sup>6</sup>

There are a number of studies that have questioned the autonomy of elasticities, i.e. they treat parameters to be constant over the sample. The most crucial implication of the autonomy assumption is that it requires constant expenditure shares over the sample for any product or industry considered. In our case, the constant expenditure shares assumption is more of a necessity rather than a convenience: there are no data on expenditure shares for Turkey. So the best we could hope for is to econometrically test the structural stability of the estimated coefficients and the import demand equation that we used. In doing so we employed two (Chow) tests, a breakpoint specification test and a predictive test; in both tests the break points were taken to be 1980 and 1984. Additionally, for robustness check, we employed CUSUM and CUSUM squares test to see if the recursive residuals exhibit any instability in these breakpoints.<sup>7</sup> Based on the results from these tests we have selectively estimated elasticities over different sub-samples, namely 1970 to 1979, 1970 to 1983, 1980 to 1995

---

were insignificant were dropped from equation (2) before the final estimates of the elasticities were computed.

<sup>6</sup> We would like to thank an anonymous referee for having pointed out this issue to us.

<sup>7</sup> We could do this to the expense of 2SLS against OLS for the products that did not necessitate AR correction.

and 1984 to 1995.<sup>8,9</sup> We also account for the effects of any outlier due to 1994 crisis with a dummy that takes the value of 1 in 1994. Additionally, we also test for a possible change in the import demand elasticity with another dummy that has the value of 1 in 1994 and 1995 in order to see if the crisis has a continued effect on the estimates.

For all estimated equations insignificant coefficients were dropped and the equations are re-estimated. All estimation and testing results are given in tables 1 through 5.

## 5. Data

Estimation of equation (1) was based on disaggregated, 3-digit SITC, sector-level data. The sectors were selected based on their import share in total imports, their position within the structure of the Turkish economy and data availability. Most of the products groups considered have, on the average, more than 1% share in total imports and are also domestically produced; some are also being exported.

We used annual data for the period 1970-1995 covering 26 SITC industries.<sup>10</sup> Import quantities according to SITC, Rev.2 are available in units in the *United Nations, International Trade Statistics Yearbook, Trade by Commodity*. Import values in terms of U.S. dollars are also available in the same source. Therefore, for each product category, the ratio of import values to

---

<sup>8</sup> This is equivalent to specifying and estimating the augmented equation:

$$q_{it}^m = \beta_{i0} + \beta_{i1} p_{it}^m + \beta_{i2} p_{it}^d + \beta_{i3} e_t + \gamma_{i0} D_t + \gamma_{i1} p_{it}^m D_t + \gamma_{i2} p_{it}^d D_t + \gamma_{i3} e_t D_t + u_{it}$$

where  $D_t$  is a dummy variable that is defined as follows: 0's for 1970-1979 or 1970-1983 and 1's for 1980-1995 or 1984-1995. Thus, the structural stability tests are also indicating which product groups were affected by the liberalization measures of 1980 and 1984 and whether the effects of liberalization were felt between 1980-1983 or after 1984.

<sup>9</sup> For each subsample, AR coefficients were re-estimated. Additionally, the Hausman tests do not contain the AR correction.

<sup>10</sup> Data for 3-digit SITC industries are available only at an annual frequency. An elaborate data set can be prepared for Turkey from 1970 onwards only. For some products, the data availability starts from 1981 or 1985.

import quantities is used as a proxy for the import price of each unit.<sup>11</sup> Some of the domestic prices, including those of agricultural goods, were obtained from the *OECD Economic Surveys on Turkey* as well as from the *UN Food and Agricultural Organization* database collections. These prices<sup>12</sup>, which were available in terms of Turkish Lira (TL) were converted into U.S.D. For some other products though, due to data availability, we used the ratio of export values to export quantities as proxies for domestic prices. Nominal GDP values, obtained from the *UN National Accounts Statistics* and the *International Financial Statistics (IFS) Yearbook* were used as expenditure data.

We also needed certain instruments for the instrumental variable estimation. The data for these variables were obtained for the three (in some cases two) largest trading partners of Turkey, for each product group separately. For domestic and foreign wages, daily earnings in manufacturing were used.<sup>13</sup> Exchange rates and interest rates were obtained from the *IFS Yearbook*. For interest rates, due to their common availability across countries, the discount rates of the central banks of the relevant countries have been used. Price deflators were used to approximate the output prices in countries and were calculated from nominal and real GDP data. The data were obtained from the *UN National Accounts Statistics*; we have converted all real GDP data to a common base year.

## 6. Results

Among the 26 product groups for which we have estimated import demand elasticities, 7 of them have inelastic import demand with the estimates between 0 and -1; 12 products have elasticities that fall into the interval of -1 and -2, and this can be considered to be elastic, while 7 goods are found to have highly elastic import demand with a coefficient of less than -2. All products with elastic import demand have import price elasticities that are not statistically different from one, that is, they are unit-elastic. As the magnitude of import

---

<sup>11</sup> In Shiells *et al.* (1986) these unit prices are also used as proxies. Although the practice of using unit-value proxies instead of actual import prices has been criticized by Kravis and Lipsey (1974), a comparative study by Shiells (1991) for the U.S. import demand shows that these proxies do not affect the estimated elasticities.

<sup>12</sup> For agricultural goods, government support prices were used.

<sup>13</sup> In the *UN Statistical Yearbook*, source of the wage data, hourly or monthly wages are available in terms of the currency of the corresponding country. These wages were homogenized to daily wages; hourly wages were multiplied by 8, while monthly wages were divided by 22, and then converted into U.S.D.

elasticities is directly related to the welfare cost of different trade policies, this finding has useful practical implications. Import demands, for most of the products, have an inelastic response with respect to income changes, with a value strictly less than one. That is, a limited amount of an income increase is channeled to imports.

We also find that the trade reforms of the 1980s had a significant impact on the imports of several products that form the backbone of the economy,. This showed up in our tests of structural stability of the estimated import demand equations. These products were cotton, crude oil, passenger cars, petroleum products, pharmaceutical products (only in 1980), pig iron, rubber, synthetic fiber and textile thread. For these goods we have estimated the import demand equations over the sub-samples 1970-1979, 1980-1995, 1970-1983 and 1984-1995.<sup>14</sup> Note that cotton, synthetic fiber and textile thread, inputs to the important textile industry, are strongly affected by the liberalization efforts of 1980 and 1984. There are also some product categories on which the crisis in 1994 has an outlier effect: aluminum, fertilizer, iron shapes, piston engines, rubber, textile machineries and manufacturing tobacco are these products. While the relevant dummy is significant, its inclusion into the regression does not affect the magnitude and the significance of our main elasticity estimates. Therefore, we do not report those results in our tables.

Here, we will provide results for only a selection of product categories. We refer the reader to Table 1 and Table 3 to see the intuitive magnitudes of the other elasticities and the impact of dramatic trade liberalization on the magnitude of these elasticities.<sup>15</sup>

---

<sup>14</sup> We also think that the effects of liberalization in 1984 may not be felt immediately, therefore the breakpoints may switch to late 1980s. In fact, we found evidence for some products that this breakpoint exists both in 1984 and, at the same time, in the following years. Therefore, there is a dynamic break in those industries. For example, Chow tests show that textile thread has also a breakpoint in 1985, cotton in 1985-86 and passenger cars in 1984-87. Moreover, for the latter two, recursive residuals strayed aside the 5% significance lines for 1987-88 and 1985-87, respectively. Running the regressions with those subsamples did not change the results qualitatively.

<sup>15</sup> We also report the elasticities of some products with small samples such as manufactured and unmanufactured tobacco, olive oil, piston engines and vegetable oils as their estimates are significant and their magnitudes are indicative of some interesting known facts. For example, being a tobacco producer, Turkey has a very high estimated import demand elasticity magnitude for unmanufactured tobacco, -3.091, and, being a foreign-brand cigarette importer, it has a low value (-0.646) for manufactured tobacco.

Cotton is domestically produced and is also in the export and import bundle of the country; it is thus expected that it should have a highly elastic import demand. The estimated full sample import price elasticity of -2.908. For the pre-1980 sub-sample the import price elasticity was estimated to be -0.952, while for the pre-1984 sub-sample was estimated to be -1.103; in both cases cotton is unit-elastic. For the post-1980 sub-sample the import price elasticity was estimated to be -3.569, which is the highest of all sub-samples and full sample; for the post-1984 sub-sample the elasticity was estimated to be -3.092. It is clear that the post-liberalization period has significant effects on cotton import demand. Moreover, the stark difference in the estimated elasticities between two structurally different periods can also be explained with the improved production techniques in agriculture, and modern processing and operation methods in the cotton industry. The domestic price elasticities were estimated to be insignificantly different than one. It is also of interest to note that the expenditure elasticity for cotton attains its highest levels for the post-liberalization sub-samples.

Turkey is a net importer of crude oil. The average annual share of oil imports has been 19% during the period 1970-1995. This high import share is clearly reflected in its import price elasticity with a value of -0.647. During 1970-1979, the import price elasticity was -0.941 whereas during 1980-1995 was -0.329; during the sub-sample of 1970-1983 this elasticity was -0.767 while for 1984-1995 was -0.242. This decline in the value of the import price elasticity of crude oil is not an entirely unexpected result: Turkey has progressively become more industrialized, and crude oil has been used in a wide variety of sectors during the last decade of the sample period, increasing the need for more imports with less focus on prices. Due to the very limited domestic production of crude oil, there is no domestic price available, and hence, we could not estimate the domestic price elasticities. The income elasticity value is 0.013, which from an economic perspective can be considered zero: regardless of income, the country would import the necessary quantities of crude oil.

The efforts of industrialization brought about the necessity for importation of modern textile machineries, which are the significant components of the backbone textile and clothing industry. The import price elasticity was estimated to be -1.192 and significant while the domestic price elasticity was estimated to be 0.240 and insignificant. The income elasticity was estimated to be 0.331 and significant.

The estimated import price elasticities for passenger cars are all highly significant in each of the sub-samples. During the period 1975-1983 the import price elasticity was estimated at -1.289, and not statistically different from unit elasticity; during the period 1984-1995 the estimated import price elasticity was -1.629. A possible explanation for the structural instability can be based on the evolution of the industrial basis of the country: as the country constructed its own automotive industry, either by domestic or foreign direct investments, the substitution possibilities have relatively increased. An interesting result here is the sharp increase of the domestic price elasticity between the two sub-samples: while it is only 0.547 for the first sub-sample it raises to 2.072 for the second sub-sample, indicating the impact that domestic car production has on the passenger car market. Whenever the price of domestically produced cars increases, domestic consumers quickly switch to imported cars, which are considered to have higher quality.

In Table 4, we look at the continued effects of the economic crisis in 1994 on our elasticity estimates. The product categories whose import demands are affected by the crisis are the piston engines and textile machineries.<sup>16</sup> However, we must mention that we only have two years (1994 and 1995) for the post-crisis period in our sample and the determination of the continued effects may not be complete. Piston engines have an import demand elasticity estimate of -1.258 with the interaction term's estimate as -0.048 and textile machineries have -1.167 as the elasticity estimate and -0.048 as the estimate for the interaction term.

Table 5 compares the estimated import price elasticities from certain products in our paper and products from the papers of Stone (1979) and Shiells *et al.* (1986). The level of disaggregation is similar but the samples used in estimation are different; this comparison should be viewed as a measure of the extent of the development for the relevant countries.

For instance, refined petroleum in Shiells *et al.* (1986) matches with petroleum products in our study: despite being almost a net importer of crude oil, Turkey refines the imported oil in its own refineries. Shiells *et al.* estimated the U.S. import price elasticity of refined petroleum at -0.794 and insignificant, while our corresponding value was -0.955 and significant.

The textile sector is a major driving force for the Turkish economy. Accordingly, the importation of textile and leather machineries is essential.

---

<sup>16</sup> The specification is again done by Chow tests and recursive residuals tests.

Stone's (1979) estimates for this set of products are as follows: for the U.S. 0.430 but not significant, for the EEC -0.030 also insignificant, and for Japan -0.640 and significant. Our results show that Turkey has an elasticity of -1.192 and significant; this suggests that, since the economy relies to a large extent on the textile sector, Turkey has shown serious attention in domestically producing textile and leather machineries to be used in this sector. Though the available substitution possibilities seem not to be so many, they are certainly greater than the other countries, which are not specialized as much in their textile industries.

Road motor vehicles and parts in Stone's study correspond to passenger cars, and motor vehicle parts in ours. The elasticities of this combined group of products in Stone (1979) are -2.660 for the U.S., -2.490 for EEC, while there is no reported estimate for Japan. Each of these economies has well-established automotive industries, which makes the import demand highly elastic. On the other hand, the Turkish automotive industry elasticity estimates exhibit structural instability, for the particular breakpoint of 1984; efforts of restructuring the economy and increasing openness resulted in different elasticities across sub-samples: for the pre-1984 period the estimated import price elasticity was -1.289, while for the post-1984 period it was -1.629. There was improvement in the industry but still the automotive sector operates below the standards of the developed countries in the sense that the industry can provide less substitution possibilities to the consumers.

## 7. Concluding Remarks

Having reliable estimates of trade elasticities is important for designing and implementing successful trade policies. The terms-of-trade gains from these policies as well as the cross-sectional structure of protection can be better analyzed when the effects of changes on relative prices are quantified. We have estimated disaggregated import demand elasticities for Turkey for various product groups over the period 1970-1995. We have tested for different elasticities over "closed" and "open" economy periods, and found that the effects of the trade reforms of the 1980's were significant for a number of industries that form the backbone of the Turkish economy. For instance, cotton, crude oil, passenger cars, pig iron, rubber and textile thread industries have exhibited a structural break during the trade reforms of 1980s. The magnitude of the elasticity estimates of these product groups are found to have changed notably as a result of these reforms, indicating that Turkish consumers have a wider access to substitute goods.

We also compared our results with elasticity estimates from past studies for developed countries. Based on our estimates, we infer that Turkey has caught up with the developed countries in some industries, such as cotton, petroleum products and textile machinery, while additional steps are needed in other industries like vehicle parts and pharmaceutical products in order to reduce the development gap.

**References:**

- Arıcanlı, T. A. and D. Rodrik (eds.) (1990): *The Political Economy of Turkey: Debt, Adjustment, and Sustainability*, Macmillan Press.
- Asseery A. and D.A. Peel (1991): "Estimates of Traditional Aggregate Import Demand Model for Five Countries", *Economic Letters*, vol. 35 n4, pp. 435-439.
- Arize, A.C. and J.B. Spalding (1991): "A Statistical Demand Function for Imports in South Korea", *Journal of Economic Development*, vol. 16 n1, pp. 147-164.
- Arize, A.C. and J. Walker (1992): "A Reexamination of Japan's Aggregate Import Demand Function: An Application of the Engle and Granger Two-Step Procedure", *International Economic Journal*, vol. 6 n2, pp. 41-55.
- Ceglowski, J. (1997), "On the Structural Stability of Trade Equations: the case of Japan", *Journal of International Money and Finance*, vol. 16, pp. 491-512.
- Davidson, R. and J. McKinnon (1993), *Estimation and Inference in Econometrics*, Oxford University Press.
- Deyak, T., Sawyer, W. and R. Sprinkle (1989), "An Examination of the Structural Stability of Disaggregated U.S. Import Demand", *The Review of Economics and Statistics*, vol. 71, pp. 337-341.
- Engle, R. (1982) "Autoregressive Conditional Heteroskedasticity with Estimates of the Variance of U.K. Inflation" *Econometrica*, vol. 50, pp. 987-1008.
- Gawande, Kishore, and Usree Bandopadhyay (2000), "Is Protection for Sale? A Test of the Grossman-Helpman Theory of Endogenous Protection," *The Review of Economics and Statistics*, vol. 82, 139-152.
- Goldberg, Penelope K., and Giovanni Maggi (1999), "Protection for Sale: An Empirical Investigation", *American Economic Review*, 89 n5, 1135-1155.
- Grossman, Gene M., and Elhanan Helpman (1994), "Protection for Sale," *American Economic Review*, 84 n4, 833-850.
- Kabir, R. (1988), "Estimating Import and Export Demand Function: The Case Study of Bangladesh", *Bangladesh Development Studies*, vol. 16 n4, pp. 115-127.

- Kravis, I. and R. Lipsey (1974), "International Trade Prices and Price Proxies", in *The Role of the Computer in Economic and Social Research in Latin America: A Conference Report of the National Bureau of Economic Research*, London, pp. 253-268.
- Krueger, A. O. and O. H. Aktan (1992): *Swimming Against the Tide: Turkish Trade Reform in the 1980s*, ICS Press.
- Marquez, J. (1988), "Cyclical and Secular Trade Elasticities", *Journal of Economic Dynamics and Control*, vol. 12, pp. 71-76.
- Marquez, J. (1990), "Bilateral Trade Elasticities", *The Review of Economics and Statistics*, vol. 72, pp. 70-77.
- Marquez, J. (1993), "The Autonomy of Elasticities for Trade among Canada, Japan and the United States", *Japan and the World Economy*, vol. 5, pp. 179-195.
- Marquez, J. (1994), "The Econometrics of Elasticities or the Elasticity of Econometrics: An Empirical Analysis of the Behavior of U.S. Imports", *The Review of Economics and Statistics*, vol. 76, pp. 471-481.
- Marquez, J. (1995), "A Century of Trade Elasticities for Canada, Japan and the United States", International Finance Discussion Paper, #531.
- Marquez, J. and C. McNeilly (1986), "Can Debtor Countries Service their Debts? Income and Price Elasticities for Exports of Developing Countries", International Finance Discussion Papers, #277.
- Marquez, J. and C. McNeilly (1988), "Income and Price Elasticities for Exports of Developing Countries", *The Review of Economics and Statistics*, vol. 70, pp. 306-314.
- Mitra, D., D. Thomakos and M. A. Ulubaşoğlu (2002), " 'Protection for Sale' In A Developing Country: Democracy vs. Dictatorship", *The Review of Economics and Statistics*, vol. 84 n3, pp. 497-508.
- Mwega, F. (1993), "Import Demand Elasticities and Stability during Trade Liberalization: a Case Study of Kenya", *Journal of African Economies*, vol. 2 n3, pp. 381-416.
- Sarmad, K. (1989): "The Determinants of Import Demand in Pakistan", *World Development*, vol. 17 (10), pp. 1619-1625.
- Shiells, C. (1991), "Errors in Import-Demand Estimates Based Upon Unit-Value Indexes", *The Review of Economics and Statistics*, vol. 73, pp. 378-382.

- Shiells, C., Stern, R. and A. Deardorff (1986), "Estimates of the Elasticities of Substitution between Imports and Home Goods for the United States", *Weltwirtschaftliches Archiv*, vol. 122 n3, pp. 497-519.
- Sinha, D. (1996): "An Aggregate Import Demand Function for India", *Rivista Internazionale di Scienze Economiche e Commerciali*, vol. 43 n1, pp. 163-173.
- Stern, R., Baum, C. and M. Green (1979), "Evidence on Structural Change in the Demand for Aggregate U.S. Imports and Exports", *Journal of Political Economy*, vol. 87, pp. 179-192.
- Stone, J. (1979), "Price Elasticities of Demand for Imports and Exports: Industry Estimates for the U.S., the E.E.C. and Japan", *The Review of Economics and Statistics*, vol. 61, pp. 306-312.
- Tansel, A. and S. Togan (1987), "Price and Income Effects in Turkish Foreign Trade", *Weltwirtschaftliches Archiv*, vol. 123, pp. 521-534.
- Togan, S. (1994): *Foreign Trade Regime and Trade Liberalization in Turkey During the 1980s*, Avebury Press.
- Thursby, J. and M. Thursby (1984), "How Reliable are Simple, Single Equation Specifications of Import Demand?", *Review of Economics and Statistics*, vol. 66, pp. 120-128.
- Zietz, J. and D. Pemberton (1993), "Parameter Instability in Aggregate U.S. Import Demand Functions", *Journal of International Money and Finance*, vol. 12, pp. 654-667.

**Table 1. Import Demand Elasticities – Full Sample**

SITC	Product Group	Sample	$\beta_{i1}$	$\beta_{i2}$	$\beta_{i3}$	$\rho_j$	Adj.R <sup>2</sup>	H <sub>0</sub> (4)
684	Aluminum	75-95	-1.390*** (0.284)	0.587* (0.288)	0.259*** (0.030)	-0.442*** (0.153)	0.837	4.81**
322	Coal	74-95	-1.252 (0.778)	n.a. n.a.	0.139 (0.117)	0.371*** (0.097)	0.867	n.a.
682	Copper	71-95	-2.181 (1.577)	1.335 (1.080)	0.369*** (0.070)	n.a. n.a.	0.590	0.12
263	Cotton	70-95	-2.908*** (0.504)	1.262** (0.618)	0.729*** (0.072)	n.a. n.a.	0.914	2.24
333	Crude Oil	71-95	-0.647*** (0.035)	n.a. n.a.	0.013** (0.033)	-0.429*** (0.193)	0.960	n.a.
562	Fertilizer	82-95	-3.657** (1.945)	1.555* (1.497)	0.274** (0.104)	n.a. n.a.	0.438	1.65
674	Iron Plate	81-95	-0.665 (0.718)	0.386 (0.611)	0.218*** (0.045)	n.a. n.a.	0.710	0.02
672	Iron Primary	81-95	-2.532*** (0.786)	n.a. n.a.	0.244*** (0.051)	n.a. n.a.	0.617	n.a.
673	Iron Shapes	81-95	-2.236*** (0.615)	1.968 (1.272)	0.217*** (0.051)	n.a. n.a.	0.636	0.01
122	Manf. Tobacco	86-95	-0.646*** (0.085)	n.a. n.a.	-0.225*** (0.075)	n.a. n.a.	0.864	n.a.
4231	Olive Oil	86-93	-1.522* (0.643)	1.067 (1.871)	-1.004* (0.383)	-0.778* (0.403)	0.784	0.65

781	Pass. Cars	75-95	-1.612*** (0.590)	1.793*** (0.654)	n.a. n.a.	n.a. n.a.	0.277	n.a.
334	Petroleum Prod.	75-95	-0.955* (0.524)	1.403*** (0.362)	0.261*** (0.079)	n.a. n.a.	0.305	1.77
541	Pharm. Prod.	68-95	-0.732*** (0.120)	n.a. n.a.	0.293*** (0.017)	n.a. n.a.	0.934	n.a.
671	Pig Iron	72-95	-1.186*** (0.299)	0.331** (0.150)	0.243*** (0.003)	0.692*** (0.177)	0.948	3.71*
713	Piston Eng.	85-95	-1.293 (0.809)	n.a. n.a.	0.172*** (0.049)	n.a. n.a.	0.524	n.a.
042	Rice	74-95	-1.179** (0.495)	0.831** (0.355)	0.288*** (0.035)	n.a. n.a.	0.862	0.01
232	Rubber	70-95	-0.272*** (0.105)	n.a. n.a.	0.161*** (0.011)	n.a. n.a.	0.916	n.a.
061	Sugar & Honey	70-95	-2.312*** (0.610)	1.646** (0.737)	n.a. n.a.	n.a. n.a.	0.385	n.a.
266	Synth. Fiber	81-95	-1.869** (0.826)	n.a. n.a.	0.138*** (0.037)	n.a. n.a.	0.703	n.a.
724	Textile Mach.	81-95	-1.192*** (0.141)	0.240 (0.332)	0.331*** (0.029)	n.a. n.a.	0.937	4.04*
651	Textile Thread	70-95	-0.537*** (0.114)	n.a. n.a.	0.373*** (0.017)	n.a. n.a.	0.971	n.a.
121	Unmanf. Tobacco	86-95	-3.091***	2.870	0.848***	n.a.	0.951	0.09

			(0.503)	(1.895)	(0.205)	n.a.		
423	Vegetable Oil	86-95	-1.321**	n.a.	0.230***	-0.494***	0.765	n.a.
			(0.503)	n.a.	(0.034)	(0.186)		
784	Vehicle Parts	81-95	-1.327*	0.068	0.208***	n.a.	0.756	1.89
			(0.675)	(0.312)	(0.031)	n.a.		
041	Wheat	72-95	-1.086**	-1.346	0.275***	-0.599***	0.278	4.09*
			(0.488)	(1.062)	(0.075)	(0.181)		

**Notes:**

- i.  $\hat{\beta}_{i1}, \hat{\beta}_{i2}, \hat{\beta}_{i3}$  denote the estimates of the import price, domestic price and expenditure elasticities respectively. Standard errors of estimation are given in parentheses below the estimates.
- ii. \*\*\* denotes significance at 1%, \*\* denotes significance at 5% and \* denotes significance at 10% level respectively.
- iii.  $\rho_j$  denotes the estimate of the autoregressive coefficient; n.a. indicates that no dynamics (serial correlation) found in the residuals; *Adj. R<sup>2</sup>* denotes the regression adjusted R-squared.
- iv.  $H_0(4)$  is the F-statistic of the no-money illusion hypothesis test; n.a. shows that this test could not be conducted for the corresponding product group due to lack of one of the elasticity estimates.

**Table 2. Specification Test Statistics – Full Sample**

SITC	Product Group	$\phi_{hm}$	$\phi_{hd}$	$\phi_n$	$\phi_{arch(1)}$	$\phi_{b80}$	$\phi_{b84}$	$\phi_{b80-84}$	$\phi_{j80}$	$\phi_{j84}$
684	Alumin.	0.611	0.201	0.785	0.633	0.867	0.134	n.a.	n.a.	0.182
322	Coal	0.004	n.a.	0.018	0.983	0.103	0.359	0.358	0.988	0.991
682	Copper	0.616	0.146	0.383	0.409	0.048	0.278	n.a.	0.93	0.978
263	Cotton	0.127	0.283	0.910	0.706	0.083	0.010	0.015	0.128	0.163
333	Crude Oil	n.a.	n.a.	0.747	0.003	0.000	0.000	n.a.	0.007	0.118
562	Fertilizer	0.732	0.746	0.553	0.789	n.a.	n.a.	n.a.	n.a.	n.a.
674	Iron Plate	n.a.	0.947	0.758	0.685	n.a.	n.a.	n.a.	n.a.	n.a.
672	Iron Prim.	n.a.	0.848	0.755	0.184	n.a.	n.a.	n.a.	n.a.	n.a.
673	Iron Shps	n.a.	0.592	0.373	0.560	n.a.	n.a.	n.a.	n.a.	n.a.
122	M.Tobac.	n.a.	n.a.	0.775	0.287	n.a.	n.a.	n.a.	n.a.	n.a.
4231	Olive Oil	n.a.	0.279	0.737	0.540	n.a.	n.a.	n.a.	n.a.	n.a.
781	Pass. Car	0.929	0.694	0.826	0.618	0.838	0.561	0.876	0.098	0.007
334	Petrol Pr.	n.a.	n.a.	0.570	0.229	0.595	0.041	0.018	0.408	0.582
541	Phrm. Pr.	n.a.	n.a.	0.573	0.105	0.097	0.814	0.063	0.600	0.982
671	Pig Iron	0.191	0.694	0.030	0.816	0.039	0.063	n.a.	0.882	0.495
713	Pist. Eng.	n.a.	0.570	0.469	0.827	n.a.	n.a.	n.a.	n.a.	n.a.
042	Rice	0.052	0.761	0.501	0.791	0.038	0.058	n.a.	0.669	0.607
232	Rubber	0.145	n.a.	0.731	0.452	0.518	0.025	0.082	0.305	0.149
062	Sug.- Hon.	0.928	0.184	0.443	0.061	0.426	0.368	0.162	0.833	0.929
266	Syn. Fib.	n.a.	n.a.	0.666	0.976	n.a.	0.109	n.a.	n.a.	0.583
724	Txtl Mch.	n.a.	n.a.	0.367	0.548	n.a.	n.a.	n.a.	n.a.	n.a.
651	Txtl Thr.	0.033	n.a.	0.705	0.770	0.014	0.101	0.055	0.684	0.768
121	Unmanuf. Tobac.	n.a.	0.660	0.638	0.917	n.a.	n.a.	n.a.	n.a.	n.a.
423	Vegetable Oil	n.a.	0.454	0.589	0.482	n.a.	n.a.	n.a.	n.a.	n.a.
784	Vehicle Parts	n.a.	n.a.	0.635	0.828	n.a.	n.a.	n.a.	n.a.	n.a.
041	Wheat	0.977	0.008	0.653	0.557	0.432	0.999	n.a.	0.310	0.952

**Notes:**

i.  $(\phi_{hm}, \phi_{hd})$  denotes the p-values of the DWH test statistics for endogeneity of import prices and domestic prices respectively,  $\phi_n$  denotes the p-value of the Jarque-Bera (1980) normality test and  $\phi_{arch(1)}$  denotes the p-value of Engle's

(1982) test for ARCH effects, both applied to the regression residuals.  $(\phi_{b80}, \phi_{b84}, \phi_{b80-b84})$  denote the p-values of the Chow breakpoint test, for break dates 80, 84 and 80-84 respectively,  $(\phi_{f80}, \phi_{f84})$  denotes the p-values of the Chow forecast test, for break dates 80 and 84.

ii. n.a. indicates that no structural break analysis could be done due to the time span covered.

Table 3. Estimates of Import Demand Elasticities – Sub-samples

SITC	Product Group	$\beta_{i1}$	$\beta_{i2}$	$\beta_{i3}$	$\rho_j$	Adj.R <sup>2</sup>
<b>Sample 1970-79</b>						
263	Cotton	-0.952* (0.439)	1.675* (0.803)	-0.290 (0.540)	n.a. n.a.	0.453 n.a.
333	Crude Oil	-0.941*** (0.024)	n.a. n.a.	0.311** (0.581)	0.725*** (0.201)	0.993 n.a.
671	Pig Iron	-1.439* (0.761)	1.053*** (0.286)	0.551 (0.403)	n.a.	0.584 n.a.
541	Pharm. Prod.	-0.313 (0.405)	n.a.	0.249 (0.156)	n.a.	0.188 n.a.
232	Rubber	-0.211 (0.219)	n.a.	0.134 (0.102)	n.a.	-0.010 n.a.
651	Textile Thread	-0.380 (0.268)	n.a.	-0.339 (0.504)	0.796*** (0.222)	0.100 n.a.
<b>Sample 1980-95</b>						
263	Cotton	-3.569*** (0.713)	0.867 (0.896)	0.740*** (0.117)	n.a. n.a.	0.928
333	Crude Oil	-0.329*** (0.106)	n.a.	0.041*** (0.015)	0.043 (0.025)	0.863
781	Pass. Cars	-1.038 (0.890)	1.605** (0.726)	n.a.	n.a.	0.162
671	Pig Iron	-1.176*** (0.215)	-0.095* (0.100)	0.284*** (0.023)	n.a.	0.971
541	Pharm. Prod.	-0.934*** (0.122)	n.a.	0.333*** (0.025)	n.a.	0.923
232	Rubber	-0.424** (0.204)	n.a.	0.139*** (0.017)	n.a.	0.818
651	Textile Thread	-1.191*** (0.316)	n.a.	0.383*** (0.016)	n.a.	0.977
<b>Sample 1970-83</b>						
263	Cotton	-1.103* (0.509)	0.912 (0.548)	0.193 (0.182)	n.a.	0.215
333	Crude Oil	-0.767*** (0.084)	n.a.	0.342 (0.212)	n.a.	0.973

781	Pass. Cars (78-83)	-1.289*** (0.318)	0.547 0.690	n.a. n.a.	n.a. n.a.	0.687
671	Pig Iron	-1.176*** (0.328)	0.983*** (0.242)	0.311*** (0.097)	n.a. n.a.	0.630
232	Rubber	-0.386*** (0.126)	n.a. n.a.	0.204*** (0.037)	n.a. n.a.	0.729
651	Textile Thread	-0.534** (0.234)	n.a. n.a.	0.354*** (0.085)	n.a. n.a.	0.648
<b>Sample 1984-1995</b>						
263	Cotton	-3.092*** (0.578)	1.486* (0.779)	0.535*** (0.113)	n.a. n.a.	0.904
333	Crude Oil	-0.242* (0.128)	n.a. n.a.	0.040*** (0.016)	n.a. n.a.	0.628
781	Pass. Cars	-1.629 (1.234)	2.072** 0.937	n.a. n.a.	n.a. n.a.	0.208
671	Pig Iron	-1.059*** (0.256)	-0.021 (0.115)	0.258*** (0.029)	n.a. n.a.	0.938
232	Rubber	-0.108 (0.359)	n.a. n.a.	0.085*** (0.024)	n.a. n.a.	0.501
651	Textile Thread	-0.815** (0.326)	n.a. n.a.	0.354*** (0.022)	n.a. n.a.	0.962

Table 4. Effects of 1994 Crisis

SITC	Product Group	Sample	$\beta_{i1}$	$\beta_{i2}$	$\beta_{i3}$	$D94\_95*\beta_{i1}$	$Adj.R^2$
713	Piston Eng.	85-95	-1.259* (0.650)	n.a. n.a.	0.244*** (0.050)	-0.048* (0.021)	0.693
724	Textile Mach.	81-95	-1.167*** (0.123)	0.136 (0.293)	0.377*** (0.034)	-0.048** (0.022)	0.952

**Note:**

- i.  $D94\_95*\beta_{i1}$  denote the interaction term between the dummy of 1994-95 and the import demand elasticity.

**Table 5. Comparison of Import Price Elasticity Estimates**

Product Group	Stone (1979)			Shiells <i>et al.</i> (1986)	This paper
	U.S.	E.E.C.	Japan	U.S	Turkey
Aluminum	-2.510	0.520	3.670	n.a.	-1.366 <sup>***</sup>
Cotton	-1.510 <sup>***</sup>	-0.840 <sup>*</sup>	-1.500 <sup>***</sup>	n.a.	-2.908 <sup>***</sup>
Fertilizer	n.a.	n.a.	n.a.	-0.917	-3.657 <sup>*</sup>
Cars & Parts	-2.660 <sup>***</sup>	-2.490 <sup>***</sup>	n.a.	n.a.	-1.612 <sup>***</sup> , - 1.327 <sup>*</sup>
Petroleum Prod.	n.a.	n.a.	n.a.	-0.794	-0.955 <sup>*</sup>
Pharm. Prod.	-0.550 <sup>*</sup>	-0.850 <sup>***</sup>	-1.420 <sup>***</sup>	n.a.	-0.732 <sup>***</sup>
Pig Iron	-0.510	-0.880 <sup>***</sup>	-2.430 <sup>***</sup>	n.a.	-1.186 <sup>***</sup>
Sugar & Honey	n.a.	n.a.	n.a.	0.492 <sup>**</sup>	-2.312 <sup>***</sup>
Textile Mach.	0.430	-0.030	-0.640 <sup>**</sup>	n.a.	-1.192 <sup>***</sup>
Textile Thread	n.a.	n.a.	n.a.	7.574	-0.537 <sup>***</sup>
Vegetable Oil	n.a.	n.a.	n.a.	-0.696	-1.321 <sup>**</sup>

**Notes:**

- i. <sup>\*\*\*</sup> denotes significance at 1%, <sup>\*\*</sup> denotes significance at 5% and <sup>\*</sup> denotes significance at 10% level respectively.
- ii. Comparisons are based on SITC number and name of products.
- iii. Cotton is under Textile Semi-manufactures, Pharmaceutical Products is under Other Chemicals, Pig Iron is under Unworked Iron, Steel and Ferroalloys in Stone (1979).
- iv. Vegetable Oil is under Oils and Fertilizer is under Agricultural Chemicals in Shiells *et al.* (1986).