ESTIMATES OF DEMAND RELATIONSHIPS FOR FIGS AND FIGS PRODUCTS IN TURKEY

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ALPER ERİTEN

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Prof. Dr. Sencer AYATA
Director

I certify that this thesis satisfies all the requirements as a thesis for the degree of Master of Science.

Prof. Dr. Haluk ERLAT
Head of Department

This is to certify that we have read this thesis and that in our opinion it is fully adequate, in scope and quality, as a thesis for the degree of Master of Science.

Assoc. Prof. Dr. Nadir ÖCAL
Supervisor

Examining Committee Members

Prof. Dr. Erol ÇAKMAK	**(METU, ECON)**	______________
Assoc. Prof. Dr. Nadir ÖCAL	**(METU, ECON)**	______________
Assoc. Prof. Dr. Yılmaz AKDİ	**(ANKARA UNI. STAT)**	______________

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Name, Last name: Alper ERİTEN

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ABSTRACT

ESTIMATES OF DEMAND RELATIONSHIPS FOR
FIGS AND FIGS PRODUCTS IN TURKEY

Eriten, Alper
M.S., Department of Economics
Supervisor: Assoc. Prof. Dr. Nadir Öcal

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This dissertation measures the extent of relationship between production, processing and marketing channels of fig products in Turkey for the period 1971-2003. We first provide a detailed analysis of world and Turkish fig products market. We then estimate the own price and cross price elasticities of fig products in Turkey by using simultaneous systems. The results imply that the demand facing Turkish *dried fig* processors is inelastic. Moreover also the producer-level *dried fig* price elasticity has inelastic structure. The study also finds evidence of a complementary structure between fig products apart from fresh fig.

Keywords: Dried Fig, Elasticity, Raw Product, Processed Product

ÖZ

TÜRKİYE' DEKİ İNCİR VE İNCİR ÜRÜNLERİ
TALEP İLİŞKİLERİNİN TAHMİNLERİ

Eriten, Alper
Yüksek Lisans, İktisat Bölümü
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Bu tez 1971-2003 periyodu için Türkiye'deki incir ürünlerinin üretim, işleme ve pazarlama kanalları arasındaki ilişkinin boyutunu ölçmektedir. İlk olarak dünya ve Türk incir ürünleri piyasasının detaylı bir analizini sağlamaktayız. Daha sonra eşanlı sistemleri kullanarak incir ürünlerinin fiyat ve çapraz fiyat esnekliklerini tahmin ediyoruz. Sonuçlar Türk *kuru incir* işletmecilerinin karşılaştığı talebin esnek olmadığını göstermektedir. Ayrıca üretici seviyesindeki *kuru incir* fiyat esnekliği de esnek olmayan bir yapıya sahiptir. Çalışma ayrıca yaş incir dışındaki incir ürünleri arasında tamamlayıcı bir yapının kanıtını bulmaktadır.

Anahtar Kelimeler: Kuru İncir, Esneklik, Ham Ürün, İşlenmiş Ürün

To My Father

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CHAPTER 1

INTRODUCTION

In spite of the fact that many radical alterations have emerged on world labor market, agricultural sector has been the basic source of employment for many of the world's population. This is reflected not only in agrarian cultures but also in recently developed countries which were once regarded as developing countries. Agriculture sector constituted the first step of development as it helped to eliminate the foreign exchange constraint of developing countries. During post World War II period, Turkey took part in reconstruction of Europe as an agricultural supplier. Particularly during Menderes's government this role was very important for Turkey as the economy heavily depended on export capability of agriculture sector. The share of agriculture sector in gross national product was very high, 51.3 percent in 1948 (Kruger, A.O. 1974). Although this share has decreased substantially since then and the importance of agriculture sector in foreign trade has been outweighed by other sectors[1], in some agricultural products Turkey leads in the world markets. For instance regarding fig products, especially *dried fig*, more than half of the world export is channeled from Turkey (FAO Stats.).

As far as weather preconditions, biological structure, labor intensive production process and marketing structure are concerned; the dried fig market constitutes a complex structure in Turkey. Many questions may arise from this complex structure. Firstly, 'What is the composition of fig production and trade in the world and where is Turkey's place in this market?' Secondly 'What kinds of fig products are traded in Turkey and what is the extent of their demand relationships?' Lastly, 'What is the level of responsiveness for fig products of Turkish processors and producers?' These 3 related questions have complex methodological implications. The best way is to examine the relationships between production, processing and marketing channels of fig products in Turkey.

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[1] Industrial products dominate Turkish exports. According to SIS, the share of agriculture in 2004's GDP is 12.9 %.

It is the central contention of this study that producer – processor analysis provides an important framework for addressing these crucial questions. In developing this argument, we follow French, Eryilmaz and Blackman (1991). They investigated demand relationships for apricot and apricot products by using seemingly unrelated regressions model. Besides they formed two-product blocks (processed-raw) model which is 'block recursive in that the endogenous quantities allocated to each processing use, determined in the Raw Product Block, enter as predetermined pack variables in the Processed Product Block' (French, Eryilmaz and Blackman, 1991). In this study similar modeling approach is carried out to analyze the demand relationships for fig and fig products in Turkey. It is important to note that this is the first study on these issues and we therefore believe that our results will shed some light on the several issues. Firstly we present a detailed analysis of fig and fig products market in Turkey. Secondly the study identifies the Turkey's main competitors in the world fig market and their possible effects on demand for Turkish fig products. Finally and most importantly we are able to measure the sensitiveness of the demand for fig and fig products to price changes by both estimating the own and cross-price elasticities.

The plan of the study is as follows. Firstly, in Chapter 2, we give brief information about world production and trade of fig and fig products by mainly focusing on Turkish market. In Chapter 3, we form two simultaneous systems regarding the Aegean demand model in Turkey. In Chapter 4, we outline the structure of data used in this study. This is followed in Chapter 5 by specified version of the Aegean demand model given in Chapter 3. In Chapters 6 and 7, the estimation results and elasticity evaluations are presented respectively. Lastly the study concludes by drawing conclusions for structure of producer-processor relationship.

CHAPTER 2

BACKGROUND INFORMATION

2.1) World Production

Fig is a sub-tropical climate plant and it can grow in all wild temperate climates. Specifically the annual average temperature rate must be about 18°C - 20°C. Moreover average temperature rates higher than 30°C are necessary especially in harvest seasons. Furthermore the temperature rates lower than –9°C may cause permanent damages on the fig tree as it has soft wood structure. Consequently the best climatic condition for fig production is mild winters, hot and dry summers. Precipitation rates have also importance in fig production. The annual optimum average precipitation rate for a fig tree is equal to 625 millimeters with the lower bound of 550 millimeters. However, it is important that, there must be no precipitation during harvest season. In addition to this, during drying process[2] in harvest season, any relative humidity rate above 50% may be harmful for production (Kabasakal, 1990).

Fig is one of the characteristic fruits of Mediterranean basin and is produced mainly in Mediterranean countries, North Africa, Syria, Iran, the Caucasus and Crimea. In 1888 the Smyrna fig[3] was exported from Turkey to California and from California to South America, South Africa and Australia. Finally these areas have become fig producer regions but now few of them have managed to create trade connections.

Main fig producer countries are listed in Table 2.1.1. According to the last 24 years' data published in the annual Statistics of Food and Agriculture Organization (FAO), Turkey, Egypt, Greece, Iran, Spain, Syria and the United States of America can be regarded as main fig producer countries in the world. Every year more than 1 million tons of figs are produced in the world. Turkey is the most important fig

[2]Figs are dried naturally in gardens under the sunlight.

[3] A special fig tree.

producer country in the world with an average production of more than 280 thousand tons. On the other hand with its crucial acceleration after 1980s, Egypt and with its stable potential, Greece can be regarded as the other main fig producer countries.

Table 2.1.1: *Fig Production (tons)*

Years	World	Egypt	Greece	Iran	Spain	Syria	Turkey	USA
1980/84	954,773	11,699	110,457	29,324	47,052	49,002	279,000	34,714
1985/89	1,033,367	25,800	107,825	56,110	51,197	41,051	338,800	43,245
1990/94	1,086,101	129,988	93,040	76,037	58,426	41,174	282,600	47,168
1995/99	1,131,089	216,011	81,817	73,465	60,057	45,557	272,600	46,238
2000/03	1,051,453	178,494	80,000	75,348	61,296	42,723	251,250	45,435
average:	*1,051,353*	*109,644*	*95,237*	*61,503*	*55,369*	*43,951*	*286,250*	*43,274*

Source: *FAO Stats*.

There are lots of varieties of fig produced in Turkey. For instance; the Tarak, the black and white Orak, Mor fig, Akça and Sarilop are major fresh fig varieties in Turkey.[4] From these fresh fig varieties, unfortunately only the sarilop has important economic potential as it is suitable for drying process. During the drying process of the sarilop, its water contents fall from 75% to 30-50% (Ağaoğlu, Y.S. 1993). Due to this uncertain relation between production quantities of fresh and dried figs and presence of lots of varieties of fresh fig, it is difficult to find an easy way so as to relate and compare the production data. Due to these difficulties, data from Aegean Exporters' Associations will be examined for dried fig production. From Table 2.1.2, we see that Turkey supplies more than half of the world dried fig production between 1971 and 1990. However, countries like Egypt, Iran and Syrian Arab Republic which are regarded as main fig producer countries are now out of the list and they are going to be examined in the following sections. On the other hand, Greece and the United States of America seem to be main important competitors (especially the former) for Turkey in the world dried fig markets as far as production

[4] The names of fresh fig varieties are given in Turkish.

quantities are concerned. Moreover although they are not given in the Table 2.1.1, Italy and Portugal produce small amount of dried fig as we can see from Table 2.1.2.

Table 2.1.2 : *Dried Fig Production (tons)*

Years	Turkey	Greece	Italy	Spain	Portugal	USA	Others	Total
1971/75	47,400	18,420	6,980	2,800	4,020	10,500	10,358	100,478
1976/80	53,600	18,400	7,100	2,560	4,820	10,480	5,120	102,080
1981/85	55,400	17,760	6,920	3,040	3,120	10,480	7,560	104,280
1986/90	48,917	15,883	6,117	3,883	3,617	11,917	7,600	97,933
average:	*51,025*	*17,535*	*6,760*	*3,115*	*3,910*	*10,900*	*7,655*	*100,900*

Source: *Aegean Exporters' Associations*

2.2) World Trade

With many characteristic properties, fig products have an important place in the world agricultural trade relations. Infact fig, as an important agricultural product, is included in every data sets related with tradable agricultural products. Although the fig fruit may be regarded as a unique product as far as its taste and biological structure are concerned, there are some substitute products for it. For instance grapes and apricots are regarded as main substitute products since both can be consumed as fresh and dried. In this respect, before focusing on world fig trade it is better to have a look at some basic trade data of these products. According to the Food and Agriculture Organization Statistics; grapes and apricots (especially the former) constitute considerable economic potential for world markets. After 1980 in every year almost 2 million tons of grapes and 150 thousands tons of apricots are traded. In addition to this, revenues of 2 billion dollars and 200 million dollars are gathered respectively. On the other hand, after 1980, every year about 70 thousands tons of figs are traded and a revenue of more than 100 million dollars is gathered. In the light of these data it is seen that in economic aspect grape and apricot trades seem to outweigh fig trade. Nevertheless having unique taste and nutrition content, fig products are demanded in huge amounts in every seasons forming considerable economic value for suppliers.

2.2.1) Export

As it is mentioned in previous sections, the fig fruit is consumed as fresh and dried. Hence it may be more practical to examine trade patterns of fresh and dried fig products separately. Tables 2.2.1.1 and 2.2.1.2 show world total fresh and dried figs export respectively. From Table 2.2.1.1 we observe that international fresh fig trade does not constitute a considerable economic potential in the world markets. The main reasons behind this may be highly perishable character of fresh fig and lack of technological infrastructure in storage and transportation processes.[5] However with rapid improvement in technological infrastructure and outward-looking trade policies, international fresh fig trade has accelerated since the second half of 1980s. In 2003, almost 24,000 tons of fresh figs are exported and about 40 million dollars of export revenue is channeled into the supplier countries. Turkey and Italy turn out to be the main fresh fig exporter countries between 1980 and 2003.

Table 2.2.1.1 : *Fresh Fig Exports - Quantity=Q (tons) - Value=V ($1000)*

Years	World		Greece		Italy		Spain		Turkey	
	Q	V	Q	V	Q	V	Q	V	Q	V
1980/84	3,217	2,392	17	40	441	509	8	6	1,554	728
1985/89	5,200	5,420	194	548	869	1,082	70	89	2,411	1,595
1990/94	9,422	13,290	145	486	1,563	2,217	318	615	4,006	4,322
1995/99	14,154	21,548	124	400	1,975	2,695	1,245	2,151	5,296	6,150
2000/03	18,440	26,269	149	416	1,479	1,957	1,897	3,207	5,490	5,996
average:	*9,739*	*13,264*	*125*	*376*	*1,257*	*1,681*	*658*	*1,130*	*3,679*	*3,665*

Source: *FAO Stats.*

In addition, as far as last ten years' data are concerned, Spain has increased its export share in international fresh fig trade. On the other hand Greece has maintained its stable trade potential between 1980 and 2003. Although the volume of international trade of fresh fig seems to increase, it still has relatively small share in

[5] Especially during early 1980s.

world agricultural trade. Because of that, unlike dried fig, this product is not given a duty code even in some of fresh fig exporter countries.

Table 2.2.1.2 : *World Dried Fig Exports (tons)*

Years	World	Greece	Iran	Portugal	Spain	Syria	Turkey	USA
1961/69	51,383	11,560	25	5,542	391	319	28,418	910
1970/79	46,799	9,790	80	2,683	301	927	29,378	1,146
1980/89	53,614	8,215	24	641	457	2,374	37,970	1,130
1990/99	59,585	6,216	3,443	183	2,101	3,996	34,010	3,158
2000/02	70,852	4,261	8,604	175	3,512	2,327	39,134	2,507
average:	*54,166*	*8,548*	*1,464*	*2,035*	*1,015*	*1,972*	*33,018*	*1,668*
avr.after 80s:	*62,185*	*5,765*	*4,634*	*181*	*2,426*	*3,611*	*35,193*	*3,008*

Source: *FAO Stats.*

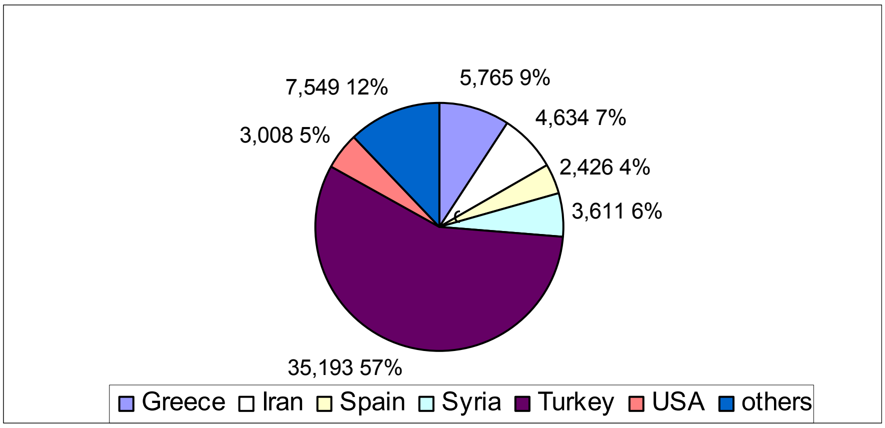

Figure 2.2.1.1: *Average Dried Fig Exports After 1980 (tons - %)*

Tables 2.2.1.2 and 2.2.1.3 present world dried fig exports in tons and value of this export in United States Dollar respectively. According to these tables, it is clear that international dried fig trade outweighs international fresh fig trade. Between the years 1961 and 2002, 54,166 tons of dried figs are exported on average and revenue of more than 55 million dollars is channeled into supplier countries. With the exception of first two decades these numbers overshoot 60,000 tons and 100 million dollars respectively.

Table 2.2.1.3: *Values of World Dried Fig Exports ($1000)*

Years	World	Greece	Iran	Portugal	Spain	Syria	Turkey	USA
1961/69	12,478	2,348	5	834	78	57	6,361	568
1970/79	30,712	6,416	29	969	239	252	19,707	1,222
1980/89	52,485	8,378	31	542	354	2,525	35,773	1,783
1990/99	105,963	12,248	2,505	267	2,612	4,488	65,699	7,261
2000/02	112,634	7,860	6,401	361	3,339	2,041	68,269	7,275
average:	*55,757*	*7,503*	*1,069*	*628*	*1,018*	*1,888*	*35,091*	*3,086*
avr.after 80s:	*107,502*	*11,235*	*3,404*	*288*	*2,780*	*3,923*	*66,292*	*7,264*

Source: *FAO Stats.*

As a main dried fig producer country, Turkey supplies more than half of the world dried fig exports. As a result, between the years 1960 and 2002, Turkey's average export revenue is about 35 million dollars. As another main dried fig producer country, Greece exports 8,548 tons of dried figs and earns about 7.5 million dollars on average. Furthermore Portugal, Syrian Arab Republic, the United States of America, Iran Islamic Republic and Spain can be regarded as other dried fig exporter countries. Incidentally as far as the period of post–1980 is concerned the countries such as Iran Islamic Republic and Syrian Arab Republic seem to catch up with Greece in quantity classification. Besides the United States of America is the third country in value classification. On the other hand Portugal seems to lose its high pre-1980 export levels. Whereas, quantity and value data of Spain seem to be more than doubled during the period of post-1980. Accordingly, as we can observe from Figure 2.2.1.1, between 1980 and 2002 Turkey, Greece, Iran Islamic Republic, Syrian Arab Republic, The United States of America and Spain maintain 57 , 9 , 7 , 6 , 5 and 4 percent of world dried fig trade respectively. Besides, 12 percent of this trade is shared by other countries. It is worth to note that in both pre and post 1980 periods Turkey turns out to be the leader country in the world dried fig markets.

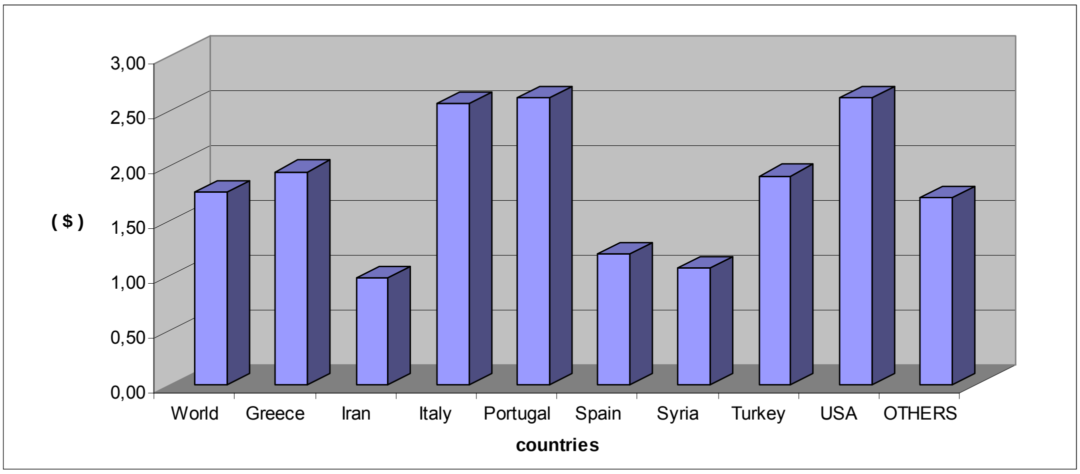

Figure 2.2.1.2: *Average Unit Dried Fig Export Prices After 1980*

In analyzing international trade potential of an agricultural product, not only quantity and value of transactions, but unit prices also play major role in shedding light on marketing capability of supplier countries and product qualities. Due to the neo-liberal policies of post-1980, all countries have reformed their access to world markets. Hence, especially for tradable agricultural products, unit prices began to reflect the quality differences of traded product.[6] When we look at average unit dried fig export prices presented in Figure 2.2.1.2, we can easily see that some countries such as Turkey and Greece, Italy and Portugal, Iran Islamic Republic and Syrian Arab Republic form pair countries as far as their unit export prices are concerned. This is, however, not surprising because each pair countries has the same geographical and climatic conditions. Infact in international markets Greek and Turkish dried figs are regarded as main substitutes so as are Iran and Syrian dried figs.

From Figure 2.2.1.2, it is seen that the United States of America, Portugal and Italy have the highest prices in post-1980 period. Besides two main dried fig supplier countries, Turkey and Greece, earn less than two dollars per unit kilogram. Whereas

[6] Dried fig products show many quality differences. See Chapter 2.3.

with their relatively poor quality Iran Islamic Republic and Syrian Arab Republic earn about one dollar per unit kilogram.

2.2.2) Import

Although the number of producers of an agricultural product may not be numerous, it is usual that the number of markets it can be exported are not that limited. For instance, in contrast to supply side almost every country in the world markets demand dried fig from producer countries. The import data of main demanders after 1980 are given in Figures 2.2.2.1 and 2.2.2.2. Before analyzing these figures it is worth to note that France, Germany and Italy are the most important dried fig demander countries. In addition to these countries the United Kingdom, the United States of America, Austria and Switzerland have considerable demands for dried fig (see FAO Stats. for the data of the period 1960-80).

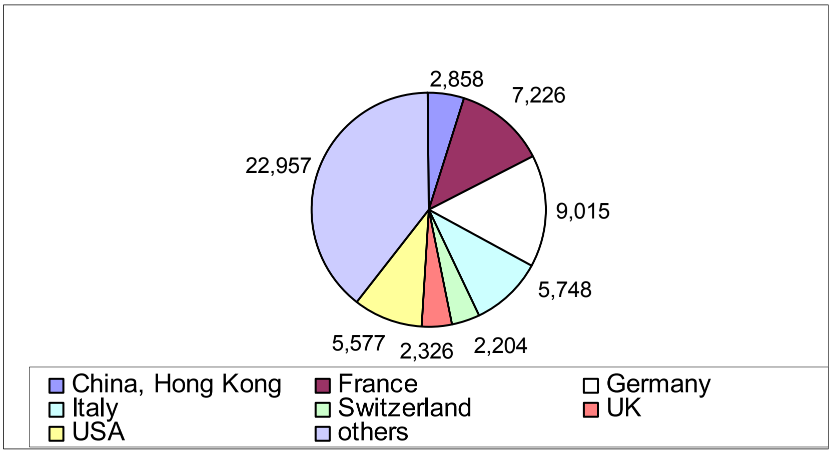

Figure 2.2.2.1: *Average Dried Fig Imports After 1980 (tons)*

When we focus on post-1980 period, we observe that dried fig demand of Germany promotes and reaches more than 9 thousands tons with an expenditure of more than 16 million dollars. Meanwhile quantity of import demand of countries such as the United States of America, Italy and especially China-Hong Kong SAR shows upward trend in the post-1980 period. Although imports of the United Kingdom and France weaken in quantity term, the expenditures of these countries increase after 1980 due to rise in unit import prices.

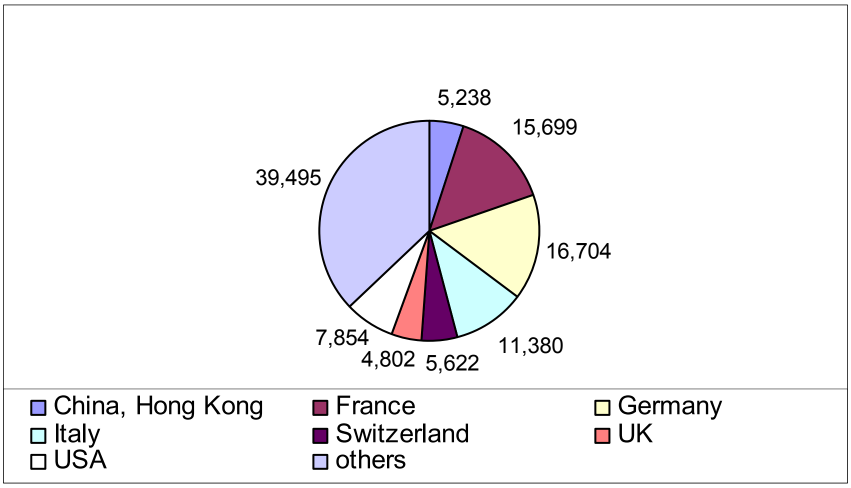

Figure 2.2.2.2: *Average Dried Fig Import Values After 1980 ($1000)*

As far as unit import prices are concerned, during 1960 and 2002 China-Hong Kong SAR, Canada, Israel and Switzerland have the highest unit price levels respectively. All other countries, except Austria, pay about 1 dollar per 1 kilogram for imported dried fig. However, Austria with 0.6736 dollar turns out to be the only country which pays less than 1 dollar per kilogram (FAO Stats.).

Regarding post-1980 period, there is a considerable increase in the levels of unit dried fig import prices. For instance; with a unit price of more than 3 dollars, China-Hong Kong SAR imports the most expensive and probably the best dried figs in the world. Besides Switzerland, Israel and Canada pay 2.54, 2.36 and 2.31 dollars per kilogram so as to import high quality dried figs (See Figure 2.2.2.3, Israel and Canada are excluded from Figure 2.2.2.3 due to their small shares in import.).

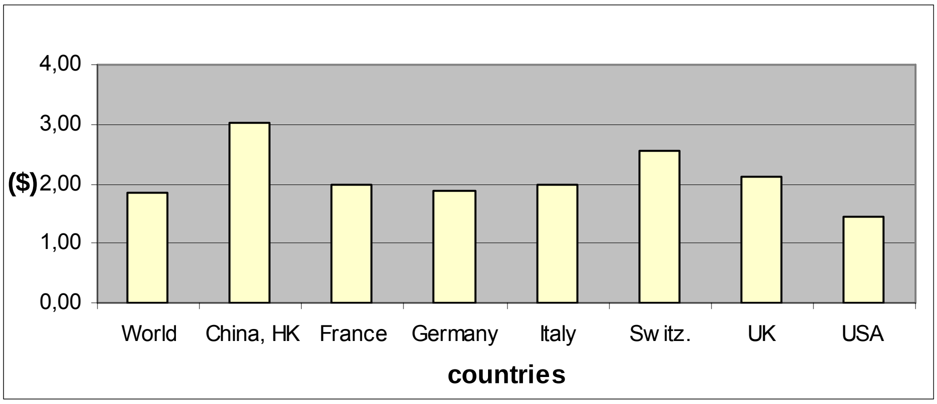

Figure 2.2.2.3: *Average Unit Dried Fig Import Prices After 1980*

In the light of all these details about international dried fig trade, we can conclude that in the post-1980 period Turkey, Greece, Iran Islamic Republic, Syrian Arab Republic, the United States of America and Spain are main dried fig supplier countries in the world markets. However from these countries the United States of America and Spain also import considerable amounts of dried fig in every year. In addition to these 2 countries Germany, France, Italy, China-Hong Kong SAR, the United Kingdom and Switzerland are regarded as main dried fig importer countries in the world markets.

2.3) Dried Fig Exports of Turkey

As it is mentioned in the previous sections, Turkey is the key country in both production and international trade of fig products. To enable country comparisons for economic importance of fig products, we use annual data of Food and Agriculture Organization Statistics. However during the examination of agricultural products of an individual country, usually the problem of choosing either calendar or crop year arises. However, as far as some agricultural products like dried fruits are concerned the importance of choosing crop year outweighs calendar year. For instance, in countries like Turkey and Greece, crop season of dried fig begins in the second half of August and ends towards the late September. Meanwhile the exportation period of dried fig begins in the late September (or early October) and lasts till the end of second quarter of the following year. Therefore, focusing on annual data instead of crop year data may weaken the validity of studies on demand relations. According to French, Eryilmaz and Blackman (1991), ignoring crop-calendar year problem results in a slight distortion of the marketing year dried apricot consumption values. Consequently, in the light of this fact, crop years data will be used in the examination of foreign demand relationships of Turkish dried fig.

Presence of fresh and dried consumption of the fig products generally indicates existence of only main two kinds of fig. Whereas, as it is mentioned in the previous sections fresh fig has lots of varieties and so does dried fig. Dried figs can be categorized under five categories namely, '*dried fig*, fig puree, bruised fig, minced fig and crack fig'. Table 2.3.1 shows that all these dried fig varieties apart from crack fig are traded between Turkey and her customers. It is important to explain all these dried fig varieties and their differences from each other. To begin with, in a narrow sense '*dried fig*'indicates the products which are not applied any mechanical process. In other words what you see in a fig garden is what you eat. In addition, '*dried fig*' is classified according to units per one kilogram and for instance the ones less than 40 figs per kilogram are called 'filtered fig'[7].

Table 2.3.1: *Turkish Dried Fig Exports According to the Process Types. Qty (tons) - Val($1000)*

season	***Dried Fig***			**Fig Puree**			**Bruised Fig**		
	Qty	*Val*	*$/kg*	*Qty*	*Val*	*$/kg*	*Qty*	*Val*	*$/kg*
1971/72 1979/80	27,411	20,429	0.74	5,535	3,076	0.55	2,666	428	0.18
1980/81 1989/90	34,075	34,896	1.04	5,984	3,169	0.53	3,420	434	0.19
1990/91 1999/00	32,768	66,252	2.04	6,033	5,356	0.93	1,148	422	0.37
2000/01 2003/04	36,318	68,015	1.87	5,674	4,653	0.83	552	247	0.53

7) Filtered fig means 'süzme incir' in Turkish which is expressed as *no. 1* in export sector.

Table 2.3.1 (continue)

season	Minced Fig			Total		
	Qty	*Val*	*$/kg*	*Qty*	*Val*	*$/kg*
1971/72 1979/80	0	0	0	35,612	23,933	0.67
1980/81 1989/90	304	333	1.10	43,509	38,532	0.90
1990/91 1999/00	977	1,205	1.24	40,927	73,236	1.80
2000/01 2003/04	1,317	1,402	1.07	43,861	74,317	1.70

Source: *Aegean Exporters' Associations*

Secondly, the term 'fig puree' indicates the products which lost its *dried fig* feature during production process. Namely any dried fig which are torn by shovel or shifter are regarded as fig puree after application of certain machinery processes. This kind of dried fig is utilized in making wafer and marmalade. Thirdly, the concept of 'bruised fig' indicates the products which have no fig taste and fig honey in its fruit. Hence, this kind of dried fig has no direct consumption channel but it is utilized especially in alcohol industry. Lastly, thanks to the technological developments in the processing technology especially during post 1980 period, '*dried fig*' which are more than 100 units per kilogram began to be channeled into world markets, in different structure. After processing, this kind of *dried fig* is 'minced' and utilized in packed products such as cornflakes, chocolate and sugar products.

In the light of these details about the varieties of dried fig, we can examine the data from Aegean Exporters' Associations in the Table 2.3.1. The original data of pre-1980 period are given in Turkish Lira. In addition to this, the last season's data cover only exports before April 2004. To present the data of pre-1980 period in dollar terms the levels of the exchange rate of the corresponding time period are used. We can easily see from Table 2.3.1 that '*dried fig*' turns out to be the most important variety of Turkish fig products export. On the other hand, other 3 varieties of dried fig seem to constitute relatively small part of Turkish dried fig export. As far as seasonal aggregates are concerned, the highest levels in quantity and value terms are observed in the 1982/1983 and 2002/2003 seasons respectively. Besides with unit price level of 2.14 dollars, the season of 1992/1993 is the only period in which unit price overshoots 2 dollars. As far as the individual varieties of dried fig are concerned, the highest levels in quantity and value of '*dried fig*' exports are observed in the 1999/2000 and 2002/2003 seasons respectively. In addition, in the season of 1992/1993, unit price of 2.5 dollars constitutes almost ten times of price of 1971/1972 season. Secondly, the quantity of 'fig puree' export averages to the levels of more than 5,000 tons with unit price of less than 1 dollar. Especially during two successive seasons between 1993 and 1995, the fig puree export reaches almost 10,000 tons which is its highest level. Thirdly, in spite of its smallest economic potential, the 'bruised fig' export peaks in the season 1982/1983 with 17,224 tons and revenue of 1,334 thousands dollar. Lastly, during its infancy, the 'minced fig' export is becoming more attractive in the world markets and it forms export revenue of more than 1 dollar per kilogram.

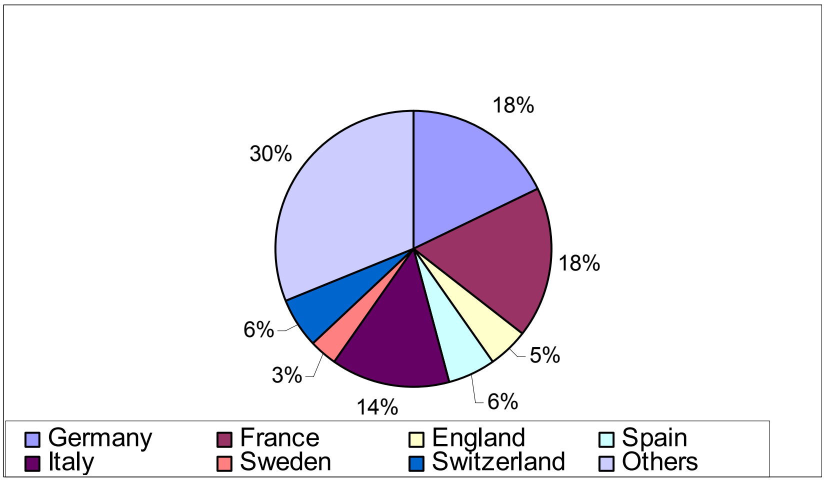

Figure 2.3.1: *Destinations of Turkish Dried Fig Exports Between the Seasons 1989/90 and 2000/01*

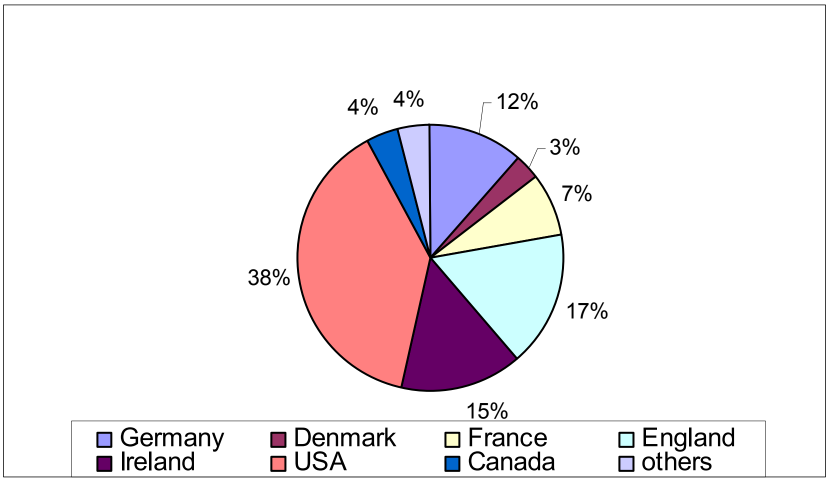

Figure 2.3.2: *Destinations of Turkish Fig Puree Exports Between the Seasons 1989/90 and 2000/01*

After the examination of the composition of Turkish dried fig exports, we can focus on the destination points of these exports. The details are given in the Figures 2.3.1, 2.3.2, 2.3.3, and 2.3.4, covering the data between the seasons 1989/90 and 2000/01. As seen from these figures, Germany, France, England, Italy, the United States of America, Austria, Sweden and Switzerland turn out to be the most important countries as the demander of Turkish dried fig products. For instance in the season 2000/01 these countries import 9,083 , 6,880 , 2,079 , 5,070 , 5,116 , 1,003 , 1,058 and 1,857 kilograms of dried figs products respectively.

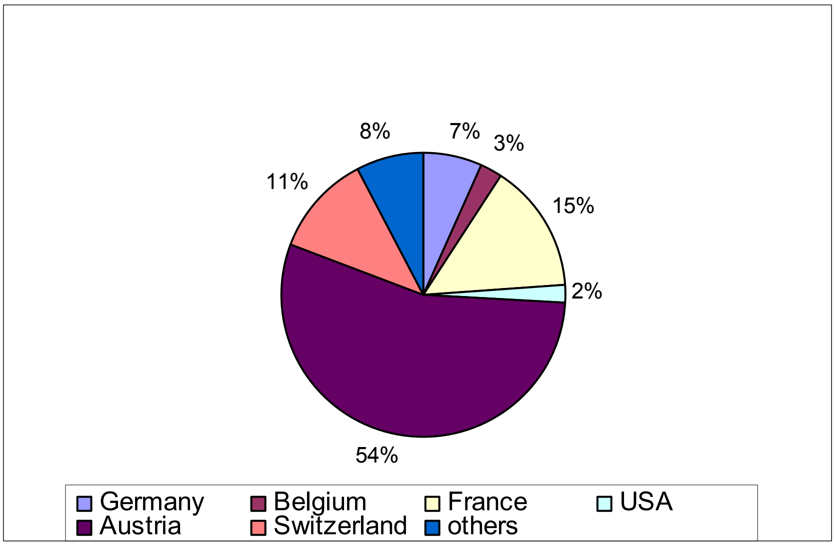

Figure 2.3.3: *Destinations of Turkish Bruised Fig Export Between the Seasons 1989/90 and 2000/01*

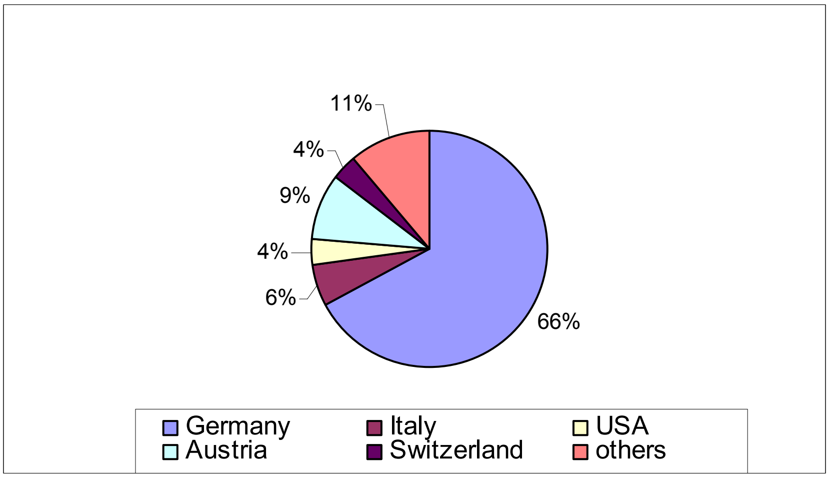

Figure 2.3.4: *Destinations of Turkish Minced Fig Export Between the Seasons 1989/90 and 2000/01*

Moreover countries such as Denmark, Spain, Netherlands, Portugal and Israel are rising stars of Turkish dried fig market and they can be classified according to process types of their imports. To begin with '*dried fig*' exports, Germany and France turn out to be main two demanders with shares of 18% and with more than

5.8 million kilograms imports. After these two countries, with 14% share Italy comes third and imports more than 4.6 million kilograms. Besides Spain, Switzerland, England and Sweden are other important destinations of Turkish '*dried fig*' exports (see Figure 2.3.1). Secondly as far as 'fig puree' exports of Turkey are concerned, the United States of America with 38 % share turns out to be the most important customer. On the other hand England, Ireland and Germany are regarded as the other destinations of Turkish fig puree exports (see Figure 2.3.2). Thirdly, with regard to 'bruised fig' exports of Turkey, Austria has more than half of the market with imports of 640,413 kilograms. In addition to Austria, France and Switzerland are regarded as the other main importers of Turkish bruised fig (see Figure 2.3.3). Finally Figure 2.3.4 shows that, Germany leads in the market with share of 2/3 of Turkish 'minced fig' exports and the other countries such as Austria, the United States of America, Italy and Switzerland seem to play the role of competitive fringe in this market (Aegean Exporters' Associations).

In the light of the figures presented above, we can conclude that European Union countries constitute important share in exports of Turkish dried fig products. Countries such as Germany, France and Italy turn out to be major Turkish dried figs importer countries. These countries do not implement any trade barriers against Turkish fig products and every season large amounts of fig products are imported from Turkey. Moreover Turkish dried figs processors benefit from social security payments and transaction payments exemptions in the light of their value added tax payments of package and equipment expenditures. However until recently they have been subjected to export fund payments (100$ per one ton of big size *dried fig* export and 60$ per one ton of small size *dried fig* export) under the condition of repayment in 15 months from the date of export. Beginning from the season 2005-2006 Turkish dried figs processors are not subjected to this kind of transaction.

CHAPTER 3

STRUCTURE OF DEMAND

In Turkey the region of Aegean is regarded as the center of international fig trade. In other words West Anatolian littoral is the only dried fig exporter region of Turkey and from this center more than half of the total world trade is supplied in every year. Besides this region supplies 80 % of Turkish fig production in every season and contains more than 80 % of fig trees in Turkey (SIS, Agricultural Structure, 1997). In Aegean Region, particularly the Aydin and Izmir provinces turn out to be the most important areas as far as international dried fig trade is concerned. Correspondingly these two provinces are the leaders in Turkey with regard to economic potential of fig production. For instance, according to State Institute's Statistics, in 1997, Aydin and Izmir provinces supplied 58 % and 15 % of total figs production in Turkey respectively. In Izmir, Tire district and its plateaus are the most important dried fig producer areas. In Aydın province the districts of Germencik, Incirliova, and Nazilli are regarded as the most important dried fig producer areas. Consequently, following analysis rests only on the structure of Aegean fig industry especially by focusing on Aydin and Izmir provinces.

The Aegean demand model constitutes the following types of relationships:

a) derived demand functions facing processors of *dried fig*, fig puree, bruised and minced fig.

b) functions of market allocation of processed product supply.

c) function of domestic consumption.

d) derived demand function facing Aegean fresh-fig producers.

e) producer-level pricing equations for dried fig products utilized for processing which signal structure of producer-processors bargaining.

The first three equations and corresponding relationships can be defined as *the Processed Product Block*. On the other hand the last two equations and corresponding relationships can be defined as *the Raw Product Block*.

3.1) Processed Product Block (Model A)

The demand functions facing processors of *dried fig*, fig puree, bruised and minced fig are derived from foreign demands for Turkish dried fig products. The functions are conceptualized with the freight on board (f.o.b) processor price expressed as a function of Turkish exports relative to populations of importer countries and exogenous demand shifters such as exchange rate movements, per capita income, substitute products, alterations in consumer preferences and in other factors. Unlike Greek products, due to having no memberships in European Union, Turkish agricultural products face with double quality and health control in both Turkish and importer country customs. At the end of these controls[8] some products may be sent back to Turkey due to having insufficient properties as far as aflatoxin, humidity and other preconditions are concerned. In this respect, all the related consignments are turned down even though just a small part of the products turn out to be defective. As a consequence both Turkish processors and producers experience a significant economic burden[9] due to being citizens of a nonmember country of European Union.

However due to the export-boosting policies and technological developments, Turkish exporters have the opportunity of re-processing the turned-down products and make the economic burden decrease to just processing and transportation costs levels.[10] In this respect although Turkey does not import dried fig, the turned down products have been classified as dried fig imports since the season 1994/95. We can surely say that the so-called import quantities may influence the demand structure of Turkish dried fig and this factor must be taken into consideration in the light of its consequences.

As it is mentioned in the previous sections the crop season of dried fig begins in the second half of August and ends towards the late September. On the other hand dried figs are processed within short period, primarily in September and October.

[8] Especially more sensitive controls in importer countries.

[9] Turned-down products create same burden with stocks carried from previous season and this situation may result in pessimist views about future exports and this weakens the competitiveness of processors.

[10] Plus opportunity time and financial costs but no additional raw product cost.

Meanwhile the exportation period runs from late September to the second quarter of next year. When there is a insufficient demand, unlike fresh fig, non-perishable feature of dried fig allows producers to store it and sell in the next season. However the carried-over products[11] lose considerable economic value and can be utilized only as fig puree, bruised or minced fig in next marketing year. Hence the processors usually do not choose the option of carrying some of the seasonal supply to the next season. In the light of this situation we assume that the processing does not result in a burdensome carry-out at the end of the marketing season. The model also regards the processors as the ones who are primarily concerned with marketing their products in order to achieve prices that will cover processing and raw material costs and make a positive return over their investment. Moreover processors carefully examine alterations in current market conditions as reflected by supply-oriented allocations between dried fig products relative to the seasonal supply. This allocation relationship mainly happens to be in '*dried fig*' market.[12] Unfortunately separate export data of each *dried fig* varieties are not available and only allocation relationships of 4 main types of dried fig products will be examined instead. These allocation relationships involve domestic consumption and f.o.b processor price as endogenous variables, unit processing and raw product costs, total supply and population (market size) as primary shifters.

On the other hand domestic processor prices turn out to be the most important variable with respect to domestic consumption. In addition to this, the amount of foreign demand influences domestic consumption levels as the domestic market size is not capable of absorbing total supply. In other words, the surplus over exportation is channeled into domestic market and dynamics of domestic demand structure are based on this reciprocity.

In this simultaneous system, choosing suitable normalized variable for each equation turn out to be one of the most important steps in modeling. In the study of French, Eryilmaz and Blackman about apricot demand relationships, demand was normalized on price and allocation relationships were normalized on quantity.

[11] Especially the carried over *dried fig*.

[12] *Dried fig* market contains lots of varieties such as 40 units, 60 units and 80 units of dried fig per kilogram.

Likewise, so as to relate domestic consumption with foreign demand, the model for dried fig normalizes the demand functions on price with allocation relationships normalized on movement.

Model A:

(1) PDF = f(DDFN, DFPN, DBFN, DMFN; ED) (dried fig)

(2) PFP = f(DDFN, DFPN, DBFN, DMFN; EP) (fig puree) *f.o.b. demand*

(3) PBF = f(DDFN, DFPN, DBFN, DMFN; EB) (bruised fig) *facing processors*

(4) PMF = f(DDFN, DFPN, DBFN, DMFN; EM) (minced fig)

**** **** ****

(5) DDFN = f(PDF, DDDFN; CPD, PGD, TSN)

(6) DFPN = f(PFP, DDDFN; CPP, PGP, TSN) *market allocation*

(7) DBFN = f(PBF, DDDFN; CPB, PGB, TSN)

(8) DMFN = f(PMF, DDDFN; CPM, PGM, TSN)

**** **** ****

(9) DDDFN = f(PDDF, TSN) *domestic consumption*

**** **** ****

(10) TSN = DDFN + DFPN + DBFN + DMFN + DDDFN + M

(Definitions of variables are presented in Table 3.2.1)

3.2) Raw Product Block (Model B)

As it is mentioned in the previous sections, unlike world grape and fresh apricot trade, world fresh fig trade does not constitute high values. However thanks to presence of sufficient foreign and domestic demand, Turkish fig producers can find an opportunity to sell small part of their products just before the drying process. The presence of this opportunity creates an adequate financial source for producers during harvest season and transfers work hours from drying process to relatively less hard pressed period. Under this circumstance a probable producer-processor bargaining structure cannot be formed in fresh fig market and producers are faced by a competitive demand function derived from consumer and market intermediary demands.

On the other hand, as far as dried fig market is concerned there is an exact producer-processor bargaining structure that does not allow making a perfect competition definition of producer-level demand functions for dried fig products. This producer-processor bargaining structure is primarily affected by the following factors:

- price elasticity of processed product demand
- imports (turned-down products)
- bargaining tactics
- substitute markets
- financial strength of processors
- liquidity constraints of producers
- existence of cooperatives
- level of support purchases or subsidies of cooperatives
- level of fresh product sales
- weather conditions

Under the existence of this kind of producer-processor bargaining structure, the definition of producer-level demand functions gains a different dimension. In this respect;

French showed that even if a farm-level demand function is not defined, consistent price predictions of the raw product price may be obtained as a function of the quantity of raw product purchased and other variables that reflect grower and processor expectations of processed product demand and profitability and, hence, influence the outcomes of the bargaining process. (French, Eryilmaz, and Blackman, 1991 p.349)

In the light of this implementation, producer-level demand functions and allocation identity can be defined as follows.

Model B:

(1) PGF = f(QGFFN; EF)

(2) PGD = f(QGDFN; VDF)

(3) PGP = f(QGFPN; VFP) *producer prices*

(4) PGB = f(QGBFN; VBF)

(5) PGM = f(QGMFN; VMF)

(6) QGN = QGFFN + QGDFN + QGFPN + QGBFN + QGMFN allocation identity

<u>Table 3.2.1: Definition of Variables in the Model</u>

Variables	***Definition***
PDF	*Dried fig* marketing-year unit f.o.b. processor price (deflated)
PFP	*Fig Puree* Marketing-year unit f.o.b. processor price (deflated)
PBF	*Bruised fig* Marketing-year unit f.o.b. processor price (deflated)
PMF	*Minced fig* Marketing-year unit f.o.b. processor price (deflated)
DDFN	Turkey marketing-year *dried fig* exports expressed relative to Turkey or importer countries population (N)
DFPN	Turkey marketing-year *fig puree* exports expressed relative to Turkey or importer countries population (N)
DBFN	Turkey marketing-year *bruised fig* exports expressed relative to Turkey or importer countries population (N)
DMFN	Turkey marketing-year *minced fig* exports expressed relative to Turkey or importer countries population (N)
DDDFN	Turkey marketing year domestic consumption relative to Turkish population
ED	Vector of *dried fig* demand shifters
EP	Vector of *fig puree* demand shifters
EB	Vector of *bruised fig* demand shifters
EM	Vector of minced fig demand shifters
EF	Vector of *fresh fig* demand shifters
TSN	Total Dried Figs Supply relative to Turkey population
CPD	*Dried fig* unit processing costs (deflated)
CPP	Fig puree unit processing costs (deflated)
CPB	Bruised fig unit processing costs (deflated)
CPM	Minced Fig unit processing costs (deflated)
PGF	*Fresh Fig* raw product prices (deflated)
PGD	*Dried Fig* raw product prices (deflated)
PGP	Fig Puree raw product prices (deflated)
PGB	Bruised Fig raw product prices (deflated)
PGM	Minced Fig raw product prices (deflated)
PDDF	Domestic dried fig price
RPDL	Previous year values of PDF/CPD
RPMPL	Previous year values of PPM/CPMP
RPBFL	Previous year values of PBF/CPB
PPM	*Minced fig-Fig Puree* Marketing-year unit f.o.b. processor price (deflated)
CPMP	Minced Fig-Fig Puree unit processing costs (deflated)
PGMP	Minced Fig-Fig Puree raw product prices (deflated)
DMPN	Turkey marketing-year *minced fig-fig puree* exports expressed relative to importer countries population (N)
∆DDFNL	Change in previous year values of *dried fig* per capita processed product movement
∆DMPNL	Change in previous year values of *minced fig-fig puree* per capita processed product movement

Table 3.2.1	**(continue)**
∆DBFNL	Change in previous year values of *bruised fig* per capita processed product movement
QGFFN	*Fresh Fig* raw product quantity relative to Turkey population
QGDFN	*Dried fig* raw product quantity relative to Turkey population
QGFPN	*Fig puree* raw product quantity relative to Turkey population
QGBFN	*Bruised fig* raw product quantity relative to Turkey population
QGMFN	*Minced fig* raw product quantity relative to Turkey population
QGMPN	Minced fig-Fig puree raw product quantity relative to Turkey population
V	Vectors of variables that reflect both producer and processor expectations of demand and profitability of processed products
QGN	Total raw product quantity relative to Turkey population

' N ' indicates Turkey or importer country per capita value (x 1000) in Processed Product Block.

' N ' indicates Turkey per capita value (x 1000) in Raw Product Block.

CHAPTER 4

DATA

In this model we first calculate the f.o.b processor prices using the data declared by Aegean Exporters' Associations. Due to presence of more than 10 types of packed *dried fig*[13], using the price data of a proto-type product may not give consistent results.[14] Therefore taking average value of exports seems to be more practical way of calculation of the f.o.b. processor prices. On the other hand unlike *dried fig,* other dried fig products do not have lots of varieties. However so as to apply the same method, the prices of these products are also calculated by taking average value of exports. Secondly there does not exist any data set including processing costs of dried fig products. Although in some years f.o.b. processing costs data are declared by Aegean Exporters' Associations, those data sets do not cover our entire estimation period. To get over this problem, corresponding data sets are collected from local processor firms located in Izmir – Aydin region (see Appendix A). Lastly although Taris declares its raw product prices in every year, due to its relatively small share (see Appendix B), in total exports and presence of unregistered economy, those prices may differ considerably from valid market prices. Likewise, the corresponding data sets are collected from local processor firms as far as raw product prices are concerned. Although firm-level data formation may result in deficiencies, this kind of tacit knowledge[15] enable us solve the data problem (see Appendices for deflated data values).

All the processor and raw product prices and all costs data are deflated by Consumer Price Index. As far as quantity variables are concerned, the corresponding

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[13] The main packed *dried fig* varieties are layer, lokum, pulled, lerida, garland, protoben, makaroni, baglama, cikolata and naturel.

[14] In the study of French, Eryilmaz and Blackman, for instance, the price per case of 24 No. $2^{1}/_{2}$ cans is chosen to represent the price of canned apricots.

[15] For more information about *tacit knowledge* especially for technology sectors see Alfred Kleinknecht and Jan ter Wengel, The Myth of Economic Globalization, *Cambridge Journal of Economics, 1998*, *22, 637-647*.

data are given per 1.000 population. During implementation of these calculations, firstly the processor prices are deflated by weighted average of Consumer Price Indexes of importer countries[16]. Secondly processing costs and raw product prices are deflated by Consumer Price Index of Turkey. Lastly export quantities are deflated by weighted average importer countries' population and domestic quantities are deflated by population of Turkey as market sizes. However population and price index data for calendar years are assigned to crop years which may result in some distortions. Due to the presence of deep unregistered economy, domestic consumption levels are determined in the light of levels of total dried fig production, total exports and imports (turned-down products). In addition to this, domestic price levels are calculated by subtracting indirect taxes and costs of additional quality processes[17] from export prices.

In this model all these calculations are implemented for data sets covering the period 1971/72 and 2003/04.

[16] See Figures 2.3.1, 2.3.2, 2.3.3 and 2.3.4 for importer countries.

[17] Due to insufficient domestic controls aflatoxin separation process has not been implemented in Turkey. This may result in saved cost of labor and raw product costs.

CHAPTER 5

EMPIRICAL SPECIFICATIONS

To perform the estimation process we have to modify our model in the light of data limitations. Besides during this modification the vector of variables E and V must be identified as they explain alterations in product foreign demand quantity and in outcomes of producer-processor bargaining structure respectively.

5.1) Processed Product Block Specifications (Model A)

As it is already mentioned, due to improvements in technology, Turkish dried fig sector has been producing 'minced fig' since late 1980s. In this respect, f.o.b. processor price data for minced fig are not available for pre-1990 period. However in the light of the f.o.b. processor prices of dried fig products, the prices of fig puree and minced fig turn out to constitute similar levels. Moreover as far as utilization and production processes are concerned both of these dried fig products show similar forms. Consequently the separate minced fig demand equation (4) is eliminated from the model and minced fig and fig puree equations are aggregated into a single minced-puree component, DMPN.

DMPN = DMFN + DFPN;   PPM = (DMFN/DMPN)*PMF + (DFPN/DMPN)*PFP

As we have already mentioned in previous sections, estimating demand functions for products like dried fig contains many difficulties. Not only prices, supply quantities, per-capita income levels or prices of substitute products affect demand structure of this kind of agricultural product, but also exchange rate movements, level of diversification of utilization forms, alterations in consumption habits of consumers or even foreign trade policy options may have great influence on the demand relations. In this respect so as to take this exclusive factor into consideration while measuring demand relations of dried fig products, we would better have a look at the study of French, Eryılmaz, and Blackman, 1991, for apricot products:

To account for the possible effects of changes in the unmeasurable or difficult to measure demand shift variables, we introduced a piece-wise linear-quadratic trend variable of the form $a_1T + a_2TC + a_3(TC)^2$, where T= Year (57,58,…,88) , TC= D(T-73) , and D is zero prior to 1973, one in 1973 and after. This permits the trends indicated in the Eryılmaz study to change at about the time of the Arab Oil Embargo and double-digit inflation in 1973/74 and at roughly the start of the marketing order program for advertising and promotion and the beginning of increasing levels of demand for dried apricots. An increase in dried apricot demand is suggested by the simultaneous increases in total U.S. per-capita consumption and deflated prices (see tables 1-3). The quadratic form of TC allows the trend slope to change as time moves forward. Alternative models with the dummy shifter D set at one in 1972 and 1974 (thus changing the starting value of TC) yielded estimates with larger variances.

In the light of this application in the study of French, Eryılmaz and Blackman, we might have introduced the same piecewise linear-quadratic trend variable form in our model. However as it is mentioned above, this trend variable form rests on a global structural change in all world markets following Oil Crises of 1973. This event not only accelerated primary product prices in parallel to higher world inflation but also resulted in the collapse of the post-war system of international regulation, generated large trade deficits (and large scale borrowing) for developing countries dependent upon oil imports (Weeks, 1996). These devastating outcomes both weakened the efficiency of inward-looking policies and sowed the seeds of post-1980 neo-liberal policies. In addition to such an important occurrence, 1973 witnessed the start of marketing order program for advertising and promotion acceleration in dried apricot demand in the USA. In the light of all these factors using trend dummy variables with the one measuring its alterations during post-1973 period may give consistent results. However our data set used for dried fig estimation covers the period 1971-2003 and only in the beginning of this period we did witness such an important event like oil crisis. So we do not need to use trend dummy variables in our model. Moreover usage of such variables seems to have lost its effectiveness in today's econometric analysis. As a result we introduce a general trend variable and also its quadratic form (but not quadratic form of trend-dummy) so as to eliminate immeasurable demand shift variables[18].

[18] Instead of vector of demand shifter (V...) we use variables T, C and T^2.

Besides, instead of using trend-dummy we introduce an intercept dummy variable, so as to measure outcomes of post-1980 policies, of the form C=0 prior to 1983 and C=1 in 1983 and after.

The period between January 1980 and November 1983 is regarded as 'stabilization and structural adjustment phase under taken by the government formed under the auspices of the military regime' (Öniş, 1991). Although the economic characteristic of this period did not disappear until 1985, (Boratav, 1998), the period after November 1983 'represented the attempts of a newly elected civilian government to resume the stabilization effects of the previous three years' (Öniş, 1986 pp.9). In addition to this period (1980-83), the period 1977-79 witnessed balance of payments crisis with limits on growth process, stabilization packages in conjunction with the IMF, and political instability. Finally in September 1980, the democratic regime was collapsed and replaced by the military rule. In summary, these two successive periods can be regarded as a transition from inward-looking policies of 1960s and 70s into neo-liberal policies of post-1980 Özal decade. From this transition period, the year 1983 is chosen as threshold[19] for our model since infrastructure of post-1980 reforms had been installed then and a new era for Turkish economy had begun.

To sum up, the demand functions facing processors are expressed as the following linear approximations:

(1*) $PDF = B_{10} + B_{11}DDFN + B_{12}DMPN + B_{13}DBFN + B_{14}T + B_{15}C + B_{16}T^2 + u_1$

(2*) $PPM = B_{20} + B_{21}DDFN + B_{22}DMPN + B_{23}DBFN + B_{24}T + B_{25}C + B_{26}T^2 + u_2$

(3*) $PBF = B_{30} + B_{31}DDFN + B_{32}DMPN + B_{33}DBFN + B_{34}T + B_{35}C + B_{36}T^2 + u_3$

Where 1* = 1;   2* = 2 + 4; 3* = 3

[19] But not a material threshold to affect slope term.

As far as market allocation side of apricot model is concerned; French, Eryılmaz, and Blackman, 1991, were able to form a long run equilibrium relationship measuring movements and carried over quantities in present and successive season respectively. While imposing such a relationship they expressed price and cost variables as year-to-year differences.

Similar to their approach, we are going to apply the same form to our model. However, before this formulation we have to identify a crucial difference between USA's apricot and Turkish dried fig models. In the former model mainly the domestic market was examined and the foreign channel entered just in supply side. Hence all the effects of outside consumption were neglected and related quantity deflation terms were applied only in the light of USA's data[20]. On the other hand as far as Turkish dried fig model is concerned the foreign markets constitute the main branch of consumption. Hence especially in f.o.b. demand side all the necessary deflation processes are performed in the light of foreign markets' data. In this respect; different from USA's apricot model, in Turkish dried fig model a second consumption channel is introduced as 'domestic consumption'[21]. Hence in market allocation side, so as to form a triple relationship between foreign quantity demand, domestic supply and domestic consumption the deflation process is applied in the light of Turkish data. Besides price variables are eliminated from market allocation equations and final forms are represented as follows:

(4*) $DDFN = B_{40} + B_{41}.DDDFN + B_{42}.\Delta CPD + B_{43}.\Delta PGD + B_{44}.TSN + u_4$

(5*) $DMPN = B_{50} + B_{51}.DDDFN + B_{52}.\Delta CPMP + B_{53}.\Delta PGMP + B_{54}.TSN + u_5$

(6*) $DBFN = B_{60} + B_{61}.DDDFN + B_{62}.\Delta CPB + B_{63}.\Delta PGB + B_{64}.TSN + u_6$

Where 4* = 5 , 5* = 6 + 8 , 6* = 7

[20] Price and population data.

[21] Export is surplus over domestic consumption.

In the domestic consumption equation (9) in model A, due to having no data about domestic prices, PDDF indicates export prices. Although export and domestic prices may differ substantially during marketing season, these prices do fluctuate in the same band especially during first shipment periods due to presence of perfect competition. As a result, due to lack of data, domestic price variable is replaced by export price variable.

(7*) $DDDFN = B_{70} + B_{71}.PDDF + B_{72}.TSN + u_7$

(8*) $TSN = DDFN + DMPN + DBFN + DDDFN + M$

Where 7* = 9 8* =10

The processed block simultaneous equation system consists of eight equations where PDF, PPM, PBF, DDFN, DMPN, DBFN, TSN, and DDDFN are endogenous and PDDF, ΔCPD, ΔPGD, ΔCPMP, ΔPGMP, ΔCPB, ΔPGB, M, T, C, T^2 are exogenous variables. These variables and their expected signs are presented in Table 5.1.1.

Table 5.1.1: *Equations of Aegean Demand Model*

Equations	Endogenous variables	Exogenous variables	Expected signs of coefficients
Model A			
1*	PDF	DDFN,DMPN,DBFN,T,C,T^2	-,-,-,+,?,?
2*	PPM	DDFN,DMPN,DBFN,T,C,T^2	-,-,-,+,?,?
3*	PBF	DDFN,DMPN,DBFN,T,C,T^2	-,-,-,+,?,?
4*	DDFN	DDDFN ,ΔCPD,ΔPGD,TSN	-,-,-,+
5*	DMPN	DDDFN ,ΔCPMP,ΔPGMP,TSN	-,-,-,+
6*	DBFN	DDDFN ,ΔCPB,ΔPGB,TSN	-,-,-,+
7*	DDDFN	PDDF,TSN	-,+
8*	TSN	DDFN,DMPN,DBFN,DDDFN,M	

5.2) Raw Product Block Specifications (Model B)

Due to the same data structure as in Processed Product Block, the fig puree and minced fig quantities are expressed as a single variable, QGMPN = QGFPN + QGMFN . As a result the separate producer level minced fig demand equation (5) is eliminated from the model B, and fig puree and minced fig equations are aggregated into a single minced-puree component. (3) + (5) = 3^*

As far as fresh fig market is concerned, the same form as in Processed Product Block is included so as to enable accounting for demand shifts. So equation 1 becomes;

$$(1^*)\ PGF = A_{10} + A_{11}\ QGFFN + A_{12}\ T + A_{13}\ T^2 + A_{14}\ D + u_1$$

Where D is 0 prior to 1985, 1 in 1985 and after. This dummy shifter D set at 1 in 1985 is included into the model so as to measure outcomes of technological developments of 1980s and alternative years apart from 1985 resulted in estimates with higher variances. Moreover 1985 is the date when the effects of policy change in 1983 began to be reflected in producers' side.

In the previous sections many factors, which affect producer-processor bargaining structure, were presented. In the light of outcomes of these factors apart from quantity purchased for processing, change in lagged processed product per capita movement, and the previous-period price relative to processing costs[22] turn out to be main variables in producer-processor bargaining structure. As a result,

$$(2^*)\ PGD = A_{20} + A_{21}\ QGDFN + A_{22}\ RPDL + A_{23}\ \Delta DDFNL + A_{24}\ D + u_2$$

Where D is 0 prior to 1985, 1 in 1985 and after when the outcomes of early 1980s' policies began to affect producer market.

$$(3^*)\ PGMP = A_{30} + A_{31}\ QGMPN + A_{32}\ RPMPL + A_{33}\ \Delta DMPNL + A_{34}\ D + u_3$$

[22] RPDL, RPMPL and RPBFL are indicators of processor profitability. Hence RP.. and ΔD.. will be used instead of V.. which is vector of variables that reflect both producer and processor expectations of demand and profitability of processed products.

Where D is 0 prior to 1990, 1 in 1990 and after, following the beginning of minced fig production.

(4*) $PGB = A_{40} + A_{41}\ QGBFN + A_{42}\ RPBFL + A_{43}\ \Delta DBFNL + A_{44}\ D + u_4$

Where D is 0 prior to 1988, 1 in 1988 and after. Year 1988 did result in estimates with lower variances.

Finally;

(5*) QGN = QGFFN + QGDFN +QGMPN + QGBFN

These five equations form a simultaneous system where PGF, PGD, PGMP, PGB and QGN are endogenous and other variables are exogenous. These variables and their expected signs are presented in Table 5.2.1.

Table 5.2.1: *Equations of Aegean Demand Model*

Equations	Endogenous variables	Exogenous variables	Expected signs of coefficients
Model B			
1*	PGF	QGFFN,T,D,T^2	-,+,?,?
2*	PGD	QGDFN,RPDL,ΔDDFNL,D	-,+,+,+
3*	PGMP	QGMPN,RPMPL,ΔDMPNL,D	-,+,+,+
4*	PGB	QGBFN,RPBFL,ΔDBFNL ,D	-,+,+,+
5*	QGN	QGFFN,QGDFN,QGMPN,QGBFN	

CHAPTER 6

ESTIMATION METHOD AND RESULTS

As we can see from Tables 5.1.1 and 5.1.2, in our simultaneous system, Model A and Model B consist of eight and five equations respectively. The main characteristic property of the system is that the endogenous variables which are determined in Model B join into the Model A as exogenous variables. In this respect, our Aegean Demand Model can be estimated by using some special methods. The method of two-stage least squares (2-SLS) is the most common method used for estimating simultaneous-equations models. In addition to this, Full-Information and Limited-Information Maximum Likelihood Methods can also be used for estimating simultaneous equations (Greene, 2003).

As the estimates of parameters may be sensitive to estimation methods and model specifications, using more than one method in estimation of equation systems helps us to obtain comparable results (French, Eryilmaz and Blackman, 1991). Besides so as to reach the most efficient results, the complete simultaneous solution of equations is needed. However in Aegean Demand Model due to alterations in deflation process[23], respecification of equations[24] and structural deficiencies separate individual systems are formed like those in apricot model. '…In view of these results, the processed product demand functions were respecified with the cross-product terms deleted. With this specification, the canned-frozen and dried apricot equations form separate simultaneous systems' (French, Eryilmaz and Blackman, 1991, pp.353). Likewise in addition to the structural factors given in Chapter 5.1, deletion of variables which are key elements of simultaneous structure result in formation of separate individual systems in both Model A and Model B. For instance in Processed Product Block (Model A) equation 3* cannot be explained by variables

[23] In first three equations of Model A, quantity and price values are deflated according to importers' countries data. On the other hand in other equations Turkish data are used. Hence in estimation results N^t is used instead of N where necessary. See Chapter 5.1.

[24] For instance, price variables are dropped from equations 4,5,6 in Model A. Cross product term, DMPN, is dropped from equation 1 and 3 in Model A.....

DDFN (Turkey marketing year *dried fig* exports expressed relative to importer countries populations) and DMPN (Turkey marketing-year fig puree-minced fig exports expressed relative to importer countries populations). As given in Chapter 2.1, 'sarilop' is the only fresh fig variety which is eligible for dried figs production. However in Raw Product Block (Model B) separate 'sarilop' export values are not available and total fresh fig export values are used for equation 1*. As a result the quantity relationship between fig products which is represented by equation 5* in Model B gains a separate structure. In the light of these specifications, data limitation problems and other structural factors in both Model A and Model B, all equations are estimated individually by using Ordinary Least Squares estimation method. As given in previous chapters the data set used for this estimation covers the period 1971-2003. However one observation is lost in equations 4*, 5* and 6* of Model A and in equations 2*, 3*, and 4* of Model B due to change and lagged variables respectively. Although this factor aggravates our small sample size problem, we successfully applied Ordinary Least Squares technique to estimate our models and estimation results are presented and evaluated in the following chapters.

6.1) Processed Product Block Estimates

In equations (1*) and (3*) the cross coefficient DMPN is near 0 and not statistically significant. Moreover even in equation (2*) DMPN is near 0 and not statistically significant. On the other hand in equation (3*) the cross coefficient DDFN is near 0 and statistically insignificant. In the light of these results, the processed product demand functions are respecified with both the cross-product terms deleted from equation (3*) and the cross-product term, DMPN, deleted from equation (1*) and finally from equation (2*). The following estimates are obtained,

(1*) $PDF = 3.9723 - 4.3887(DDFN) - 2.0157(DBFN) + 0.213(T) - 1.5399(C) - 0.00454(T^2)$

t-value	(9.21)	(-5.73)	(-4.18)	(6.80)	(-6.72)	(-6.19)
σ	(0.431)	(0.765)	(0.482)	(0.031)	(0.228)	(0.0007)

SSR=2.0818 *R^2=0.79431* *DW= 2.0360*

(2*) $PPM = 2.0734 - 2.1711(DDFN) - 1.2975(DBFN) + 0.0881(T) - 0.79134(C) - 0.00175(T^2)$

t-value	(5.49)	(-3.24)	(-3.07)	(3.21)	(-3.95)	(-2.73)
σ	(0.377)	(0.669)	(0.421)	(0.027)	(0.2)	(0.0006)

SSR=1.5935 R^2*= 0.57685* *DW=1.9065*

(3*) $PBF = 0.47025 - 0.67098(DBFN) + 0.00228(T) - 0.2345(C) + 0.00022(T^2)$

t-value	(6.29)	(-3.43)	(0.17)	(-2.52)	(0.74)
σ	(0.074)	(0.195)	(0.012)	(0.093)	(0.00029)

SSR=0. 36232 R^2*=0.47241* *DW=1.8116*

As far as the results of the '*dried fig*' component are concerned, we observe that all coefficients are large enough relative to their standard errors and are of expected signs including the cross-product term[25]. With regard to trend variables, T and T^2, we observe an upward trend but in decreasing rate with a significant effect of policy shift of 1983. Regarding puree-minced component, both DDFN and DBFN variables turn out to be better predictor of puree-minced price. Similar to equation (1*), in equation (2*) trend variables indicate an upward trend but in a decreasing rate with a considerable effect of post-1980 policy shift. In equation (3*) all coefficients are large enough relative to their standard errors apart from trend variables which indicate no alteration in the level of demand during whole period. Similar to previous equations, the 1983's policy shift maintains its effect also in bruised fig component.

(4*) $DDFN^t = 0.16882 - 0.50382(DDDFN^t) - 0.0108(\Delta CPD) - 0.0311(\Delta PGD) + 0.55371(TSN^t)$

t-value	(3.49)	(-4.04)	(-0.13)	(-0.70)	(8.13)
σ	(0.048)	(0.124)	(0.081)	(0.044)	(0.068)

SSR=0.062745 R^2*=0.76419* *DW=1.816*

[25]The results can be compared with expected signs of coefficients given in the Tables 5.1.1 and 5.2.1.

(5*) $DMPN^t$=0,04018 -0.093305($DDDFN^t$) -0.04495(ΔCPMP) + 0.2227(ΔPGMP) + 0.10157(TSN^t)

t-value	(1.44)	(-1.291)	(-1.43)	(1.82)	(2.57)
σ	(0.027)	(0.072)	(0.031)	(0.122)	(0.039)

SSR=0.020698 $R^2=0.32112$ *DW=1.1787*

(6*) $DBFN^t$ = -0.22918 - 0.45065($DDDFN^t$) - 0.46356(ΔCPB) - 0.0024(ΔPGB) + 0.3767(TSN^t)

t-value	(-5.44)	(-4.15)	(-2.21)	(-0.01)	(6.29)
σ	(0.042)	(0.108)	(0.208)	(0.139)	(0.598)

SSR=0.044919 $R^2=0.63705$ *DW=2.4070*

(7*) $DDDFN^t$ = -0.38423 + 0.071953(PDDF) + 0.4425(TSN^t)

t-value	(-6.45)	(3.90)	(9.62)
σ	(0.595)	(0.018)	(0.045)

SSR=0.1031 $R^2=0.78628$ *DW=2.33*

As far as the '*dried fig*' market allocation equation (4*) is concerned we observe that more than half of the total supply has been channeled into foreign '*dried fig*' market under constant domestic consumption, raw product and cost prices (ceteris paribus). Note that both price and cost change coefficients are insignificant in spite of their expected signs. This could be due to the small sample size. Regarding puree-minced market allocation equation (5*), it is found that apart from total supply variable the coefficients of all other variables are not different from 0 and the estimation results have very low explanatory power with autocorrelation problem. As far as the results of bruised fig market allocation equation (6*) are concerned all the coefficients apart from raw product price change coefficient turn out to be large enough relative to their standard errors and are of expected signs. Finally results of domestic consumption equation (7*) imply that all of the coefficients, except price coefficient, are of expected signs and are statistically significant. Besides with constant prices, more than 44% of total supply is channeled into domestic markets. The results are also presented in the Table 6.1.1.

Table 6.1.1:*Results of Model A*

Exo. Varbs.	Equations					
	1* (PDF)	2* (PPM)	3* (PBF)	4* ($DDFN^{t)}$)	6* ($DBFN^{t)}$)	7* ($DDDFN^{t)}$)
Intercept	3.9723	2.0734	0.47025	0.16882	-0.22918	-0.38423
	9.21	5.49	6.29	3.49	-5.44	-6.45
DDFN	-4.3887	-2.1711				
	-5.73	-3.24				
DMPN						
DBFN	-2.0157	-1.2975	-0.67098			
	-4.18	-3.07	-3.43			
T	0.213	0.0881	0.00228			
	6.8	3.21	0.17			
C	-1.5399	-0.79134	-0.2345			
	-6.72	-3.95	-2.52			
T2	-0.00454	-0.00175	0.00022			
	-6.19	-2.73	0.74			
$DDDFN^t$				-0.50382	-0.45065	
				-4.04	-4.15	
ΔCPD				-0.0108		
				-0.13		
ΔPGD				-0.0311		
				-0.7		
ΔCPMP						
ΔPGMP						
ΔCPB					-0.46356	
					-2.21	
ΔPGB					-0.0024	
					-0.01	
TSN^t				0.55371	0.3767	0.4425
				8.13	6.29	9.62
PDDF						0.071953
						3.9
R^2	0.79431	0.57685	0.47241	0.76419	0.63705	0.78628
DW	2.036	1.9065	1.8116	1.816	2.407	2.33

Note: The first row of the variables shows the value of coeeficients and the second row shows t-values
Equation 5* is excluded.

6.2) Raw Product Block Estimates

The estimation results are given in the Table 6.2.1. When we look at coefficient of determination values, it is clear that all equations leave some amount of price variation unexplained. More specifically, firstly, the results of fresh fig equation's (1*) estimates indicate that the quantity and the trend variable coefficients are not of theoretically expected signs. Besides fresh fig equation has the lowest coefficient of determination value of the Block which shows that the regressors do not explain the regressand very well. This could be due to the weaker structure of fresh fig market compared to dried fig market and due to the factors given in the previous section.

(1*) PGF = 0.41009 + 6.0838 (QGFFN) – 0.029787 (T) + 0.0004163 (T^2) + 0.171(D)

t-value	(8.33)	(1.87)	(-3.63)	(2.44)	(3.19)
σ	(0.049)	(3.25)	(0.008)	(0.0001)	(0.053)

SSR=0.15419 $R^2 = 0.38172$ *DW = 1.4896*

Secondly, as far as *dried fig* equation is concerned, all coefficients apart from D are large enough relative to their standard errors and are of the theoretically expected signs.

(2*) PGD = 2.3202 – 2.9197 (QGDFN) + 0.1456 (RPDL) + 2.0874 (ΔDDFNL) + 0.289 (D)

t-value	(4.22)	(-5.28)	(2.93)	(3.28)	(1.51)
σ	(0.549)	(0.552)	(0.049)	(0.635)	(0.19)

SSR=1.8431 $R^2 = 0.71975$ *DW = 1.2344*

Thirdly, in equation (3*) only the 'RPMPL' and 'D' coefficients are large relative to their standard errors and are of the theoretically expected signs.

(3*) PGMP = 0.066 + 0.114 (QGMPN) + 0.023 (RPMPL) – 0.0899 (ΔDMPNL) + 0.966 (D)

t-value	(1.39)	(0.35)	(2.14)	(-0.29)	(5.21)
σ	(0.047)	(0.325)	(0.01)	(0.308)	(0.018)

SSR=0.54809 $R^2 = 0.53247$ *DW = 1.8258*

(4*) PGB = 0.134 – 0.342 (QGBFN) + 0.0034 (RPBFL) + 0.163 (ΔDBFNL) + 0.0754 (D)

t-value	(3.15) (-1.72)	(0.26)	(0.99)	(3.26)	
σ	(0.042) (0.197)	(0.0132)	(0.163)	(0.0231)	

SSR=0.066379 $R^2 = 0.56284$ *DW = 1.5685*

Lastly, regarding bruised fig equation, although all coefficients are of theoretically expected signs; apart from D, they are not statistically significant due to small sample problem.

Table 6.2.1: *Results of Model B*

Exo. Varbs.	Equations			
	1* (PGF)	2* (PGD)	3* (PGMP)	4* (PGB)
Intercept	0.41009	2.3202	0.066	0.134
	8.33	4.22	1.39	3.15
QGFFN	6.0838			
	1.87			
QGDFN		-2.9197		
		-5.28		
QGMPN			0.114	
			0.35	
QGBFN				-0.342
				-1.72
T	-0.02979			
	-3.63			
D	0.171	0.289	0.966	0.0754
	3.19	1.51	5.21	3.26
T2	0.000416			
	2.44			
RPDL		0.1456		
		2.93		
RPMPL			0.023	
			2.14	
RPBFL				0.0034
				0.26
ΔDDFNL		2.0874		
		3.28		
ΔDMPNL			-0.0899	
			-0.29	
ΔDBFNL				0.163
				0.99
R^2	0.38172	0.71975	0.53247	0.56284
DW	1.4896	1.2344	1.8258	1.5685

Note: The first row of the variables shows the value of coefficients and the second row shows t-values.

CHAPTER 7

ELASTICITY EVALUATIONS

Although we are unable to obtain simultaneous solution of our equation system, it is possible to find elasticity values for our individual equations. Among these equations, foreign demand equations facing Turkish processors turn out to be the most important equations as marketing capability of Turkish dried fig products depends mainly on foreign selling opportunities. In this respect Table 7.1 presents price elasticities for both year 2000 and mean values of prices and quantities for demand equations of dried fig products. When we analyze the elasticity values computed at mean and year 2000 values[26], we see that although elasticities differ in magnitude, their structure does not show any change from being inelastic to elastic and vice versa. As far as the elasticities corresponding to Processed Product Block (Model A) are concerned, the inelastic values (in absolute term) computed at year 2000 values turn out to be lower than the ones computed at the mean values. On the other hand, the elastic values (in absolute term) computed at year 2000 values turn out to be higher than the values computed at the mean values. As to the Raw Product Block (Model B), unlike Model A, inelastic value computed at year 2000 values becomes more inelastic when computed at the mean values. The elastic value computed at year 2000 values turn out to be less elastic when computed at the mean values.

In the light of the results presented in the Table 7.1 it is seen that at year 2000 and mean values the own-price elasticity of *dried fig* is equal to -0.5942 and -0.835 respectively. In other words, foreign import demand elasticity of Turkish *dried fig* shows an inelastic structure. Due to having no findings of an early study about *dried fig* elasticity evaluations unfortunately we are unable to evaluate the validity of our results objectively. However since Turkey is regarded as the most important dried figs supplier country in the world, inelastic foreign demand structure is not an unexpected result. Actually our findings considerably support this reality. On the

[26] In computation of elasticity aggregates price and quantity values are used.

other hand, in producer level, the own-price elasticity of *dried fig* computed at year 2000 and mean values is equal to -0.6183 and -0.4427 respectively. These results indicate that the inelastic structure of processed product demand is also reflected in raw product demand. In Chapter 3.2 we have already mentioned that level of price elasticity of processed product affects producer-processor bargaining structure. Finally this relationship also emerged in evaluation of elasticity aggregates. Similar to own-price elasticity values, the cross price elasticity of *dried fig* with respect to puree-minced fig price computed at year 2000 and mean values is equal to -0.5084 and -0.8025 respectively. These results indicate that even puree-minced fig component which may be the most probable substitute for *dried fig* has complementary structure and variations in price of puree-minced fig cannot affect *dried fig* quantity demand in considerable magnitudes.

Table 7.1: *Elasticities*

e	**2000 prices**	**mean**
processed		
DDFN - PDF	-0.5942	-0.835
DBFN - PBF	-13.6239	-6.6445
DBFN - PDF	-23.5095	-12.2699
DDFN - PPM	-0.5084	-0.8025
DBFN - PPM	-15.6494	-9.0579
raw		
QGDFN - PGD	-0.6183	-0.4427
QGBFN - PGB	-30.581	-8.4889

As opposed to *dried fig*, the own-price elasticity of bruised fig[27] computed at year 2000 and mean values is equal to -13.6239 and -6.6445 respectively. At producer-level these values are equal to -30.581 and -8.4889 at year 2000 and mean values. Since bruised fig has not a direct consumption channel and it is usually utilized in alcohol industry, foreign demanders are very sensitive to price variations. Like in two blocks of *dried fig* market, in two blocks of bruised fig market the

[27] This also means foriegn import demand elasticity of bruised fig.

demand structure of one side is also highly reflected in other side and producers experience more elastic demand. The cross-price elasticity of bruised fig with respect to *dried fig* price at year 2000 and mean values is equal to -23.5095 and -12.2699 respectively. Besides the cross-price elasticity of bruised fig with respect to puree-minced price computed at year 2000 and mean values is equal to -15.6494 and -9.0579. The higher effect of *dried fig* price on bruised fig demand may be attributed to reference price structure of *dried fig* in price adjustments of fig products. In fig products market, *dried fig* price is formed first and later other product prices adjust according to *dried fig* price. As the results of cross-price elasticities of our model support this reality, the price adjustments of fig products happen in the same direction. To sum up, all these findings support the presence of complementary structure in fig products market.

CHAPTER 8

CONCLUSIONS AND COMMENTS

In this dissertation we analyzed the extent of relationship between production, processing and marketing structures of fig products in Turkey. At first sight, although this study seems to consist of basic information peculiar to Turkey, the findings may be very beneficial also for all interest groups outside Turkey. This is due to the fact that Turkey is the leader country in world fig products market and any fundamental peculiar to Turkey is also valid for world market. It is therefore that in Chapter 2 we focused on world production and trade patterns in detail with putting more emphasis on Turkey since it has the largest export share in the world market. In the following chapter, Turkish fig products market is divided into two simultaneous system as Processed Product Block (Model A) and Raw Product Block (Model B). Later the structure of data used in the study is outlined and in the light of data limitations and structural deficiencies, specifications are redefined in Chapters 4 and 5 respectively. Finally by using Ordinary Least Squares estimation method an econometric analysis is applied to compute elasticity values of fig products in Chapter 6. The data set used in this econometric analysis covers the period 1971-2003. In the light of the estimation results given in Chapter 6, we conclude that most of the coefficients are statistically significant and the coefficient signs are consistent with both theoretical and practical expectations. It should be noted that as far as coefficient of determination values of equations are concerned, one may conclude that estimation results of Aegean Demand Model leaves some amount of price and quantity variation unexplained. However those low coefficient of determination values may be attributed to small sample size problem and specification errors in the model.

Regarding elasticity values computed at both year 2000 and mean quantities and prices we can conclude that the demand facing Aegean *dried fig* processors is inelastic. Similarly, at producer-level, the demand facing Aegean *dried fig* producers is also inelastic. On the other hand the price response of bruised fig demand equation shows highly elastic structure so does producer-level demand equation. Besides cross price elasticity of bruised fig demand equation indicates presence of complementary and elastic structure in both *dried fig* – bruised fig and minced-puree – bruised fig products. Regarding the cross price elasticity in *dried fig* equation we again observe a complementary but this time inelastic structure in *dried fig* – minced-puree products.

This study provides a detailed examination of export channel of Turkish dried fig products and raw dried fig product channel. This study also finds evidence of insufficiency of Aegean Demand Model in fully explaining domestic consumption, fresh fig and other raw dried fig products. This finding cannot be regarded as fully surprising and is attributed to following factors. Firstly, a considerable part of Turkish economy is defined as unregistered. This directly results in distortions of domestic final and raw products prices. Even in registered part of the economy, due to having large scale indirect tax structure in Turkey, the registered price and quantity values are distorted. Hence data problem emerges and this creates unexplained price and quantity variations in econometric analysis. Secondly, in addition to registered-unregistered structures of foreign and domestic markets, insufficient controls of farm and non-farm production and processing activities in domestic market creates a second diversion between these two markets. In case of data problem, using of foreign values as an indicator in domestic market evaluations, under the assumption of perfect competition structure, may necessitate new calculations the extent of which are not certain. As a result creating new data at farm and processor level may cause subjective calculations and results. Thirdly, as explained in previous sections, fig tree and its fruit are very sensitive biological plants. Any unexpected weather conditions may result in quality deterioration which later creates alteration in demand relationships of fig products. Hence this econometric analysis may not be capable of describing these kinds of sensitive factors. Lastly, in addition to these basic factors, unexplained price and quantity variations can also be resulted from any activities such as alterations in views of political authority on agriculture sector, alterations in consumer habits, technological improvements in the sector and level of optimism or pessimism of processors and producers.

Although Aegean Demand Model contains unexplained parts and structural deficiencies, nearly all basic information about the demand structure for Turkish fig products are given in this study. Considering the fact that this study is the first on fig market of Turkey we believe that the detailed analysis of fig market presented here and computed elasticities may be useful for all interest groups. It is important to note that firm level voluntary export quotas (so as to prevent new entrance to the export market) have been imposed on Turkish dried fig processors showing presence of policy shifts in this market. Moreover, Turkey started the accession negotiations with European Union. Fig products market is one of the important sectors in which Turkey may have an impact on accession negotiations in agriculture. Our findings provide useful information that can be helpful in these negotiations and in forming of new policies.

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APPENDICES

APPENDIX A

PROCESSING COSTS of FIRMS LOCATED in IZMIR-AYDIN REGION

Table A.1

F.O.B. Costs of *Dried Fig* (lerida 10kg box) in 1992/93 season	
Cost Items	Cost Levels (TL/kg)
Commission	75
Local transportation (labor)	50
Medication	15
Labor (in processing)	1,800
Water	20
Electricity	25
Painting	25
Fuel oil	30
Box	300
Box nailing	60
Strand	55
Nail	25
Paper	70
Transportation of labors	150
Renting	100
Transportation to harbor	25
Loading in Harbor	25
Duty commission	20
Bill of lading	10
Union registration	15
Laboratory costs	30
Agriculture controls	20
Finance of V.A.T. for 3 months	30
Mail costs	50
Stationary	50
Travel costs	30
Salaries of employees	140
Interest costs for 2 months (5%)	1,100
Bank commission (5%)	60
Depreciation	50
Insurance	10
Others	670
Total:	5,135 TL/ kg

Source: *Aegean Exporters' Associations*

APPENDIX B

TARIS's SHARE in DRIED FIG EXPORT of TURKEY

Table B.1

Season	Taris Export/Total Export (%)	Taris Export Value/Total Export Value (%)
1993/94	5.12	4.78
1994/95	5.08	4.78
1995/96	5.53	5.4
1996/97	3.69	3.99
1997/98	3.21	4.03
1998/99	4.35	4.99

APPENDIX C

DEFLATED EXPORT QUANTITIES of FIG PRODUCTS of TURKEY

Table C.1

season	*DDFN*	*DMPN*	*DBFN*
1971/72	0.5362	0.0403	0.1390
1972/73	0.5754	0.0646	0.2139
1973/74	0.4911	0.0513	0.0764
1974/75	0.5303	0.0369	0.0685
1975/76	0.4503	0.0301	0.0881
1976/77	0.5118	0.0623	0.1234
1977/78	0.4477	0.0468	0.0744
1978/79	0.5884	0.0614	0.1410
1979/80	0.5974	0.0438	0.0648
1980/81	0.5361	0.0503	0.0731
1981/82	0.6911	0.0462	0.0548
1982/83	0.6040	0.0489	0.6918
1983/84	0.5904	0.0515	0.1796
1984/85	0.6685	0.0456	0.0486
1985/86	0.6955	0.0416	0.0862
1986/87	0.6993	0.0515	0.0693
1987/88	0.6057	0.0509	0.0626
1988/89	0.6823	0.0482	0.0559
1989/90	0.5431	0.0554	0.0442
1990/91	0.5255	0.0443	0.0576
1991/92	0.5401	0.0699	0.0545
1992/93	0.4412	0.0584	0.0339
1993/94	0.5286	0.0810	0.0346
1994/95	0.6000	0.0864	0.0430
1995/96	0.6198	0.0585	0.0433
1996/97	0.6187	0.0429	0.0525
1997/98	0.5844	0.0426	0.0472
1998/99	0.6457	0.0413	0.0316
1999/00	0.6747	0.0511	0.0321
2000/01	0.6474	0.0654	0.0352
2001/02	0.5903	0.0601	0.0203
2002/03	0.6360	0.0708	0.0172
2003/04	0.6185	0.0286	0.0074

APPENDIX D

DEFLATED EXPORT PRICES of FIG PRODUCTS of TURKEY

Table D.1

season	*PDF*	*PPM*	*PBF*
1971/72	1.2263	0.4459	0.2267
1972/73	1.4025	0.7283	0.2912
1973/74	2.4121	1.3596	0.5534
1974/75	2.7820	1.3600	0.5623
1975/76	2.6330	1.2182	0.4275
1976/77	2.7075	1.4292	0.4053
1977/78	2.6822	1.5373	0.4070
1978/79	2.7082	1.4176	0.2905
1979/80	3.3979	1.8938	0.7359
1980/81	2.9976	1.0988	0.4064
1981/82	2.0873	0.8618	0.3225
1982/83	1.8562	0.6781	0.1243
1983/84	1.3763	0.5431	0.1141
1984/85	1.5435	0.6571	0.3969
1985/86	1.4363	0.6496	0.2682
1986/87	1.3628	0.6141	0.2126
1987/88	1.6494	0.7853	0.3348
1988/89	1.7652	0.7238	0.2860
1989/90	2.2105	1.1322	0.3001
1990/91	2.7615	1.3247	0.3993
1991/92	2.7314	1.2532	0.3907
1992/93	3.0235	1.3010	0.3723
1993/94	2.3350	1.1320	0.3711
1994/95	2.0890	0.4780	0.3905
1995/96	2.3220	1.2228	0.4772
1996/97	2.2008	1.2094	0.4667
1997/98	1.9510	0.9604	0.3229
1998/99	2.0733	1.1411	0.4602
1999/00	1.8057	0.9580	0.3857
2000/01	1.6884	0.7146	0.3216
2001/02	1.7354	0.8385	0.3167
2002/03	2.0381	0.9836	0.6723
2003/04	1.7858	0.9987	0.7499

APPENDIX E

DEFLATED PROCESSING COSTS of FIG PRODUCTS

Table E.1

season	*CPD*	*CPMP*	*CPB*
1971/72	0.2657	0.2689	0.1047
1972/73	0.2380	0.2600	0.1517
1973/74	0.4399	0.3410	0.2386
1974/75	0.4561	0.4775	0.2197
1975/76	0.3800	0.4532	0.1646
1976/77	0.3923	0.4503	0.1516
1977/78	0.4902	0.5748	0.1373
1978/79	0.4283	0.5232	0.1077
1979/80	0.4588	0.4848	0.1412
1980/81	0.4898	0.5142	0.1426
1981/82	0.4697	0.4776	0.1198
1982/83	0.5098	0.4919	0.0720
1983/84	0.5192	0.5012	0.0632
1984/85	0.5923	0.6494	0.1433
1985/86	0.4831	0.6381	0.1449
1986/87	0.5009	0.5951	0.1674
1987/88	0.5313	0.5978	0.1818
1988/89	0.6284	0.6680	0.2029
1989/90	0.6192	0.7163	0.1842
1990/91	0.6404	0.7446	0.1541
1991/92	0.6914	0.7928	0.1645
1992/93	0.8386	0.8911	0.1502
1993/94	0.6487	0.7380	0.1506
1994/95	0.8426	0.2967	0.2295
1995/96	0.7374	0.8752	0.2205
1996/97	0.6739	0.8340	0.2025
1997/98	0.6895	0.7457	0.1669
1998/99	0.6465	0.7255	0.1699
1999/00	0.6149	0.6568	0.1615
2000/01	0.5746	0.5179	0.1300
2001/02	0.9076	0.9435	0.2139
2002/03	0.6913	0.7156	0.2035
2003/04	0.4311	0.4779	0.1339

APPENDIX F

DEFLATED RAW PRODUCT PRICES of FIG PRODUCTS

Table F.1

season	*PGD*	*PGMP*	*PGB*	PGF
1971/72	0.2065	0.0984	0.0715	0.5366
1972/73	0.2550	0.0964	0.0806	0.4074
1973/74	0.3405	0.1190	0.0768	0.1491
1974/75	0.4371	0.1330	0.1257	0.3327
1975/76	0.5734	0.1546	0.1526	0.2860
1976/77	1.0339	0.2256	0.1460	0.2522
1977/78	1.1489	0.2003	0.1398	0.2140
1978/79	1.0431	0.1652	0.0948	0.1881
1979/80	0.9733	0.1990	0.1735	0.1166
1980/81	0.6135	0.1589	0.1617	0.1426
1981/82	0.6255	0.1454	0.1198	0.1492
1982/83	0.5318	0.0962	0.0628	0.1770
1983/84	0.5245	0.0929	0.0612	0.2370
1984/85	0.4521	0.0955	0.1238	0.2602
1985/86	0.3971	0.0668	0.0757	0.2046
1986/87	0.3933	0.0769	0.0810	0.2818
1987/88	0.6786	0.1224	0.1273	0.2829
1988/89	0.8034	0.1219	0.1502	0.2896
1989/90	0.8740	0.1212	0.1259	0.2674
1990/91	1.0126	0.1556	0.1865	0.2892
1991/92	1.4818	0.2346	0.2040	0.3443
1992/93	1.5964	0.2010	0.1975	0.2876
1993/94	1.5132	0.1982	0.1980	0.3215
1994/95	1.7927	0.1366	0.1944	0.3521
1995/96	1.8554	0.2962	0.3309	0.3435
1996/97	1.6382	0.2891	0.2976	0.3493
1997/98	1.4642	0.1885	0.1595	0.4046
1998/99	1.2153	0.2059	0.2365	0.3094
1999/00	1.1722	0.2026	0.1745	0.2665
2000/01	1.0555	0.1478	0.1566	0.2416
2001/02	1.2181	0.2360	0.2198	0.3682
2002/03	1.3879	0.2879	0.3238	0.2159
2003/04	0.7394	0.1842	0.2178	0.2254

APPENDIX G

DEFLATED RAW PRODUCT QUANTITIES of FIG PRODUCTS

Table G.1

season	*QGFFN*	*QGDFN*	*QGMPN*	*QGBFN*
1971/72	0.0002	0.9048	0.1458	0.1087
1972/73	0.0002	0.9625	0.2321	0.1658
1973/74	0.0002	0.8125	0.1826	0.0586
1974/75	0.0003	0.8407	0.1264	0.0503
1975/76	0.0003	0.8098	0.1167	0.0732
1976/77	0.0004	0.8583	0.2266	0.0957
1977/78	0.0004	0.7502	0.1708	0.0576
1978/79	0.0005	0.8267	0.1895	0.0918
1979/80	0.0007	0.8918	0.1442	0.0447
1980/81	0.0024	0.8450	0.1753	0.0532
1981/82	0.0073	0.9980	0.1484	0.0366
1982/83	0.0152	0.7630	0.1388	0.4056
1983/84	0.0228	0.7989	0.1570	0.1126
1984/85	0.0169	0.8125	0.1257	0.0275
1985/86	0.0090	0.8613	0.1175	0.0497
1986/87	0.0156	0.8640	0.1457	0.0399
1987/88	0.0185	0.7114	0.1375	0.0343
1988/89	0.0261	0.7868	0.1281	0.0301
1989/90	0.0234	0.6568	0.1503	0.0250
1990/91	0.0223	0.6211	0.1171	0.0318
1991/92	0.0230	0.6152	0.1741	0.0290
1992/93	0.0289	0.5305	0.1480	0.0191
1993/94	0.0318	0.5308	0.1813	0.0163
1994/95	0.0304	0.5859	0.1849	0.0198
1995/96	0.0325	0.6443	0.1257	0.0212
1996/97	0.0335	0.6445	0.0950	0.0258
1997/98	0.0318	0.5835	0.0886	0.0223
1998/99	0.0293	0.6184	0.0776	0.0143
1999/00	0.0370	0.6356	0.1026	0.0143
2000/01	0.0362	0.5847	0.1308	0.0150
2001/02	0.0370	0.5428	0.1151	0.0088
2002/03	0.0404	0.5695	0.1364	0.0073
2003/04	0.0512	0.5593	0.0514	0.0032

APPENDIX H

ELASTICITY CALCULATIONS

(1*) $PDF=3.9723-4.3887(DDFN)-2.0157(DBFN)+0.213(T)-1.5399(C)-0.00454(T^2)$

Flexibility = % Δ PDF / % Δ DDFN = (ΔPDF/PDF) / (ΔDDFN/DDFN) = (DDFN/PDF) * ΔPDF/ΔDDFN

* From Appendix D, at 2000 values DDFN= 0.6474
From Appendix E, at 2000 values PDF = 1.6884
From Equation 1 above, ΔPDF/ΔDDFN = -4.3887
So Flexibility = (0.6474/1.6884) * -4.3887 =-1.6828
Price elasticity = 1/flexibility = 1/-1.6828 = -0.5942 (point elasticity)

* Mean value of DDFN = 0.5853
Mean value of PDF = 2.1448
So Flexibility = (0.5853/2.1448) * -4.3887 = -1.1976
Price elasticity = 1/flexibility = 1/-1.1976 = -0.835

Same steps are used in calculations of other elasticities.