THE IMPORTANCE AND POSITION OF THE FLAT GLASS SECTOR WITHIN THE GLASS INDUSTRY OF TURKEY BETWEEN 1977-1984

by

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FOREWORD

The stabilization measures of January 24, 1980 have affected various sectors of the economy positively or negatively. The effects that were observable after the initial applications of these measures created such results that they are negotiable. In other words, the success attained in the export markets created some costs in Turkish domestic market. These costs differ from industry to industry and from product to product.

This study attempts to clarify the effects of stabilization measures in the flat glass industry within the glass industry of Turkey. It has been divided into four main parts. The first part is an introduction. The second part makes seperate analysis of domestic and export markets. The third part combines the items seperately discussed in the second part. The fourth and last part gives the conclusion.

In Part I, glass industry is introduced for both World and Turkish markets between 1977-1984 interval. The structure of Turkish glass industry besides the production and consumption aspects are also mentioned within Chapter II. After analyzing the World and Turkish glass industries, flat glass industry -as a subsector of glass industry - is introduced in Chapter III. Flat glass kinds and utilization fields are explained in the same chapter. The last chapter of the first part is devoted for the flat glass production technologies and the main economic impacts of flat glass production technologies versus float glass production technologies. Flat glass -having relations with automotive, construction and greenhouse sectors of the economy- is considered only within the framework of window glasses, in this study. This restriction is due to the fact that among the sectors which use flat glass as an input in their production stages, construction sector has the vital importance. Thus, window glass -as a kind of flat glass- has been deliberately chosen to serve for the purpose of analyzing the economic and social importance of construction sector. We have also tried to restrict our analysis with only residence constructions as the highest share in

the construction sector belongs to residence constructions. The results of the performances in residence constructions are evaluated before and after 1980. The last chapter of the first part is devoted for the flat (sheet) glass production technologies versus float glass production technologies.

In Part II, World and Turkish flat glass industries are dealt with. Detailed analysis of flat glass domestic and export sales are made for Turkey. The importance of construction sector is also considered in relation with domestic flat glass sales.Individual performance of each flat glass factory in Turkey is also evaluated. In export sales analysis, importing countries are categorized according to price, quantity and revenue aspects.

In Part III, domestic and export markets are combined and compared both with respect to each other and with respect to pre-1980, post-1980 periods. The results of these comparisons are given such that they are based on statistical tools such as regression and correlation analysis. The details of these statistical results take place in the "Statistical Appendix" part.

In Part IV, conclusions are given to summarize the points that are discussed in the preceding parts.

ABSTRACT

The steering role of industries are very important in developing countries. Determining functions of especially some industries have vital places in these economies. Among them, construction industry has a very considerable share. Effecting many other industries and employment opportunities is what construction industry causes.

One of the industries which construction industry affects is glass industry. Of course glass industry -when considered as a whole- can not be completely related with the construction industry. As in every kind of industry, glass industry has subsectors. Flat (sheet) glass subsector of glass industry is therefore the sector which has the closest ties with the construction industry.

In this study, the importance and position of flat glass industry as a subsector of the whole glass industry is examined for Turkey. The mostly emphasized point here is the changes observed in this sector before and after the application of the economic stabilization policies in 1980. The results do not show radical but somewhat considerable changes in the post-1980 period. Especially the effects of outward-looking policies are explicitly observable from the number of countries that Turkey directed her exports and where the geographical places of these countries are. The costs of the outward-looking policies are, on the other hand, supported by the domestic market policies as the comparison between export and domestic market performances show.

ÖZET

Gelişmekte olan ülkelerde endüstrilerin yönlendirici rolleri çok önemlidir. Bu ekonomilerde, özellikle bazı endüstrilerin belirleyici fonksiyonlarının çok hayati yerleri vardır. Söz konusu endüstriler arasında inşaat kesiminin dikkate değer bir payı vardır. Pek çok başka sanayi kolunu etkilemek ve istihdam olanaklarını belirlemek, inşaat sanayiinin sebep olduğu konular arasındadır.

İnşaat sanayiinin etkilediği sanayi dallarından biri de cam sanayiidir. Şüphesiz cam sanayii bir bütün olarak ele alındığında inşaat sanayii ile tam bir ilişkilendirme sözkonusu olamaz. Her sanayi dalında olduğu gibi cam sanayiinde de alt sektörler vardır. Bu açıdan bakıldığında, düzcam alt sektörü, cam sanayiinin inşaat sanayii ile en yakın bağlarının olduğu faaliyet dalı olarak görülebilir.

Bu çalışmada, cam sanayiinin bir alt sektörü olarak düzcam sanayiinin Türkiye için yeri ve önemi incelenmiştir. Burada, 1980 yılında uygulanmaya başlanan ekonomik istikrar politikalarının öncesi ve sonrasında gözlemlenen değişiklikler, özellikle vurgulanmıştır. 1980 sonrasında önemli ama radikal olmayan değişiklikler olduğu sonucu ortaya çıkmıştır. Özellikle dışa açık politikaların etkisi, Türkiye'nin ihracatını yönelttiği ülke sayısına ve bu ülkelerin coğrafi dağılımlarına bakılarak açıklıkla gözlemlenebilir. Dışa açık politikaların ortaya çıkarttığı maliyetler ise, ihracat ve iç piyasa karşılaştırmalarının gösterdiği gibi, iç piyasa politikalarıyla desteklenmeye çalışılmıştır.

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PART I

CHAPTER I

INTRODUCTION

1.1 INTRODUCTION TO THE PHENOMENON

Before studying flat glass industry, the difference between natural and artificial glass has to be given. It is known that natural glass -named obsidian- was used by primitive people B.C. but it lost all its commercial importance completely after the production and spread of artificial glass.

Although there is no concrete scientific indicator about when, where and how artificial glass was first produced, today, it is almost sure that glass was first produced in one of the Middle-Eastern countries. It is deducted by some historians that Egypt is the first country where artificial glass production had been realized in 18th century. Towards the mid of 19th century, we see the use of artificial glass in Mesopotamia and in Anatolian, Greek, Chineese, English, German, French, Italian, Islamic, Seljuk and Ottoman cultures, being subject to different proficiencies.

Glass production, which became a technology in 19th century, showed a considerably rapid improvement after the First World War. As a result of the regular research that has been put into practice in the last 50-60 years, today's results have been obtained and various kinds of glass products serve for the people's needs now.

Glass, which is produced by various methods and used for lots of different

purposes in different sectors of economies, requires special investments to be used as a consumption good. The industry where glass is produced -namely, glass industry- is one of the sub-branches of manufacturing industry. That is to say, glass industry is considered and evaluated with respect to the other industries within manufacturing industries of economies.

Although glass industry as a whole is one of the important sub-sectors of the manufacturing industry in Turkey, we want to analyze glass industry not as a whole but with only flat glass industry. In the flat glass industry, our special reference point is "window glass". The reason why we want to analyze only flat glass (window glass) industry is because of its relation with one of the most important sectors of the economy; the construction sector.

As the population increase and the supply of residences are in continous disequilibrium in Turkey, we want to show the realities about production and consumption of flat glass, explicitly. Within this perspective, it seems necessary to mention about the export market for Turkish flat glass as well as the domestic flat glass market with respect to the construction-housing sectors of the economy.

Since the number of houses supplied do not satisfy the existing demand for residences, "**shelter**" becomes a real problem for the population in an environment where continous price increases are observable in flat rents. Besides the high annual inflation rates (40-50% annually), 20% of which is structurally a **given** for the Turkish economy, above indicated problems of the construction and housing sectors create additional negative aspects.

1.2 PURPOSE AND SCOPE OF THE STUDY

The purpose of this study is to show the importance and position of flat glass industry as a sub-sector of the glass industry in Turkey. The position of the glass industry and the glass consumption indicators of some other economies are put into the content of the study to be

able to compare their glass industries with the Turkish glass industry.

The time period of this analysis is chosen deliberately to begin with 1977 and end with 1984. There are two time periods of equal length in the study. That is to say, the implications that figures tell us after the beginning of the **stabilization policies in January 24,1980** are compared with the figures before this date. To be consistent, the four years after 1980, i.e.: 1981-1984, and the four years including 1980, i.e.: 1977-1980, are chosen. Beginning with 1981, the results of these policies were observable. Thus, the effects of the stabilization policies are comparable with the period before they were applied. Of course, it would be healthier to draw conclusions if we had longer periods both before and after the application date of the stabilization policies.

The analysis in this study mainly tries to explain the performance in window glass as a kind of flat glass. The other flat glass kinds and processed flat glass kinds are not considered thinking that housing and construction sectors of the economy are very much related with the window glass. These related sectors are also analyzed in the study, to some extent.

On the other hand, the export market for the Turkish flat glass industry is analyzed in a seperate section giving emphasis to the window glass destination countries. There, the export prices are evaluated giving emphasis to the geographical settlement of the importing countries.

The final analysis of the study is devoted for making comparisons between the performances in domestic and export markets for the window glass. The advantages and disadvantages experienced within the country and abroad are mentioned.

Finally, the conclusions of all the analysis are given with special reference to the pre-1980 and post-1980 periods.

In this study, one very important aspect, namely, "the costs" are not mentioned. There are a few reasons behind this attitude. The first reason is that, we have tried to observe the application of outward-looking policies after January-1980. Therefore, the destinations and export quantities are very important as compared to the pre-1980 period. On the other hand, prices are also important both in terms of comparing domestic market performance with export market

performance and in analyzing these markets individually. But, due to the inavailability of reliable cost data, we have decided not to use the cost figures. Instead of using unhealthy and unreliable cost data, it is better to make a few assumptions about costs. Our assumptions about costs are, first; costs have increased as much as inflation. Therefore, as we have used constant 1977 prices, costs of 1977 are valid all through the analysis. Second, domestic and export costs differ only as much as the burden created by packaging and transportation costs of export sales. Thus, we have decided to make the assumption that export sales costs are 20% higher than domestic sales costs (in domestic flat glass sales, products are transported without any packaging and of course, the distances to be covered are relatively shorter than the distances to be covered for export market). The export sales packaging cost is mainly determined by the wood to be consumed. Wood for packaging purposes is very expensive and thus the labour cost added to the wood cost creates a considerable effect.

Thus, we have assumed export sales costs to be 20% higher than domestic sales costs although we have not put any cost figure into our analysis.

CHAPTER II

INTRODUCTION TO GLASS INDUSTRY BETWEEN 1977-1984

2.1 WORLD GLASS INDUSTRY

Below, per capita glass consumption figures of West European countries with respect to Turkey are shown for the following analysis:

TABLE 2.1 Glass Consumption in the World (kg/capita)

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
1.W.Germany	60.6	66.7	62.6	68.9	70.9	76.5	70.7	60.9	69.8	68.0
2.Belgium	63.1	68.6	77.3	59.7	65.5	70.4	52.8	53.5	na	na
3.France	59.6	66.0	70.5	68.7	71.3	76.0	70.8	71.5	75.9	75.7
4.England	48.2	50.1	54.2	55.9	58.3	52.8	na	na	na	na
5.Italy	33.8	37.4	38.9	38.6	47.8	51.1	46.0	43.3	47.4	50.0
6.Austria	31.8	35.8	44.7	41.5	38.0	50.2	53.6	45.4	46.8	na
7.Greece	13.0	16.7	16.8	20.0	18.2	17.7	19.8	22.1	22.1	16.3
8.Turkey	6.4	6.8	7.6	8.2	8.0	5.7	8.6	7.5	7.0	7.4

na: Not available

After the economic recession, caused by the energy crisis, had adversely affected the industrialized countries, glass industry was one of the industries which showed a tendency to resume its normal state, parallel to the revival in general economic conjuncture. Per capita glass

consumption showed a considerable increase in West European countries.

For manual labour occupies an increasing share in costs, mass production methods had to be accelerated in the glass industry beginning with 1977. For example, there is a tendency in some countries to cease the manual production of crystal and glassware. On the other hand, in flat glass production, factories based on manual production are being closed to establish new plants enabling usage of modern techniques and mass production. Although the production of industrial containers was decreasing parallel to the general conjuncture, there became an important increase in demand for glass fiber, its derivatives and optical glass in 1977.

As can be observed from the above given glass consumption per capita figures, the countries which consumed glass most were W.Germany, Belgium and France, with changing orderings from first to third between 1975-1984.

Beginning with 1978, developed countries continued to replace vertical methods by the float process in flat glass production. Use of solar energy in the modern architectural understanding and internal lighting resulted in excessive consumption of glass as a building construction element and an increase in the production of solar control glass was realized.

An increase in the demand for flat glass was observed in the developing countries as a result of the acceleration in the construction industry, and there were demands for new plants with relatively low capacities.

In the container glass field, existing methods without essentially changing the production methods were improved and importance was given especially to automation in quality control. Glass containers regained importance for the packaging of beer and beverages instead of metal cans and plastic containers which had in the recent years gained advantage over glass containers.

New developments were realized in the production techniques of glass fiber, optical glass, and special glasses such as laser glass were introduced to fulfill the requirements of the improving technology.

Parallel to the developments in production, importance was given to energy saving in the entire production phases and methods.

The eastern-block countries gave importance to glass technology and glass production, and expanded efforts to increase their commercial relations with the western industrial countries. The increase in exports from eastern countries to western industrial countries reached to significant levels. However, it is a rather difficult task to establish a relation between the quantities and values of exported products, originating from the eastern block.

The emergence of a few big producers operating in all the major branches of the glass industry had been underlying the trend in the international scene for years. This trend was observed to accelerate at a faster pace during 1979. The takeover bid of the Pilkington Group of England to BSN Gervais Danone of France, covering the latter's float operations, was a new development within this framework.

The sluggish economic conjuncture in 1980 resulted in a lower volume of glass production worldwide, as compared with 1979. Cost reduction was the main objective of world glass producers during the year. On the other hand, parallel to the developments in the field of electronics, research and development efforts were channelled towards introducing new applications of glass in telecommunications and microelectronics via optical fibers.

European glass industry's market sharing arrangements of the last few years reached a new equilibrium in 1981. While some of the groups were specializing in certain segments of the industry, others preferred a complete withdrawal. The sluggish economic circumstances in almost all the European economies and the consequent fierce competition, resulted in lower profitability, lay-offs and companies changing hands.

The glass industry, in order to survive, had already turned to various measures. At the top of these come cost minimizing and productivity increasing applications, not to mention saving of energy. Within this framework, new growth areas such as optical fibres, production and usage of which is already spreading rapidly, are being emphasized. Middle-Eastern countries have

further increased the size of their markets, and their share in the world glass trade. It is worthwhile to note that these countries, in accordance with their policy of import substitution, have persistently increased their efforts in 1981 to establish their national glass industries.

In the European glass industry, market sharing arrangements and specialization endeavours of the last three years, which was first observed mainly in 1981, were given more emphasis especially in the first half of 1982. Some groups attempted to secure their profits by shifting their efforts to the areas other than glass.

The economic crisis continued in 1982 and affected all industries infavourably, and consequently, stagnation in the glass industry persisted in 1982. However, glass products carried on the measures of the latest years in order to survive and to take advantage from the fiercely competitive environment. In this context, cost minimizing and productivity increasing policies were eagerly pursued as well as the attempts to create new demand through product diversification. Middle Eastern countries remained as net importers of glass products and they intensified their relationships with the developed countries in order to improve their existing glass industries and to establish new ones.

Glass industry was among those that were most affected by the economic recession in the world. Stagnation was observed in the glass industries of the European countries and demand continued to fall in the U.S.A. and Japan in 1983. Large glass manufacturers accelerated efforts in modernization, research and development. The fact that the German glass industry founded a research center and that the leading groups in the glass industry established cooperation with scientific research centers, is an indicator of the importance given to the above mentioned efforts. Some large companies even diversified fields of operation in order to minimize risks.

In the Western countries, although there was not a considerable growth in the construction sector yet, demand for multilayer glass used for isolation purposes had increased the sales of flat glass in 1984. Along with this, growing sales in the automotive industry had also

affected the flat glass sales positively. Work for collecting cullet[1] had been continued intensively and considerable decreases in the production costs had been realized.

In 1984, western glass producers played an important role in realizing a large number of projects in developing countries while going on with programs to find new production areas in their own markets. Thus, research for the use of glass in the sectors of high technology like electronics, medicine, chemistry, communications and optics was continued.

These were the facts about the world glass industry before and after 1980. On the other hand, the state of Turkish glass industry between 1977-1984 is analyzed in the following section.

2.2 TURKISH GLASS INDUSTRY

2.2.1 Structure of Turkish Glass Industry

Most of the glass production in Turkey is realized by the company named Türkiye Şişe ve Cam Fabrikaları A.Ş. (Turkish Glassworks Industry Incorporation) which is established by 93% share of Türkiye İş Bankası. In the five year plans, the idea is that glass sector investments are to be made by the private domestic capital. Although there is no public enterprise in this sector, there are small and medium size plants which take part in the production process, other than T. Şişe ve Cam Fabrikaları A.Ş. These relatively small plants mostly operate in glassware, bottle, safety and insulating glass productions. Anadolu Glass Ind. Inc., which was realizing flat glass and bottle production at a considerable level individually, had to take part within T. Şişe ve Cam FabrikalarıA.Ş. due to the domestic market conditions. As in all parts of the world, Turkish glass

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1 Cullet: Waste or broken glass, usually suitable as an addition to raw batch.

industry is integrated horizontally, at a considerable extent.

Vertical integration is also high in the sector, again due to the operations which are tied to T. Şişe ve Cam Fabrikaları A.Ş. A machinery and mould factory produces moulds necessary for bottles, containers and glassware. Also, the spare part and some special machinery requirements of the production plants are satisfied.

In the mining operations, all the main raw materials other than soda ash are produced and prepared for glass production. These raw materials are sand, limestone, dolomite, feldspar, clay, kaolin, barite, colemanite, fluoride, slate, gypsum, quartz, quartzite and calcite.

The Soda Company which makes production since 1975, facilitated glass production especially when there was foreign exchange bottleneck and important raw materials in various sectors were to be imported. On the other hand, due to the domestic soda ash production, soda ash imports declined by $6 million.

Glass production of Turkey started with the main fields of glass, i.e. bottle, glassware and flat glass. This starting point then continued with glass fiber, insulating glass, safety glass and technical glass. The population and thus the domestic demand in Turkey played a motivating role in product diversification as well as the increase in quantities produced. It is impossible in countries, where there is not enough population, to establish glass industry which requires high production concentrations. Therefore, although per capita glass consumption is relatively low in Turkey, the large population of the country is a guarantee for the development of the sector.

2.2.2 Production in Turkey

In the glass industry, which contains various kinds of products, there are two kinds

of raw material sources; one being the cullet and the other being the glass batch[1].

Cullet is used in the production of glassware and bottles, and glass batch is used in plants with high production capacities and in automated factories.

Glass batch contains;

-Raw materials which give colorless oxides (the most important one being the soda ash) and

-Secondary raw materials (decolourizers, colourants, materials which give opaqueness). The inputs that take place in the glass-batch and their compounds change according to the kind of product to be obtained.

The batch is melted in furnaces -with 1550^0C temperature- with some factory cullet. This melted batch is then put into the homogenization and bubble elimination stages. After these stages, according to the product to be obtained in the refiner (working chamber), which is the continuation of the melting-end, the temperature is reduced to 800-1100^0C, and shaped during the cooling process.

Year-by-year production increases in almost all kinds of glass products are observed in Turkey. In 1981 and 1982, production increased considerably as compared to 1980, in which various difficulties were experienced in production. In 1981 and 1982, production increased considerably after experiencing various production difficulties in 1980. In 1981 and 1982, production increased by 45.5% in double-glazing units, 18.8% in flat glass, 14% in wired and patterned glass, 12.6% in roving and glass fiber, 10.5% in glass containers. On the other hand, there was only 1% increase in household glassware production.

Optical glass is being imported and processed in Turkey. Other imported products are lead-glass pipes, glass pipes used for health and laboratory purposes. These imports do not constitute a large number, both in value and quantity terms. In 1982, glass product imports cost about $3 million (Ministry of Commerce, Computer Center figures).

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1 Glass Batch: The raw materials,properly proportioned and mixed, for delivery to the glass furnace.

2.2.3 Consumption in Turkey

Glass, which has a very widespread field of consumption, beside being consumed as household glassware and lightware directly, is consumed indirectly as flat glass, glass containers, safety glass and glass fiber through the demand in different sectors of the economy. Glass is in a complementary relation with construction, automotive and food industry products.

The per-capita glass consumption figures are considered as direct indicators of economic development, nowadays. In 1979, the per capita glass consumption was between 38 and 70.9 kg in West Europe whereas this figure was 18.2 kg in Greece and 8.0 kg in Turkey. Glass consumption being very much tied with construction and automotive sectors which are sensitive to conjunctural fluctuations, decreases in recession periods.

Although the domestic glass consumption in Turkey does not change very much from year to year and some importation is made to eliminate demand bottlenecks, it is generally determined by production. In other words, the years which show high increases in domestic consumption are the years that supply have increased due to the changes in production conditions and capacities.

The per capita glass consumption figures show that Turkey is quite behind the developed countries but is in a rapid rate of increase. The per capita consumption figure being 2.7 kg in 1965 have continuously increased until 1978 -excluding 1971- and reached 8.2 kg in 1978. 1978 marks an important stage in this development. Meeting the glass product requirements of the local market and contributing to national economy by increasing Turkey's foreign market shares, were the main targets of the Turkish glass industry. During the past years, these targets were met within capacity limitations. Expansion and new investment projects covering various products were initiated in order to meet higher targets in the future. The developments in the world were closely pursued and new methods in technology and product varieties were included in Turkey's investment and production programmes. Studies were accelerated for the establishment of a large research and

development center.

Turkish glass industry could continue its normal operations while other sectors of the economy were severely hit by the shortage of foreign exchange in 1979. This is mainly due to its relative independence from foreign supplies for production, except the fact that occasional shortages of fuel created some difficulties.

Glass industry of Turkey remained unaffected by the worldwide sluggish economic circumstances and foreign demand stood high for its glass products in 1980. However, strikes that brought almost the entire glass industry to a standstill for four months and energy, soda ash shortages during the initial months of the year, resulted in a substantial decrease in the volume of glass production. Along with aggrevating shortages in the domestic market, this also caused significant losses of potential exports, too.

As a result of work peace, which was sustained all through 1981 and the duties and responsibilities it bears, the glass industry in Turkey had a very successful year of operation. All the indicators, and especially the exporting performance, point to a year of major progress. Despite all the financial diffucilties, which were the outcomes of the tight monetary policy, investments were carried on without any delay. The float plant in Kirklareli was almost completed by the end of this year.

Favourable conditions regarding production in 1981 were instrumental in increasing the per capita consumption figure to 8.6 kg.

As a result of the economic improvements, glass industry investments were carried on in 1982, but the per capita consumption was relatively lower than that of 1981, i.e.: 7.5 kg.

Glass industry carried on with its development in the direction of growth, modernization and updating of its methods in a period when Turkish economy was, in general, restructuring itself in 1983 and 1984, and per capita consumptions were 7.0 kg, 7.4 kg. respectively.

Per capita glass consumption graph and the related data in Turkey between

1965-1984 are as follows:

TABLE 2.2 Per Capita Glass Consumption in Turkey (kg)

Years	Per capita Glass Consumption in Turkey (kg)
1965	2.7
1966	2.9
1967	3.6
1968	3.8
1969	4.5
1970	4.7
1971	3.9
1972	4.5
1973	6.1
1974	6.2
1975	6.4
1976	6.8
1977	7.6
1978	8.2
1979	8.0
1980	5.7
1981	8.6
1982	7.5
1983	7.0
1984	7.4

Source: Annual Reports of Turkish Glassworks Ind. Inc.

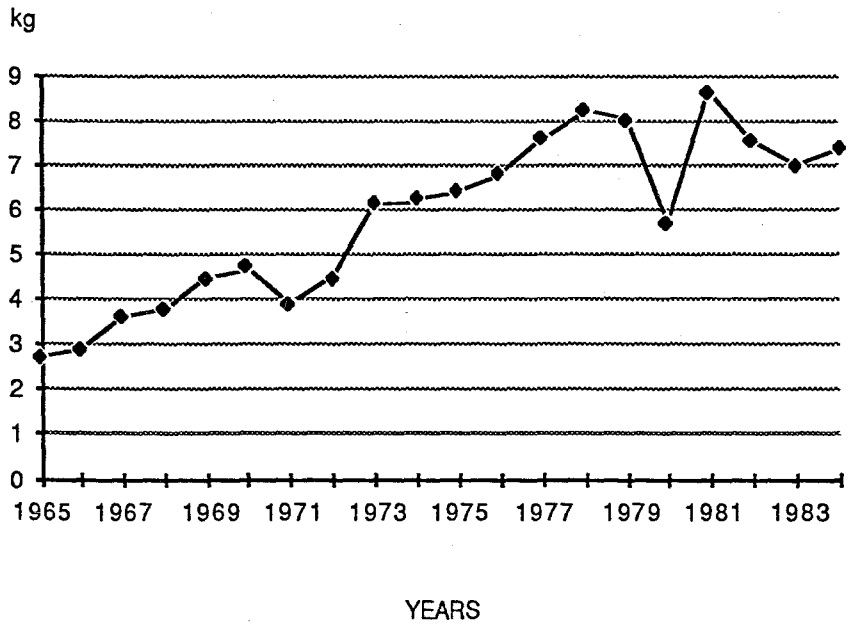

Figure 2.1 Per Capita Glass Consumption in Turkey

CHAPTER III

INTRODUCING FLAT GLASS INDUSTRY AS A SUBSECTOR OF THE GLASS INDUSTRY

3.1 GLASS INDUSTRY PRODUCTS CLASSIFIED

Glass industry products can be classified in seven groups, showing different features in terms of their fields of utilization [The Handbook of Glass Manufacture, Volume II, pp. 1169-1184]. These seven groups are; 1)Glassware, 2)Lightingware, 3)Glass Bottles and Containers, 4)Technical Glass, 5)Glass Fiber, 6)Optical Glass and 7)Flat Glass.

If we try to explain these groups, we can give the following information about them, in general:

3.1.1 Glassware

It is the group which represents all kinds of glass products used in form of cups to drink water, beverages, alcoholic drinks, glass plates, glass vases, ash trays, and decorative glassware made of soda lime and crystal, all of which are produced either by manual or automated methods.

3.1.2 Lightingware

It is the group which represents all kinds of glass products used for lighting purposes such as decorative lamps and television tubes.

3.1.3 Glass Bottles and Containers

In this group, the bottles and jars produced may be in different colours and in different volumes. The latest technologies now enable glass bottles to be lighter than before and thus, reduce transportation costs. On the other hand, by the help of a new technology, **sleeve bottles** are being produced recently. The weight of these bottles are lighter but have the sam capacities with the bottles that were heavier. Therefore, a **sleeve** is put over the glass bottle to protect it against outside pressure.

3.1.4 Technical Glass

The products which take place in this group are heat-resistant laboratory glass equipment, heat-resistant household glassware, glass tubes, glass rods, headlight lenses and glass beads.

3.1.5 Glass Fiber

Glass fibers have properties which allow them to contribute to the composite in

which they are incorporated, such as strength, stiffness, dimensional stability, heat resistance, desirable chemical and electrical properties. The kinds of glass fiber products are continuous strand mats and roving, polyester, glass tissue, bituminous water proofing membranes, blown bitumen, fiber glass reinforced plastic, and glass reinforced plastic finished products.

3.1.6 Optical Glass

These glasses are of high quality optical properties, used in the manufacture of optical systems. These kinds of glasses generally have **refractive** and **absorptive** properties. Refraction occurs as a result of the change in the velocity of light at the boundry between two glasses of different densities. Absorptive properties contain reflection and transmission properties, too.

3.1.7 Flat Glass

This term covers sheet glass, plate glass, float glass and various forms of rolled glass. Flat glass has different kinds such as window glass, figured glass and wired glass.

On the other hand, flat glass is used as an input for the production of "processed flat glass products". These are automobile safety glass, door glass, insulating glass, oven glass, bullet-resistant glass, tempered rear glass, mirror and enamelled glass.

3.2 DEFINITION AND UTILIZATION FIELDS OF FLAT GLASS KINDS

3.2.1 Sheet Glass (Window Glass)

As it is mentioned above, flat glass concept covers sheet glass, plate glass, float glass and various forms of rolled glass. Sheet Glass refers to clear flat transparent glass with fire finish, which is produced by the vertical drawing process and is commonly known in the trade as window glass. It is not mechanically ground and polished. It is drawn from molten glass. The thickness of these glasses are between 2-20mm.

Four sheet glass classifications -according to thickness and weights- are generally used by the industry [The Handbook of Glass Manufacture, Volume II, p.688]. The largest category, window glass, accounts for approximately 75% of sheet glass produced and consists largely of two thicknesses:

i)Single strength glass ranging from 1/2 to 1/10 inch (12.7 to 2.5 mm.) in thickness and varying in weight from 16 to 19 oz./sq.ft. (4.88 to 5.80 kg/m^2) and,

ii)Double strength glass ranging from 1/9 to 1/8 inch (2.8 to 3.2 mm.) in thickness and varying in weight from 24 to 26 oz./sq.ft. (7.32 to 7.93 kg/m^2).

These glasses are used in the glazing of windows and doors for residences, business buildings and apartment buildings, for skylights, conservatories, greenhouses and in the manufacture of laminated safety glass for automotive windows. The four quality designations (AA, A, B and Greenhouse) indicate the relative freedom per unit area from visual defects -seed, bubbles, ream and waviness [The Handbook of Glass Manufacture, Volume II, p.690]. The size of the sheet and the location orientation of defects can influence the quality grade. Glass less than 0.080 inch (0.20 mm.) is referred to as thin glass and is used for photographic equipment and picture glass in addition to speciality items such as watch crystals, lantern slides, microscope

slides, etc. Heavier glass includes all glass over 1/8 inch (0.32 mm.) thick and up to 3/8 inch (0.95 mm.) thick. It is used in automotive glazing, windows and furniture. The development of higher quality sheet glass has led to its increased use in markets formerly dominated by float and plate glasses, such as automobile windshields and mirror products.

Tracing the history of sheet glass will give us a good view of the total development of flat glass manufacturing through the decades. Some of the methods that have been used will be explained in the following chapter, "Flat Glass Production Technologies".

3.2.2 Plate Glass

Plate Glass is defined as transparent flat glass having plane polished surfaces and showing no distortion of vision when objects are viewed through it, at any angle. In the early days of its production, polished plate glass was used mainly in the manufacture of mirrors. Today, its expanded uses include automotive glazing, construction and furniture. The methods used to produce polished plate glass and those required to make window glass are quite different after the melting and fining processes have been completed. It is the rolling, grinding and polishing operations that distinguish plate glass from sheet (window) glass.

3.2.3 Patterned Glass

Patterned Glass is semi-transparent of translucent, with distinctive geometric, linear hammered or all over floral-like designs on one (usually) or both surfaces. These figured effects provide diffused light transmission with varying degrees of privacy to meet the special requirements in functional or decorative applications. The glass is furnished in a range of

thicknesses, usually 1/8, 7/32, 3/8 and 1/2 inch (0.32, 0.56, 0.95 and 1.27 mm.).

Patterned glass has enjoyed increased acceptance in industrial, commercial and home constructions, and is applied in a wide field of specialties where transparency is unnecessary or even objectionable, such as in skylights, factory windows, office partitions, and corridor panels. The four general types are:

(1)Rolled glass, uncoloured,

(2)Wire glass,

(3)Cathedral, clear and coloured

(4)Heat absorbing, plain and wire.

The diversity of patterns and types makes available a wide variety of utilitarian and architectural light-diffusing effects. Different surface finishes include;

(1)Plain rolled fire finish,

(2)Mud ground,

(3)Ground and polished,

(4)Frosted,

(5)Sandblasted,

(6)Textured,

(7)Vitreous enameled.

3.2.4 Float Glass

The float process developed by Pilkington Brothers of England, while differing radically from existing flat glass production methods in certain phases, has several common steps. For example, raw batch handling, batch mixing, melting and cutting are similar to those operations in sheet and plate processes. Essentially, the same raw materials are used.

The float process departs from all others where the molten glass flows **horizontally** from the melting chamber into the float chamber which is a molten tin pool approximately 160 feet long and 12 feet wide. During its passage over this 160 feet of molten tin the hot glass assumes the perfect flatness of the tin surface and develops excellent thickness uniformity.

The finished product is as flat and smooth as plate glass, without having been ground and polished. A wide range of thicknesses is possible by this method.

Tin was selected as the flotation medium because it has the proper specific gravity, melting temperature range, and surface tension. Several different temperature zones in the float chamber provide for heating, fire-polishing and cooling before the glass emerges final cooling.

As is evident, this process has many advantages over previous forming methods. As a result, the major flat glass manufacturers in the world have all licensed the float process, and the number of such plants has **mushroomed** within the last ten years.

CHAPTER IV

FLAT GLASS PRODUCTION TECHNOLOGIES

4.1 THE KINDS OF TECHNOLOGIES

The science of glass making has progressed rapidly in the last ten years. Tremendous changes in glass forming technology is introduced by the float glass process. Environment control through glass today is accomplished not only by means of absorbing solar energy but by means of reflecting it as well. In addition, the aesthetic appearance of environmental-control glasses has been vastly improved. Transparent coatings for glasses have been developed that are pleasing to the eye and at the same time make it possible to control the environment within the confines in which man works.

Safety aspects of living today also have been of great concern. Efforts in glass manufacturing are devoted to producing windshields that will cause less lacerative and concussive effects and still maximize the safety of the individual in the automobile. Tempered glass products have been introduced where patio doors and storm windows have been an extreme hazard to children and adults alike [The Handbook of Glass Manufacture, Volume II, p.685].

In summary, glass as a material has had to meet the challenge of technology in general. It has done this with developments in the basic characteristics of glass as a material, through improvement in both strength and environmental control properties.

The process of glass making had progressed slowly through time until the last century. Since then it has undergone significant changes in technology both in manufacturing techniques and products. Up until the 19th Century, glass making had been relatively slow in its

development because of the complex problems posed by physical properties and the nature of glass forming. The highly complex mathematical problems posed by the interactions of radiant energy transformations, viscosity variations, and non-linear relaxation coefficients have made the manufacture of glass largely an art. The property of continuous change of viscosity with temperature, which made possible the production process of glass blowing, added considerably to the difficulty in the flat glass manufacturing area. The changing viscosity imposed the necessity for rapid, controlled forming.

Perhaps the greatest factor in getting the impetus to overcome the technological problem of glass making was the increased cost of labor, which made the highly skilled manual production extremely costly and limited the uses that might be made of glass. Basic knowledge of the chemistry and physics of glass, plus inventive genuis in the mechanical equipment field, made possible the rapid advancement of low-cost glassware.

Flat glass manufacturing, which originally consisted of taking circular and cylindrical shapes and flattening them out to produce a flat product in a hand manufacturing mold, has developed into a highly technical mechanical process that enables volumes of glass to be formed of high precision quality at minimal manufacturing costs.

The last decade has seen the advent of a totally new and revolutionary concept of flat glass manufacturing. This is the innovational **float process.**

The second area in which flat glass manufacturing in particular has seen major developments is in the field of environmental control. Until this time, flat glass had been used basically as a barrier to the outside elements; at the same time it provided transparency, which added to the utility of the material. Today, because the glass chemists have improved upon their science, we see in the marketplace glasses that can change phototropically to provide variable radiant energy transmission, dependent upon the incident light; we see coatings and compositions of glass, which affect radiant energy and color on transmission and reflection in ways to satisfy the varied and ever changing demands of architects and designers.

Thus, the understanding of the fundamental properties of glass in the area of transmission and reflection of energy has made glass a much sought after material. The physical property experts have (through greater understanding of the mechanisms) learned methods of modifying coefficients of expansion and relaxation, which have increased the uses of glass because it is stronger and safer.

Below, flat glass production methods are explained one-by-one. These are; 1)Crown Method, 2)Hand Cylinder Method, 3)Machine Cylinder Method, 4)Fourcault Method, 5)LOF-Colburn Method, 6)Pittsburgh Method, 7)Float Method.

4.1.1 Crown Method

While glass blowing is an ancient art, its first application to the production of window glass was performed by the Syrians during the 7th Century, when the "Crown Process", a combination of blowing and spinning, was developed. Rectangular plates of various sizes were cut from the smoother areas of circular disks. Window glass made by this process was superior to that made by other methods, up to the 12th and 13th centuries, until the handblown cylinder method was introduced. The famous cathedral windows of Europe were probably made up of coloured crown glass, the very imperfections of which added to the artistic effect.

4.1.2 Hand Cylinder Method

In this process, the length of the cylinder blown corresponds to the length of the stock sheet, and its circumference. The blowpipe employed has a rather larger nosepiece to permit the gathering of a greater amount of glass. To start the process, the nose is dipped into the glass

and rotated to collect the desired quality. Rolling and pressing and gentle blowing serve to form the gather into the desired shape. When sufficiently cooled, it is again dipped into the glass pot or tank and a second gathering is made. The proper form of the gather is ensured by further rotation, and shaping with a moist wooden paddle.

Cylinder is advanced through zones of increasing temperature until it is soft enough for the glass to be unfolded. By ironing out over the surfaces with a heavy wood block, the open hemi-cylinder is flattened. The flat sheet thus formed is allowed to cool slowly and later is cut into panes of the desired sizes.

This handblown glass was poor in quality according to modern standards. The gatherer introduced cords and bubbles. The glass surface was battered in appearance because of the repeated cooling and reheating. The glass was not uniform and the thickness was not completely flat.

4.1.3 Machine Cylinder Method

In 1903, Lubber and the American Window Glass Company developed a method for the mechanical blowing of cylinders many times larger than a handblown cylinder. The speed of drawing and the cylinder sizes were increased by slow stages.

Production of sheet glass by machine cylinder grew rapidly until the early 20's when the more satisfactory flat drawing sheet process began to demonstrate its greater superiority. Although the mechanical cylinder blowing process contributed to large production, it was relatively slow and laborious, and resulted in considerable waste of time and material. The product was not of particularly good quality. With the adaptation of the flat sheet methods, machine cylinder operations shrank rapidly until 1929 when the last cylinder machine was shut down. Of the nearly 600 million feet of sheet glass produced in 1925 by 42 plants (a decrease from 100 in 1899), 59%

was produced by Machine Cylinder, 29% by Colburn, 10% by Fourcault and 2% by Hand Cylinder Methods. By 1929, the number of operating plants decreased to 16, ten of which were using the continous flat sheet process.

4.1.4 Fourcault Method

Continuous flat sheet drawing systems were developed rapidly after 1913 in the United States and Europe. In the Fourcault method, the sheet is drawn **vertically** through a slotted refractory shape called a "debiteuse". The surface of the glass made in this way has a fire finish or polish, which is the brilliant surface achieved by allowing the molten glass to cool to rigidity without coming in contact with anything solid when it is soft [The Handbook of Glass Manufacture, Volume II, pp. 691-693].

The debiteuse used in the Fourcault process is a specially shaped refractory clay block with a scientifically designed opening through which any thickness or "strength" is drawn vertically. The shape is furnished as a blank in the unburned state. The piece is then carefully fired and ready when needed for direct transfer to the drawing chamber without recooling.

In the drawing chamber, the debiteuse floats because of the greater density of the glass, but is forced down to the prescribed level by adjustable arms. The sheet thickness is affected by four factors:

(1)Temperature of glass in the drawing chamber -the higher it is, the thinner the sheet.

(2)Debiteuse float level in glass -the deeper it is submerged, the thicker the sheet or the faster the draw.

(3)Sheet coolers -the closer they are to the sheet and the lower the temperature of circulating water, the thicker the sheet.

(4)The speed of draw -the faster the machine rate, the thinner the sheet.

Compared to the Machine Cylinder Method, the Fourcault process was a continuous system and practically all the melted glass entered the final sheet. Because of the temperature conditions of the drawing chamber, the Fourcault process had to be periodically stopped and the drawing chambers heated to a higher temperature. Also, because of slow corrosion and erosion of the debiteuse, it had to be replaced every three to four months. As few as one, often three, or as many as nine or eleven machines can be operated simultaneously on a single tank.

TABLE 4.1 Fourcault Process Rates of Draw

Thickness (mm.)	Drawing Speed (mm./min.)
0.76	3556.0
2.29	1625.6
3.18	1143.0
5.59	457.2
12.70	152.4

4.1.5 Libbey-Owens-Ford (Colburn) Method

While Fourcault was developing his continuous vertical sheet drawing process in Belgium, the ideas of Colburn for a continuous flat sheet drawing process were successfully developed by Libbey-Owens in U.S.A. in 1916. As practised today by the Libbey-Owens-Ford Company, the molten glass is cooled somewhat in its passage from the melting tank to the drawing chamber, where it is reheated to a uniform temperature in preparation for a straight upward pull for a short distance. Then, horizontal flattenning and stretching is applied. The use of debiteuse or other refractory shape to create the sheet is unnecessary. Uniformity of temperature and glass

consumption and constant machine speeds are prime considerations in maintaining a wide sheet of uniform thickness. One or usually two machines handle the production from a Colburn process tank.

The annual net production from Colburn process tanks is approximately 2,787,090 m^2. On the average, about 110 tons of glass are drawn daily from 800-ton tanks.

TABLE 4.2 Libbey-Owens-Ford (Colburn) Process Rates of Draw

(Production Approximately 7432.24 m^2/24 hours on 2 mm. basis)

Thickness (mm.)	Drawing Speed (mm./min)
1.02	4572.0
8.00	406.4
31.75	38.1

Source: The Handbook of Glass Manufacturing, Volume II, p.695

4.1.6 Pittsburgh Method

The Pittsburgh process for making a continuous flat sheet was introduced about 1925 by the Pittsburgh Plate Glass Company, now PPG Industries, Inc. It is a vertical drawing process similar to the Fourcault, except that the floating debiteuse is replaced by a submerged solid "draw bar". This horizontal refractory is to assist in conditioning the glass, to determine the line of origin of the sheet, and to control the convection currents in the drawing chamber. Usually four

machines handle the production from a Pittsburgh process tank of normal size drawing about 250 tons per day. In recent years, the number of machines per tank has increased up to eight, and it is not rare to have 10 per tank. The quality of glass produced by this process has also been significantly improved.

4.1.7 Float Method

In the Pilkington Brothers (PB) float process, glass from the tank flows under a tweel and over a lip (or spout) onto the tin bath. The glass temperature at this point is approximately 1065^0C. This value may fluctuate, depending on the tonnage and other considerations, but it is always well above the liquidus temperature. The glass follows a very complicated flow pattern in this region of the bath. While the bulk of the glass is flouring forward and laterally to form what is called the "onion", the glass that was in contact with the lip refractory flows in the reverse direction to the "wetback" and then outwards and forward to be in the outer edges of the ribbon[1]. It is this wetback flow phenomenon which is at the heart of the PB process.

The flat ribbon is pulled by tractive forces coming from the lehr (and possibly from sizing machines); it is this combination of forces which acts to thin the ribbon as it moves downstream. At some point in the bath, the ribbon cools to the point of dimensional stability, and it is then conveyed to the annealing lehr, exiting the bath at a temperature of 607^0C.

The Pittsburgh Plate Glass Company (PPG) float process differs in that the glass passes onto the float bath over a wide threshold made of a material which does not react with the glass to any extent. It passes through a short set of refractory guides and proceeds at essentially

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1 Ribbon: A continous strip of glass in process.

Ribbon Process: A process whereby molten glass is delivered to a forming unit in a ribbon form.

constant width downbath with the width and thickness controlled by the lehr and sizing machines. When the ribbon exits the bath, again at about 607^0C, it is annealed, cooled and conveyed to the wareroom.

4.2 ECONOMIC IMPACTS OF THE FLAT GLASS PRODUCTION TECHNOLOGIES VERSUS FLOAT GLASS PRODUCTION TECHNOLOGIES

First, it is necessary to confess that we do not have to discuss the economic aspects of Crown Method, Hand Cylinder Method and Machine Cylinder Method here. Nowadays, the widely utilized flat glass production technologies are Fourcault Method, LOF-Colburn Method, Pittsburgh Method and Float Method. There is increasing tendency towards using especially Fourcault and Float Methods as the relative advantages of these two methods are approved all over the world.

The Fourcault Method helps drawing continous flat sheet vertically. Compared to the Machine Cylinder Method, as the process is a continous system, all the melted glass enters the final sheet product. It completely eliminates several necessary operations of the Cylinder Method and thus reduces labour costs. On the other hand, due to the temperature conditions of the drawing chamber, Fourcault process has to be stopped periodically and the drawing chambers must be heated to a higher temperature to remove the accumulation of devitrification[1]. After this "clean-up", operating temperatures can be restored, the machines baited and drawing resumed. Because of slow corrosion and erosion of the debiteuse, it has to be replaced every three or four months.

In the Fourcault Method, the aim of drawing best quality glass in the required

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1 Devitrification: Crystallization in glass

thickness is based on the temperature of glass in the drawing chamber, debiteuse float level in glass, sheet coolers and the speed of draw. The variations in the quality of the glass drawn by Fourcault Method can be attributed in part to;

1)Corrosion of refractories

2)Deterioration of machine performance

3)Shifting of the normal convection currents of the glass and of the atmosphere in the drawing kiln[1]

4)Human control factors.

Float Method: If the technological impact of float glass has dominated flat glass manufacture for the past two decades, the economic impact has been equally significant. In the United States, for example, PPG was the first flat glass manufacturer to be licensed to use the float process (1962); other manufacturers followed in rapid succession.

Several points are evident. Firstly, float glass replaced plate glass just about as fast as the new float plants could be built. Secondly, while total flat glass production fell in the recession of 1974-1975, float production actually increased, with the older and less efficient sheet plants closing down. Fifteen years is certainly not a long period of time for technological revolution to take place in a heavy industry but, in the case of float glass, the revolution is clearly over.

In the first years of the float glass manufacture, the optical quality of product was purported to be equivalent to that of plate glass. For the thicker product, which was used primarily in the manufacture of mirrors and automotive backlights, this was by and large true, with the difference so small as to be of no commercial significance.

The comparison of float and sheet glass shows float to be superior optically at all thicknesses. In fact, float glass produced under conditions which yield glass of "poor" optical quality is still markedly superior to high quality sheet glass.

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1 Kiln: A kind of furnace

PART II

CHAPTER V

WORLD AND TURKISH FLAT GLASS INDUSTRIES IN GENERAL

5.1 WORLD FLAT GLASS INDUSTRY

In the recent years, production and consumption of flat glass in the European countries have shown a relatively better trend, in spite of the economic crisis experienced in 1978-1980. Flat glass production levels had been 3.6, 3.8 and 3.9 million tons in 1978, 1979 and 1980, respectively.

In Europe, construction and automotive industries constitute 50% and 20% of the whole flat glass industry, respectively. Both of these sectors are affected by the economic conjuncture, greatly. Within this framework, new building constructions decreased continuously and declined 20% below 1977 level in 1981. The vehicle production reached its peak in 1979 by 12.5 million units and 11% decrease is observed in 1981 with respect to 1979.

In spite of these negative market conditions, the efforts of the Eastern Block countries and others to increase their market shares in Europe have faced the flat glass producers with more difficult conditions. In fact, the most important reason of the instability in the flat glass market is the supply and demand imbalance, ceteris paribus. The flat glass companies which continue with their activities comfortably under a hidden cartel environment, have found themselves

in a very serious competition. This competition stems from the fact that the newly established companies have expanded the existing production capacities greatly.

The crisis that industry had experienced, began with the drawback of the French glass company BSN from flat glass production. Pilkington bought the Flachglas subsidiary company of BSN in Germany (which has 3 float lines), but Pilkington was not allowed to get the other subsidiary companies of BSN due to the anti-trust laws. Therefore, the plants of BSN in Holland and Belgium were sold to Asahi and that of France were sold to PPG companies. On the other hand, the Guardian company put the float glass factory into operation in Luxemburg.

As a result of the above mentioned developments, the existing established capacities of flat glass in 1980-1984 period are as follows:

TABLE 5.1 Existing Flat Glass World Capacities in 1980-1984 Period

	Number of Float Lines	Capacity (tons/day)	%
Saint-Gobain, France	11.5	6,000.0	40.1
Pilkington, U.K.	8.0	4,750.0	31.7
PPG, U.S.A.	4.0	1,650.0	11.0
Asahi Glass, Japan	3.0	1,300.0	8.7
SIV, Italy	1.5	770.0	5.1
Guardian, U.S.A.	2.0	500.0	3.4
TOTAL	30.0	14,970.0	100.0

The daily production capacity reaches 15,000 tons which means a 5.5 million tons of annual production potential and, 71.8% of this total is controlled by Saint-Gobain and Pilkington. In spite of this concentration, the efforts of PPG, Asahi and Guardian to get a bigger

share in the market, increases the competition. The wishes of these companies in terms of getting a bigger share in the market can be very explicitly understood from the specific example of PPG which established a 500 tons/day capacity float line.

On the other hand, the third world and Eastern Block countries which establish float lines to have a share in the market place, increase the competition one step further.

Under these conditions, flat glass prices are determined at considerably low levels and, powerful producers -although they continue to earn profits from their other glass production activities- make losses in the flat glass activities. Saint Gobain states that the price of standard 4mm. flat glass is the same in real terms for the last five years whereas raw material and fuel costs, which constitute 50% of the total production costs, increased cumulatively. Therefore, the decreasing profit margins is the most important result that competition creates.

Today, the capacity utilization rate in Europe is around 75-80%. If we accept the fact that the break-even point is reached at 75% capacity utilization, we can easily conclude that the flat glass production activities continue in very limited profit margins.

While speaking about the capacity utilization at European level, it is important to mention what established capacity means. Saint Gobain states that by the help of the attained technical knowledge accumulation and by the possible arrangements during cold repairs, production capacities can be increased from 400 tons/day to 550 tons/day. This development, which represents a 37.5% more production, meaning a strenghtening supply-demand imbalance for today, clarifies the long-term advantages about productivity increase and cost reduction.

In Europe, float revolution is likely to be completed. In the north, only one Fourcault furnace is being operated by Flachglas and it is being kept active to supply thin flat glass. In the south, Spain, Italy and Greece are producing flat glass but, the first two countries are expected to turn to float completely in the very near future.

Today, float technology is widely approved as future's most efficient flat glass production method. Therefore, all the efforts now continue to have increasing utilization and

improvement of this technology. Besides the above mentioned precautions, importance is given to improve the machines and equipment for furnace designs, use of robots in industry, automation and the end of cooling.

The highest amount of flat glass production in Europe is realized in West Germany. The flat glass production of W.Germany which was 752,000 tons/year in 1975 reached its record level in 1980 by 1,171,000 tons whereas production decreases started in 1981. Excluding Italy and Spain, there were decreases in the productions of all European countries. As in the other countries in the world, the decreases in the flat glass productions in Europe are closely related with the negative developments in the construction and the automotive industries. In the recent years, the tendency to slow down in the construction sector in West Europe still continues. For example, in 1980 the floor-areas of the constructions realized in West Germany were 132 million square meters whereas this area decreased to 120 million square meters in 1981. In the same time period, the floor-areas of the constructions in England decreased from 240 million square meters to 205 million square meters.

Automotive industry is also an important field of flat glass consumption. Flat glass utilization in automobile production decreased by 12% from 1976 to 1981. In 1984 and 1985, although there are increases, this increase is still less than the flat glass utilization level of 1976 by 8%. There are two important reasons causing this result: The first one is the slow down in the automobile production, and the second one is the widespread usage of thin glass to reduce cost.

In the United States of America, the flat glass production is realized in 62 plants. 90% of production is being steered by four big companies. These are; PPG, LOF, AFG and the Guardian. 1984 was a year of sales records for most of the companies. The stagnation in the automotive and construction sectors reached to extraordinary levels in U.S.A.. For example, 1.3 million units of houses produced in 1981 declined to 1.0 million units in 1982. This figure indicates the lowest production level of the last 35 years. Automobile production which was 6.4 million units in 1980 declined to 5.5 million units in 1982.

In U.S.A., the floor-areas of the houses are becoming smaller. On the contrary, for the internal decorations of the houses, more glass, mirror, etc. are being used, now. Thus, the decreasing flat glass sales quantities are being compensated to a certain extent. Construction sector constitutes one third of the total flat glass demand. But, ordinary flat glass does not satisfy the house owners who are aware of energy saving. Therefore, there are important efforts of glass producers to find and improve new products to satisfy these demands.

In Japan, flat glass is produced in ten production plants, owned by Asahi Glass Company Ltd., Nippon Sheet Glass Ltd. and Central Company Ltd. Also, safety glass and other secondary products are produced in eight production plants. In this country, 60% of the flat glass produced is used in construction industry, 30% in automotive industry and 10% in other sectors of the industry. While the automobile production was 7.04 million units in 1980, it declined to 6.89 million units in 1982 by 2.2% decrease. Floor-areas of the buildings constructed decreased from 245.6 million square meters in 1979 to 203.1 in 1981. In Japan, flat glass production increased between 1975-1980. In 1980, production reached its peak by 37.5 million square meters and declined to 31.3 milion square meters in 1982.

5.1.1 Middle-Eastern and North-African Countries

In these countries, glass industry is in a relatively worse position when compared to developed countries.

In Iran, established flat glass capacity is 160,000 tons/year. This total capacity is shared among three big producers. Among these producers, Ghazvin Glass Co. produces 120,000 tons of flat glass per year by Colburn method. The capacity of Abguineh Glass is 30-40,000 tons/year whereas that of Iran Glass Co. has 10,000 tons capacity per year. This company made an agreement with Japanese Nippon Glass Co. for float glass production. As the factories were in

operation with very low capacities, 100,000 tons of imports were realized in 1984.

In Iraq, Ramadi Glass Co. which was established by Russians in 1970 has 12,000 tons of flat glass production capacity per year. It fulfills its functions by one furnace and two old Fourcault machines. On the other hand, a float factory with 100,000 tons capacity per year has been decided to be constructed by the agreement between Pilkington Brothers and Gulf Industry Consultancy. As the final stage of the dialogues, licence of production is given by Pilkington Brothers to Gulf Industry Consultancy.

In Syria, there are two flat glass plants. The first one -namely, Şam Bottle and Glass Factory- has 25,000 tons of flat glass capacity per year. The second one, which was established by French Samover Co. is Halep Bottle and Glass Factory, and it has 30,000 tons of flat glass capacity per year.

Lebanon has a factory named El Machrek with a flat glass plant capacity of 15,000 tons/year, to be sufficient for domestic consumption. In this factory, Saliver Co. has 10% share. To eliminate the deficiencies in production and to re-export, 10-15,000 tons of imports are realized.

In Israel, there is a flat glass plant which works with Libbey-Owens method and satisfies domestic demand. This plant also makes export. On the other hand, Israel imports 5-10,000 tons of float glass from Europe.

In Saudi Arabia, there is no flat glass production. Saudi Arabia imports mostly flat glass of about 15-20,000 tons, continuously. 50% of this quantity is brown and dark grey in color and reflective glass.

In Libya, there is no flat glass production. In accordance with the increasing construction activities, 8-10,000 tons of imports are realized.

In Kuwait, there is no flat glass production. Annually, 20,000 tons of imports are realized approximately. Some of this amount is used for re-export purposes. Consumption and demand of colored and quality glass is at considerable levels.

In Jordan, Jordan Glass Factory has got a flat glass plant which can produce both

normal and colored flat glass with 27,000 tons/year capacity. It has been put into operation in 1984. It has a Pittsburgh group with three machines. The share of this plant is important in the market where there is 13-15,000 tons of consumption per year.

In Egypt, 15,000 tons of flat glass is produced annually at three flat glass production plants of El-Nasr Glass and Crystal Company. They have an attempt to establish a float plant with American Guardian Company. They also import about 50,000 tons of flat glass, annually.

Algeria has 15,000 tons of annual production capacity. Annual import quantity is about 20,000 tons/year.

In Tunisia, there is no flat glass production. The minimum import capacity is 15,000 tons/year.

In Morocco, there is no flat glass production. Their minimum import capacity is same as that of Tunisia, i.e.:15,000 tons/year.

5.1.2 European Countries

Among the East European countries, Russia was the biggest producer with 269 million square meters of flat glass production in 1977 whereas this quantity decreased by 9% and was only 245 million square meters in 1981. Again among the East European countries, the quickest drop in flat glass production was observed in Poland. The level of flat glass production which was 72.4 million square meters in 1977 was 61.0 million square meters in 1981.

In Greece, there is a flat glass production unit near Piraeus managed by Hellenic Chemical Products and Fertilizer Inc. In the plant, Fourcault and Libbey-Owens methods are used and there are three furnaces. The total capacity is 215 tons/day (which is almost 70,000 tons/year), net storehouse quantity is 180 tons/day (which is almost 60,000 tons/year). Due to the bottlenecks in production, 8-10,000 tons of sheet and 10-12,000 tons of float -which is not domestically

produced- imports are realized.

In West Germany, Flach Glass and St. Gobain factories produce float glass. If jumbo size is exactly produced and distributed, there is 9-10,000 tons/year potential. Actually, the size 3.18m.x2.20m. is being sold up to 300 tons.

Italy has six float factories. On the other hand, the flat glass sub-unit of PPG Industries in Salerno has been transformed into float glass plant with the inclusion of extra 100 tons/day.

In Austria, there is no flat glass production. Germany keeps 60-70% of this market.

England is the market where Pilkington is dominant.

In the West European countries, there are 26 flat glass plants 23 of which takes place in the European Economic Community. Two of the remaining three plants are in Spain and one of them is in Sweden. The total potential of production capacities in these plants are 4.82 million tons/year. On the other hand, while the works to establish a new plant in Italy continues, a new float factory is put into operation in Holland. The plant which is put into operation in Holland is the affiliate of Glaverbel, namely Maas Glas BV, and has 450 tons of daily production capacity. In this sole float glass producing factory of Holland, 600 workers are employed. In Italy, Toscana Glass -the affiliate of French Saint Gobain- invests for a flat glass plant with 600 tons/day capacity. Lahti Company in Finland and Hodia Company of Spain have started changing their Pittsburgh process to float.

In West European countries, 1983 flat glass production has reached 454,765 tons, by 4% increase over 1982 level. In 1983, the highest flat glass production increase was observed in England.

In Europe, there is only East European countries and Portugal which continue flat glass production with old methods.

In Bulgaria, there are two flat glass factories. The total capacity of these factories are 750 tons/day gross (170,000 tons year, net).

In Romania, there are four flat glass production plants which produced 360,000 tons in 1981.

In Yugoslavia, approximately 80,000 tons of flat glass is produced by three furnaces.

In the flat glass production, the American company AFG brought a new float technology named "Mini-Float" which enables float glass production in smaller dimensions and the products of this technology are marketed in international markets. "Mini-Float" system decreases the necessary float glass capacity to produce flat glass by 75%. Standard daily production capacities of float glass plants which are about 500-650 tons, is more than enough for many of the developing countries, nowadays. These countries either continue to produce low quality flat glass by high energy costs, or import glass with high prices.

Today, due to the improvements in the energy saving studies, the traditional normal glass applications have left their places to special insulating glasses. In accordance with the climate conditions, more heat reflection in winter and less heat reflection in summer is being realized within the properties of flat glass for the near future. The authorities say that in the next decade, there will be a revolution in the insulated glass production technology, product design and performance.

To increase the isolation power of insulating glass and to add sound absorption property to it, there are new trials of putting various gases in the area between glasses. Gases like helium and argon which are light enough, while creating a very good sound isolation, affect heat isolation in the opposite direction. Therefore, a mixture of heavy and light gases are used to achieve better results in heat and sound isolation. By this way, heat isolation results improve by 13.5% when compared to normal double glasses. In three-layer insulating glasses heat isolation is 25% better than normal double glasses.

5.2 TURKISH FLAT GLASS INDUSTRY

Beginning with early 1950s, the studies to establish flat glass (window glass) industry in Turkey were continued, but was not successfull until 1956. This was because of the fact that Western countries were determined not to give the hints about the technology they have, neither to Turkey nor to the other less developed countries (LDCs).

In 1957, an opportunity to benefit Turkey appeared. The Soviet ambassador who was in Turkey the same year, promised to give support to the government in new fields of industry. Among these new fields of industry was also glass industry. Thus, by making use of this opportunity, the first window glass factory of Turkey was established in Çayırova. The imported technology was the Fourcault system. Later on, the opportunity to practice Pittsburgh technology in Turkey appeared, too.

In Europe, there is almost no factory producing with Fourcault and Pittsburgh systems nowadays. Even in 1974, 45% of the glass industry in Europe produced flat glass by float process. At the end of 1977, more than 90% of these establishments were producing by float process. Thus, almost all the establishments producing with the Fourcault and Pittsburgh processes were closed.

In Turkey, there is also production of figured and wired glass within flat glass industry. Figured glass, which is used in doors and in seperators and wired glass, which is a must for the industry, can be found in excess quantities in Turkey. These kinds of flat glass are produced in various colours, too.

5.2.1 The Place and Importance of Flat Glass in Turkish Glass Industry

Flat glass is widely used as a **construction element** and also in the production of

mirror, shop and table glasses besides automotive glasses. Flat glass is used as an input in producing safety and double-glazing glasses, and 10% of flat glass consumption takes place in these fields.

TABLE 5.2 Flat Glass Domestic Consumptions (tons/year)

Years	Domestic Sales (1)	Imports (2)	Domestic Consumption (1+2)
1963	24,217	863	25,080
1964	28,533	843	29,376
1965	33,703	653	34,356
1966	38,363	728	39,091
1967	43,213	525	43,783
1968	48,542	275	48,817
1969	52,979	8,307	61,286
1970	62,474	912	63,386
1971	56,030	639	56,669
1972	61,640	866	62,506
1973	79,299	2,153	81,452
1974	80,736	895	81,631
1975	85,023	1,241	86,264
1976	103,326	-	103,326
1977	129,634	-	129,634
1978	127,629	17	127,646
1979	128,715	6	128,721
1980	89,000	1	89,001
1981	130,580	-	130,580
1982	152,360	-	152,360
1983	138,873	-	138,873
1984	145,382	1,155	146,537

Source: 1)State Planning Organization

2)Turkish Glassworks Company Inc.

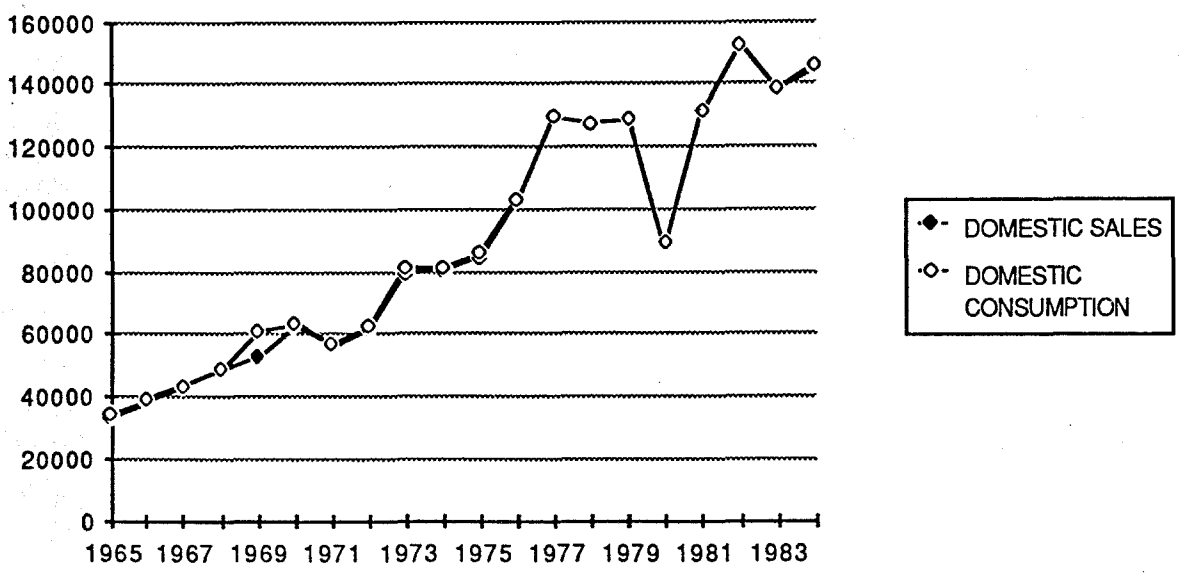

Figure 5.1 Share of Domestic Flat Glass Sales in Domestic Consumption

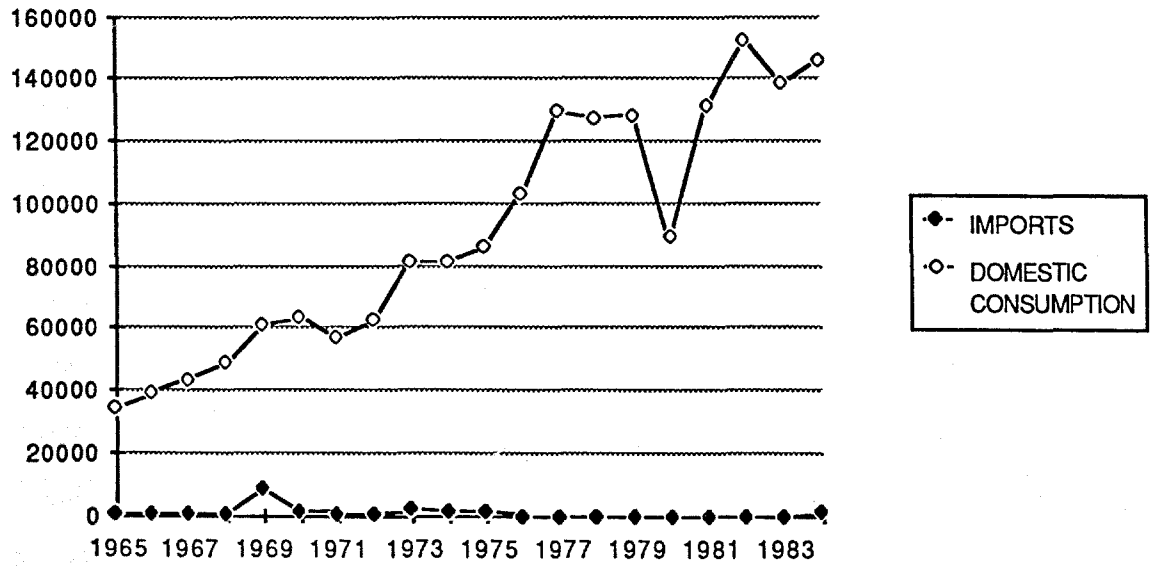

Figure 5.2 Share of Flat Glass Imports in Domestic Consumption

Domestic flat glass consumption is defined as the sum of domestic sales plus the imports. Consumption was being completely supplied with imports until 1961 before domestic production started. After then, imports declined by the beginning of domestic production. The imports were 27,000 tons in 1961, 6,000 tons in 1962 and 800 tons in 1963, and constituted a negligibly low share in total consumption. Flat glass domestic consumption increased by 11% between 1963-1979 in spite of the fluctuations in production and exports.

90% of flat glass consumption being determined by the construction sector, stagnation in this sector affects consumption widely. Domestic consumption is affected by production as well as by demand.

The domestic consumption of 1980, which was 89,000 tons, was significantly limited by deficient supply because of the strikes and energy bottleneck.

5.2.2 Factory Based Analysis

5.2.2.1 Çayırova Glass Industry Incorporation

This factory is located on the coast of Marmara Sea only about 40km. away from İstanbul. The plant has its own docks and loading facilities for easy and fast loading of ships. Besides flat glass, coloured and clear, patterned and wired glasses are also produced. This company had first started window glass production by Fourcault process. Later on, while enlarging the factory, Pittsburgh method was also put into practise. As there are actually two furnaces for flat glass production, these two technologies are practised in furnace No:1 and furnace No:2, independently. 1977-1984 performance of the factory is explained in the following lines:

TABLE 5.3 Overview of Çayırova Glass Industry Incorporation's Performance Between 1977-1984

	1977	1978	1979	1980	1981	1982	1983	1984
Flat Glass Production ('000 tons)	92.20	85.90	80.30	46.30	100.00	87.20	74.70	100.10
Flat Glass Sales Quantities								
Domestic ('000 tons)	82.74	76.16	74.59	43.74	78.72	55.54	35.67	38.72
Export ('000 tons)	2.30	3.53	5.51	2.80	19.89	31.09	38.40	47.80
Flat Glass Sales Revenues (constant 1977 prices)								
Domestic ('000 TL)	722,881	523,453	546,484	387,122	735,958	530,476	411,169	393,038
Export (FOB)								
('000 US$)	601	763	735	200	1,078	1,072	781	553
('000 TL)	10,582	16,691	20,579	13,407	107,227	203,726	206,841	259,327

Source: Annual Reports of CG

1977

In 1977, the company obtained such results that production exceeded its anticipated targets. The export sales were not as good as that of 1976 because of the increasing domestic demand.

1978

The most explicit fact of this year is the decrease in production compared to the previous year. This is because of the difficulties faced from time to time in obtaining soda ash which is an indispensible

raw material of glass. Local demand being below the anticipated level, resulted in meeting the requirements sufficiently. No concrete problems were experienced in the market despite the recession in construction and automotive sectors, caused by foreign exchange bottleneck.

1979

Recessive conditions that ruled the domestic construction sector during 1979, led Çayırova Glass (CG) to further increase its sales towards foreign markets.

1980

The cold repairs[1] of two furnaces, accompanied by the negative effects of strikes, gave rise to a considerably low level of production. The company achieved productivity increases and reached the full capacity level in production during the last months of the year. On the other hand, considerable attention was paid to energy-saving measures.

1981

During 1981, the plant was operated at full capacity and with the contribution of the improvements in productivity, it reached its highest production level ever achieved in its history. A modernization programme was largely implemented by the company to increase the overall efficiency and energy saving measures were emphasized.

1982

Çayırova Glass Ind. Inc. increased its production due to the productivity improvements attained in 1982. In order to increase exports, research was made towards the implementation of modern glass technologies.

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[1] Cold Repair: The periodic repair necessary for the flat glass furnaces approximately in every 4-5 years by putting off the fire in them for about 3-4 months.

Within the framework of the agreement made between Turkish Glassworks Ind. Inc. and German K.H.D. Company, Çayırova Glass undertook the commissioning and training services of a flat glass company in Nigeria. Hence, the first step in giving technical assistance to a foreign country had been taken in the field of flat glass. Modernization and expansion projects were carried on and research, regarding energy conservation, was emphasized.

1983

Faced with contracting demand due to economic stagnation, Çayırova Glass Ind. Inc. had made efficient use of its production capacity. It expanded its export market to a large extent by increasing the share of exports in total sales. Within the previous year, emphasis was placed on improving efficiency and reduction of costs, in order to compete in the international markets. In accordance with the current requirements of energy conservation, a high capacity waste heat boiler was connected to the system to obtain steam from funnel gasses. This resulted in considerable energy saving.

Within the framework of the agreement effected between Turkish Glassworks Ind. Inc. and K.H.D. of Germany, Çayırova Glass organized the theoretical and technical training programs of the Nigerian flat glass companies.

1984

Despite the unfavourable economic conditions prevailing within the country, Çayırova Glass Ind. Inc. went beyond its targets in 1984, in terms of flat and figured glass production. Exports continued with a favourable rate of increase. Çayırova Glass Ind. Inc. intensified its efforts for lowering production costs to increase its competitive power in foreign markets and achieved considerably good results.

5.2.2.2 Anadolu Glass Industry Incorporation

The plant is situated in Mersin on the Mediterranean cost of Turkey and has access to sea, railroad and highway for transportation. Glass containers of different sizes and shapes are also produced in this plant. Here, flat glass is produced by Pittsburgh method. 1977-1984 performance of the factory is explained in the following lines:

1977

Anadolu Glass Industry Incorporation (AG) joined Turkish Glassworks Company in 1975 with an accumulated loss of TL. 200 million. It was able to offset all its losses within three years, the last year being 1977.

In 1977, satisfactory results were obtained in Anadolu Glass Ind. Inc. Production of flat glass showed a large increase. Within a short period of time, its profitability and productivity reached to such a level that, the losses of previous years were offset. The machinery and equipment, necessary for the expansion of the flat glass capacity by 20,000 tons, were imported.

1978

The capacity of the flat glass production was increased by 20,000 tons/year, at the beginning of 1978. Although production and sales were largely affected by the difficulties encountered in the procurement of the soda ash and by the economic recession, activities with respect to exports were successfully carried out.

TABLE 5.4 Overview of Anadolu Glass Industry Incorporation's Performance Between 1977-1984

	1977	1978	1979	1980	1981	1982	1983	1984
Flat Glass Production ('000 tons)	53.94	62.50	61.33	49.61	69.25	70.76	60.29	84.12
Flat Glass Sales Quantities								
Domestic ('000 tons)	37.73	45.87	49.24	45.23	38.95	35.07	25.62	28.56
Export (FOB) ('000 tons)	14.10	12.53	8.22	6.76	27.10	34.96	35.07	46.00
Flat Glass Sales Revenues (constant 1977 prices)								
Domestic ('000 TL)	353,409	338,059	378,932	383,294	363,199	352,172	326,142	339,378
Export (FOB) ('000 US$)	4,271	2,814	1,163	527	1,587	1,233	849	532
('000 TL)	75,571	57,706	34,202	31,540	159,998	203,726	231,480	249,574

1979

Although production remained around the same level as that of the previous year, Anadolu Glass further increased its exports and thus its share in foreign markets.

1980

Anadolu Glass was adversely affected by a strike of four months, as in various sectors of the economy. Notwithstanding this period, the company attained very good results regarding capacity utilization and continued its expansion and modernization investments which were entitled to the incentive measures.

1981

Anadolu Glass worked at full capacity during 1981, and more than doubled its production as compared to the previous year. The project for the expansion and modernization of plant was also completed and it contributed favourably to the results of the year.

The tremendous sales growth that the company experienced in 1981, stems from the increasing strength of the company in the export markets.

1982

Anadolu Glass Ind. Inc. reached the planned levels, both with respect to production and sales, in 1982.

Despite the difficult conditions that prevailed in 1982, exports were realized as projected. The company continuously increased its exports especially to Middle Eastern countries, making use of its geographical location. In addition, the exports to North-African countries were expanded and considerable progress was achieved through entering the Algerian market in 1982.

1983

The flat glass furnace which had been in operation since the foundation of the plant, was replaced at the beginning of 1983. This operation was completed with an unexpected alacrity. The increase in efficiency resulting from the aforesaid operation offers hope for the future. Anadolu Glass Ind. Inc. continued with its investments towards bottleneck eradication and packaging for export.

1984

Efforts to increase productivity and improve quality gave its fruits in 1984. Production increase in flat glass affected the total sales revenue increase, too.

5.2.2.3 Trakya Glass Industry Incorporation

The factory is located in the European side of Turkey on the E-5 international highway, which facilitates the transportation of the products to Europe. This factory, which started operation in late 1981, is the one functioning with the latest technology in flat glass production. It uses Float Method. Flat glass which is horizontally drawn over melted tin gives the best optical quality. 1981-1984 performance of the factory is explained in the following lines:

TABLE 5.5 Overview of Trakya Glass Industry Incorporation's Performance Between 1977-1984

	1977	1978	1979	1980	1981	1982	1983	1984
Float Glass Production ('000 tons)	-	-	-	-	33.30	98.60	128.60	150.70
Flat Glass Sales Quantities								
Domestic ('000 tons)	-	-	-	-	12.60	58.60	74.76	73.97
Export (FOB) ('000 tons)	-	-	-	-	0.32	27.67	47.59	52.45
Flat Glass Sales Revenues (constant 1977 prices)								
Domestic ('000 TL)	-	-	-	-	112,446	545,557	785,421	769,291
Export (FOB) ('000 US$)	-	-	-	-	18	926	984	629
('000 TL)	-	-	-	-	2,103	153,782	263,221	294,938

1981

The float line of Trakya Glass (TG), which started commercial production in November 1981, signifies a breakthrough in the field of flat glass production of Turkey.

The plant doubled the existing flat glass production capacity of the country. It also created a new product quality standard in domestic market due to the float process, which is the result of the most advanced flat glass production technology in the world.

1982

Trakya Glass continued its efforts intensively towards improving quality and productivity, in spite of a technical breakdown in the plant.

The high quality float glass produced with the advantageous location of the company lead to favourable export results.

1983

Turkey's output in flat glass doubled during 1983. The import and practice of float technology can be considered as an honourable attitude as 20 countries and 90 plants are now using this technology, worldwide.

With its high optical quality products, this giant establishment satisfies the needs of various industries.

The research for a project which was directed towards meeting the fuel requirements of the plant from existing natural gas resources in the region was completed. The competitive power of the company is expected to increase in European float glass market as a result of realizing this project.

1984

Trakya Glass completed its expansion investments to utilize the technology for producing float glass at the utmost level, in 1984. Thus, it was possible to increase quality and productivity and to realize production conforming to world standards in all aspects.

The company increased the foreign exchange inflow to the economy based on the utilization of national resources and gave importance to using natural gas as an energy source that exists in the Trakya region.

CHAPTER VI

TURKISH FLAT GLASS DOMESTIC MARKET AND THE CONSTRUCTION SECTOR

6.1 THE RELATIONS BETWEEN FLAT GLASS DOMESTIC SALES AND RESIDENCE CONSTRUCTIONS

If we try to evaluate the flat glass sales performance in domestic market between 1977-1984, we can conclude the points explained below.

There is a gradually decreasing flat glass sales (square meters) from 1977 to 1980. After 1980, especially in 1981 and 1982, increases in flat glass sales have been observed. In 1983, again a decrease to 1979 level and then, a little increase in 1984 is observable.

If we observe the flat glass sales quantities in terms of tons, while the quantities sold between 1977-1979 had increased, an approximately 40% decrease was experienced in 1980 due to production decreases caused by strikes. In 1981, there was almost an increase of 46% in domestic sales offsetting the 40% decrease in 1980, this time due to the observable production increase. In 1983, a 10% decrease and in 1984 a 4% increase were indicators of unstable developments in domestic flat glass sales.

By analyzing these developments, it is possible to say that there are increases in flat glass domestic sales except the decrease of 1980 by 40%, mainly stemming from the economic structure of Turkish economy.

These results can be considered as that, there are not big and positive developments but somehow tiny changes in domestic flat glass sales in our period of analysis. On the other hand, a conclusion which can be drawn by observing the population increase is that, we would expect domestic flat glass sales to have increased at least at a constant rate, as housing sector is the best

medium for using flat glass. This assumption of course requires the presence of a positive trend of increase in the housing costructions as well as an increase in the whole construction sector. Of course, before this requirement is satisfied, it would be hopeless to expect positive trends in domestic flat glass sales.

If we look at the figures given by SIS, in the "Statistical Pocket Book of Turkey, 1984, p. 13", the population in 1977 is expected to increase from 41.768.000 to 48.265.000 in 1984. This expectation indicates an approximately 16% population increase in eight years. Thus, the annual rate of population increase is to be around 2.09%.

Within the framework of the above mentioned relations, the domestic flat glass sales quantities[1] are as follows:

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1 There is a difference between the quantity defined by "m^2" and "tons". Although the drawn flat glass quantity is the same considering the production process, the difference in these two definitions requires only a conversion coefficient. In other words, while "m^2" is the definition of the drawn flat glass in area units, "ton" is the definition of the same glass quantity by the weight units.

The parity between area and weight definitions are based on the thicknesses of the drawn glass. The following parities can be considered as the standard figures of conversion:

	Kg/m^2
2 mm.	5.00
3 mm.	7.25
4 mm.	9.70
5 mm.	12.10
6 mm.	14.45

In our quantity figures, depending on how much the total sales is within any of these milimetric classifications, the combined parities are contained in our "m^2" and "ton" quantities. The differences in the graphical representations stem from these reasons.

Years	Tons	'000 m^2
1976	101,500	13,871
1977	120,473	16,640
1978	122,032	16,343
1979	123,822	16,010
1980	88,965	11,531
1981	130,273	16,548
1982	149,600	18,396
1983	136,050	16,006
1984	141,243	16,446

Source: Annual Reports of Turkish Glassworks Company

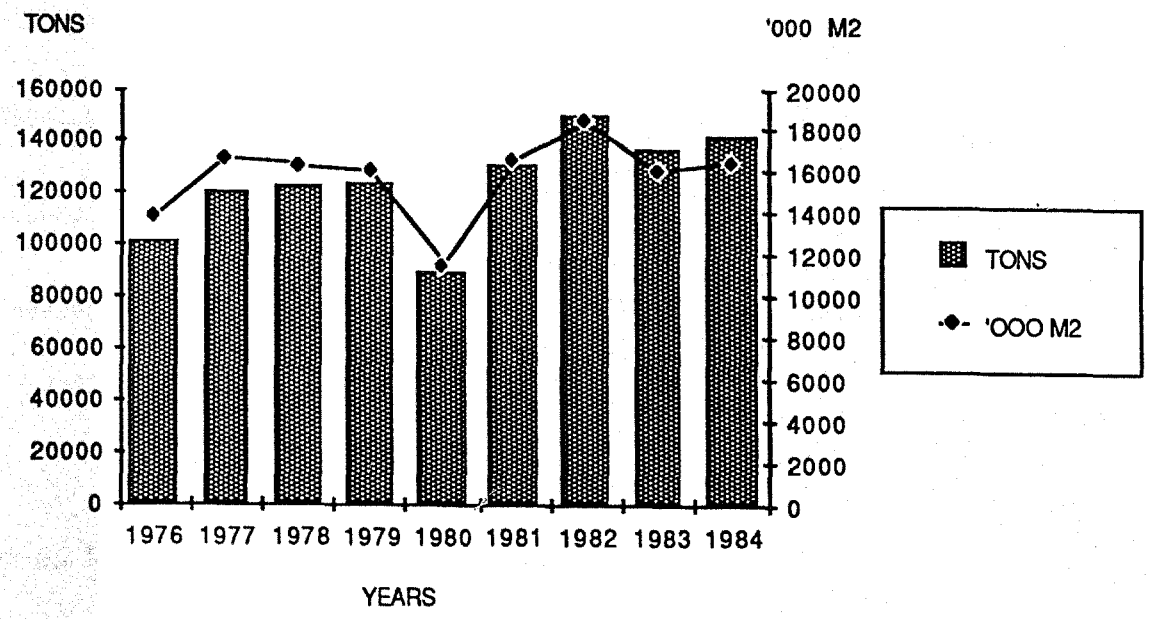

Figure 6.1 Total Flat Glass Sales Quantities (Domestic)

TABLE 6.2 Total Flat Glass Sales Revenues (Domestic)

Unit: '000 TL

Years	Current	Constant (1977=100)
1977	1,076,290	1,076,290
1978	1,326,728	861,512
1979	2,470,860	925,416
1980	3,921,415	770,416
1981	8,360,066	1,211,604
1982	12,553,930	1,428,206
1983	17,145,960	1,522,732
1984	24,763,139	1,501,706

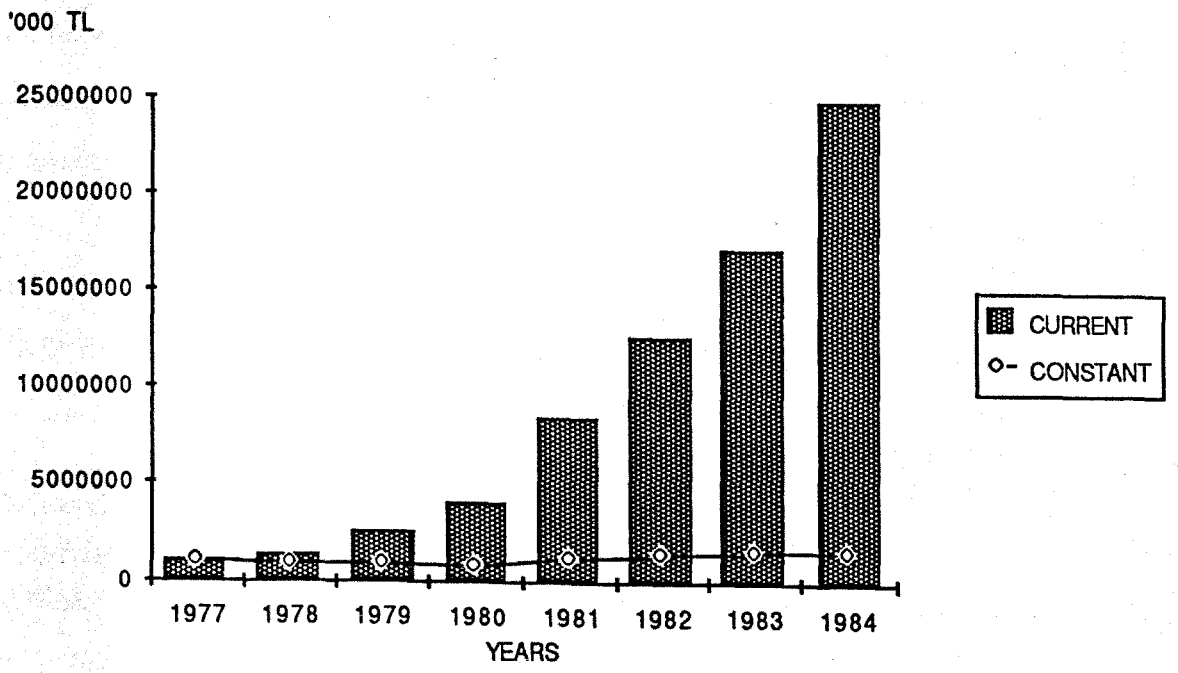

Figure 6.2 Total Flat Glass Sales Revenues (Domestic)

After trying to explain the domestic flat glass sales performance before and after 1980 generally, we now have to see the numerical facts about the housing sector, which has close ties with the flat glass domestic sales.

Total number of buildings constructed between 1977-1979 showed approximately 20% increase. In 1980, 26% decrease was observed as compared to 1979. Beginning with 1981, the number of buildings constructed decreased by showing little fluctuations and increased by 7% in 1984 as compared to 1983.

When we come to the floor-areas of the constructions, there is an 18% increase between 1977-1979. In 1980, a decrease by 20% equalized the floor area of the constructions to 1977 levels. In 1981, a big decrease of about 43% was observed as compared to 1980. Between 1982-1984, floor areas of the buildings constructed increased by about 33% and this increase was not enough to offset the decrease in 1981. Thus, in 1977, 1980 and 1984, floor-areas of the buildings constructed were almost the same and were 28973 sq.m., 28422 sq.m., 28888 sq.m., respectively.

The figures which lie behind the above given explanations are as below:

TABLE 6.3 Buildings by Use According to Building Permits (Number of Buildings Constructed)

	1977	1978	1979	1980	1981	1982	1983	1984
Residential	63,863	73,251	77,254	61,849	49,692	46,902	49,227	52,791
Non-Residential	9,329	11,068	10,117	7,730	8,411	7,459	9,741	10,362
TOTAL	73,192	84,319	87,371	69,579	58,103	54,361	58,968	63,153

Source: Statistical Yearbook of Turkey, 1985, p. 278

While the share of residential constructions in the total number of buildings constructed increased gradually between 1977-1979, this trend changed direction in 1980-1984 period.

TABLE 6.4 Buildings by Use According to Building Permits (Floor Areas of the Constructions)

Unit: '000 m^2

	1977	1978	1979	1980	1981	1982	1983	1984
Residential	22,312	25,155	27,380	22,400	15,500	17,334	18,971	22,147
Non-Residential	6,661	7,082	6,700	6,022	4,384	4,394	6,584	6,741
TOTAL	28,973	32,237	34,080	28,422	19,884	21,728	25,555	28,888

Source: Statistical Yearbook of Turkey, 1985, p. 278

The share of residential house floor-areas in the total floor areas of the building constructions were higher in 1977-1980 period as opposed to 1981-1984 period.

If we try to change the above given absolute numbers into percentages showing the increases/decreases with respect to the preceding years, the results indicate some economic facts. For example, the cumulative increase in the total number of buildings constructed between 1977-1979 was 19.4% whereas the floor-area increase was by 17.6% in the same period. In other words, before 1980, a large number of buildings with small areas were constructed.

In 1980, the decrease in the number of buildings constructed is (25.6%) more than the decrease in the floor-areas of the buildings (19.9%), as compared to 1979. That is to say, relatively larger but less number of buildings were constructed before 1980.

When we consider the years after 1980, decreases in the number of buildings constructed continued in 1981 and 1982, and this decrease reached 28% in 1982 as compared to 1980. In these years, the floor-area figures showed 31% decrease. In other words, floor-areas of the buildings constructed had decreased more than that of the number of buildings. This means that, in 1981-1982, there was an increasing trend towards smaller constructions. In 1983 and 1984, there had been 16.2% increase in the number of buildings constructed with respect to 33% increase in the floor areas of the buildings. These rates imply that the demand for larger buildings was more than

the demand for very many number of buildings.

We can thus argue that, related with the negative economic conditions, the constructors preferred producing residential buildings with large floor-areas which promised high profit margins especially in 1980, 1981 and 1982. Due to this preference -which is a very consistent preference in terms of the constructors when we analyze the income distribution inequalities prevailing in the country-, the supply of residential buildings were not sufficient for satisfying the effective demand. These large buildings were aimed to serve for high-income groups instead of low- and middle-income groups. As a result of this attitude, all the construction sector was pushed into a dynamism which was not firm and long-run oriented.

The below given figures indicate these increases/decreases in the floor-areas and number of buildings constructed:

TABLE 6.5 Increases/Decreases About the Construction Sector (%)

	1978 1977	1979 1978	1980 1979	1981 1980	1982 1981	1983 1982	1984 1983
Number of Buildings Constructed	15.2	3.6	-25.5	-19.8	-6.9	8.5	7.1
Floor-Areas of the Buildings	11.3	5.7	-19.9	-42.9	9.3	17.6	13.0

If we compare the total number of residential buildings constructed in 1981-1984 period with that of 1977-1980 period, there is a decrease by 39.1%. In case of non-residential buildings, the rate of decrease in 1981-1984 period is 6.3%. The total number of buildings constructed in 1981-1984 period was 34.1% less than that of 1977-1980 period.

If we make the same analysis in terms of the floor-areas of the buildings constructed in 1981-1984 period with that of 1977-1980 period, the results are as follows: Residential building

floor-areas in 1981-1984 period were 31.5% less than that of 1977-1980 period. Non-residential building floor-areas were 19.7% and the total was 28.8% less than that of 1977-1980 period, respectively.

In the light of the above discussions, if we give the main results of the regressions that we have solved to see the relations among the possible determining factors, they are as follows:

1)The linear equation that we have regressed
by the independent variables;

x1 = Number of Residential Houses in period (t-2) with central-heating systems

x2 = Number of Residential Houses in period (t-2) with five or more floors

x3 = Domestic Flat Glass Sales in period (t) ('000 m^2)

and the dependent variable;

Y = Floor Areas of Residential Houses in period (t) ('000 m^2)

indicates that, the above named independent variables (x1, x2, x3) explain 43.4% of the dependent variable Y (the details of which can be found in the Statistical Appendix, Part B, Equation 4).

2)The linear equation that we have regressed
by the independent variable;

x1 = Number of Residential Buildings in period (t-1)

and the dependent variable;

Y = Flat Glass Export Quantities (tons) in period (t)

indicates that the independent variable x1 explains 79.6% of the dependent variable Y (the details of which can be found in the Statistical Appendix, Part A2, Equation 1).

3)The linear equation that we have regressed
by the independent variables;

x1 = Flat Glass Export Prices (FOB TL/TON) in period (t)

x2 = Residential Building Floor Areas ('000 m^2) in period (t-1)

and the dependent variable;

Y = Flat Glass Export Quantities (tons) in period (t)

indicates that the independent variables (x1, x2) explain 76.98% of the dependent variable Y (the details of which can be found in the Statistical Appendix, Part A2, Equation 2).

4)The linear equation that we have regressed

by the independent variables;

x1 = Export Selling Price (FOB TL/TON) in period (t)

x2 = Residential Building Floor Areas ('000 m^2) in period (t-2)

and the dependent variable;

Y = Export Sales Quantities ('000 m^2) in period (t)

indicates that 76.66% of Y is explained by the independent variables (x1, x2). (the details of which can be found in the Statistical Appendix, Part A2, Equation 3).

When we come to discuss the costs, we shall be establishing important relations with the above mentioned points. That is, the unit cost of a residential building is obtained by making a ratio between the value of the buildings constructed and the total floor-areas of them. After deflating the value of the buildings to come to 1977 -as the base year- the costs are as follows:

TABLE 6.6 Unit Costs of Finished Buildings in the Construction Sector

UNIT : TL/m^2 (1977=100)

	1977	1978	1979	1980	1981	1982	1983	1984
Residential	1,347	1,896	1,977	1,785	1,820	1,787	1,752	1,358
Non-Residential	1,545	1,994	2,026	1,784	1,856	1,726	1,684	1,306
TOTAL	1,392	1,918	1,987	1,784	1,828	1,775	1,734	1,346

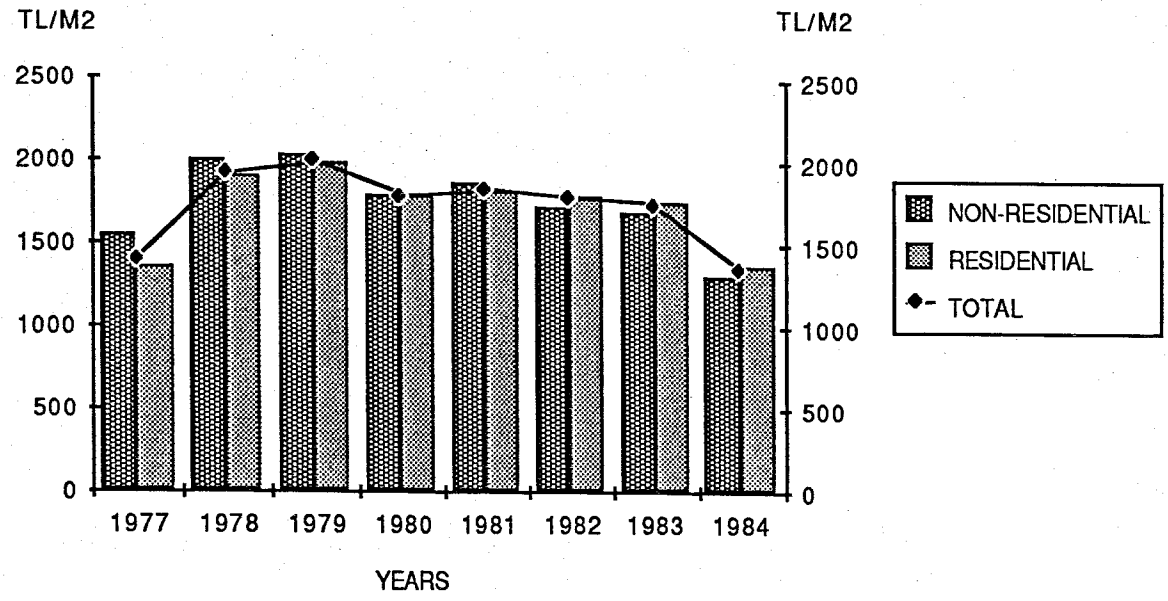

Figure 6.3 Real Unit Costs of Finished Buildings in the Construction Sector

Since the unit-costs of finished residential buildings and non-residential buildings show different trends in each year, it is better to analyze the finished buildings under these two headings individually and comparatively.

In the residential constructions, the cost increases had been 40.8% and 4.3% in 1978 and 1979, respectively. In the non-residential constructions, the cost increases had been 29.1% and 1.6% in the same years, respectively. In 1980, the costs decreased by 10.8% in the residential constructions and 13.6% in the non-residential constructions, with respect to 1979. In 1981, the cost increase was 2% in the residential sector. In 1982, 1983 and 1984 cost decreases were observed, this time by 1.8%, 2.0% and 29% respectively, in the same sector. The non-residential sector showed a cost increase by 2.5% in 1981 and cost decreases of 7.5%, 2.4% and 28.8% in 1982, 1983 and 1984, respectively.

As in the case of the number of buildings constructed and the floor-areas of the

buildings constructed, this time we have regressed equations to give concrete results about the costs of especially the residential buildings.

1)The linear equation that we have regressed

by the independent variables;

x1 = Flat Glass Domestic Selling Prices (TL/m^2) (1977=100)

x2 = Areas of Residences ('000 m^2) in period (t-2)

x3 = Cost of Residences (TL/m^2) in period (t-2)

and the dependent variable;

Y = Domestic Flat Glass Demand ('000 m^2) in period (t)

indicates that, these independent variables (x1, x2, x3) help to explain 71.2% of the dependent variable Y (the details of which can be found in the Statistical Appendix, Part A1, Equation 7).

2)The linear equation that we have regressed

by the independent variables;

x1 = Unit Cost of Residential Houses (TL/m^2) in period (t-2)

x2 = Flat Glass Price Index (1975=100)

and the dependent variable;

Y = Number of Residential Houses in period (t-2)

indicates that, these independent variables (x1, x2) help to explain 82.7% of the dependent variable Y (the details of which can be found in the Statistical Appendix, Part B, Equation 1).

3)The linear equation that we have regressed

by the independent variables;

x1 = Unit Cost of Residential Houses (TL/m^2) in period (t-2)

x2 = Flat Glass Price Index (1977=100)

and the dependent variable;

Y = Number of Residential Houses in period (t-2)

indicates that, these independent variables (x1, x2) help to explain 78.4% of the dependent variable Y (the details of which can be found in the Statistical Appendix, Part B, Equation 2).

4)The linear equation that we have regressed

by the independent variables;

x1 = Unit Cost of Residential Houses (TL/m^2) in period (t-2)

x2 = Average Daily Incomes of Insured Workers (TL/day) in period (t-2)

and the dependent variable;

Y = Floor Areas of the Residential Buildings ('000 m^2) in period (t-2)

indicates that, these independent variables (x1, x2) help to explain 81.5% of the dependent variable Y (the details of which can be found in the Statistical Appendix, Part B, Equation 3).

6.2 THE PLACE OF CONSTRUCTION SECTOR IN TURKISH ECONOMY

One of the main indicators that shows the place of construction sector in Turkish economy is the share of this sector in GNP. For example, this share -which was 5.6% in 1975- reached 6.4% in 1980. By the application of the economic stabilization policies which were put into practise on January 24, 1980, there was an observable stagnation in public investments. Private sector investments were realized behind the targets. Residential constructions receded by more than 30%. These facts affected the growth of the sector negatively and the share of the sector in GNP decreased to 6.1% in 1981 and to 5.9% in 1982, 1983 and 1984 [The Statistical Yearbook of Turkey, 1985 p.435]. When approximately three hundred industries -which are very much related with construction sector- are considered together with this sector, it is easy to see that 40% of all the economic activities are determined with it. Due to the fact that construction sector uses

labour-intensive technology, it creates wide employment opportunities. For example, the share of construction sector in terms of employment was 3.8% in total employment and constituted more than 10% of total employment, excluding agriculture.

The construction sector creates employment opportunities for about three million people, by all its related industries. This employment number represents one-sixth of the population that can actually work. In short, construction sector is the second most important sector of the economy after agricultural sector in Turkey and it really has observable economic and social impacts in almost every country.

The investments -which contain residential, public works, industrial and commercial constructions- in the sector are mostly determined by residential constructions. While 82% of all construction investments are for residential buildings, remaining 18% is determined by public-works, industrial, commercial and other construction investments. A very important amount of residential investments were realized by private sector between 1975-1980, and these were almost 93% of all the residential investments. After 1980, there are decreases in residential investments. The average costs of residential houses were increasing (in current terms) due to the increase in finance costs as well as low demand for houses with smaller floor-areas. Although a small number of people who had economic power created demand for houses with large floor-areas, people who would be willing to live in houses with relatively small floor-areas did not have economic power to purchase these large houses.

As a result of all these reasons, demand which was actually low, had also been effectively limited.

If we assume the annual rate of population increase as 2.5% approximately, both the decrease in effective demand for residential buildings and the slow-down of residential investments, created important economic and social problems.

Before looking at the residence requirements of Turkey, it would be helpful to observe the actual number of residences, shortly. According to 1980 census results, there are 8.6

million households in Turkey. State Institute of Statistics (SIS) assumes every household as 4.5 or 5 people. As half of this 8.6 million households live in urban areas, there are 4.5 million households in urban areas. Three-fourth of the residence requirements in cities stem from urbanization and one-fourth of it stem from renewal and similar reasons. Between 1960 and 1980, the urban population rose from 7 million to 20 million. Although the annual average population increase assumption for Turkey is around 2.5%, it is around 6% in urban areas. On the other hand, there are relative decreases in the urbanization rates since 1970. For example, 7% urbanization rate of 1970 was 6.3% in 1975 and 4.3% in 1980. The support price policies of those periods' governments had important effects in the decrease of urbanization rate. Due to this reason, the pushing effect of rural areas decreased and also the attractiveness of living in cities changed direction because of the high inflation rates. The decrease in the rate of urbanization after 1970 can be considered as natural since urbanization is the result of the push of rural areas and the attraction of the urban areas.

Besides the decrease in the urban population, high inflation rates also caused the marriage rates to decline. The marriage rate which was 73% in 1960 turned to be 60% between 1975-1980. Thus, qualities of the residences required also changed. Neither the decrease in the population rate nor the decrease in the marriage rates could help the solution of the residence problem. It is indicated by Kent-Koop[1] authorities that, the number of residences produced are always below the required numbers. For example, the residence gap which was 9% in 1979 rose to 16% in 1980, 17% in 1981 and 18% in 1982. 1983 gap is said to be around 20%. In short, there are about 300.000 or 400.000 residences required, every year in Turkey. A research which was made for 1981 showed that annual residence requirement was 343.000, but 267.000 residences were produced. The remaining 76.000 residence gap was closed by "gecekondu"[2] type of houses.

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1 Kent-Koop is an organization which aims to explain the importance of the housing sector apart from the construction sector, to the general public.

2 Gecekondu : A residence that is built in a day or so in suburbs where there is no infrastructure.

Construction sector had entered into a crisis after January 24, 1980. The stagnation in the construction sector created an increase in residence bottlenecks, a decrease in residence investments, and an increase in unemployment.

6.2.1 General Problems of the Construction Sector

Construction sector has a wide spectrum and contains industries which directly or indirectly produce inputs for constructing residences, roads, dams, harbours and bridges in it.

Construction sector -and especially the construction of residences- had continuously receded beginning with 1980 and caused such crisis that social and economic aspects of the country are threatened, due to the rapid increases in demand. In fact, the many-sided crisis that this sector is now faced with, has its roots in 1977 and 1978. As the "construct and sell" attitude of the constructors functioned very well almost in all cities of the country, negative outcomes related with these reasons became observable in 1980s.

Between 1977 and 1980 -when the economic and social conditions of the country were very poor-, private sector investments receded considerably, capacity-utilization rate in the economy deteriorated, and GNP -for the first time within the planned period- was negative. In spite of all these negative conditions, construction sector improved and the number of residences constructed increased. The share of construction sector in GNP also increased between 1977-1979 period [Source: Statistical Yearbook of Turkey, 1985].

The improvement trend that construction sector experienced between 1977-1979, in spite of all the macroeconomic problems, could continue only until mid-1980. After the stabilization decisions of January 24,1980, the sector started to experience difficulties at an increasing rate. Thus, the many-sided problems have come to today's important levels.

The total number of the construction permits in 1980 was 69,579 but decreased to 59,163 and 54,074, in 1981 and 1982, respectively. The growth rate of the sector was 4.2% in

1979 but decreased to 0.8% in 1980 and 0.4% in 1981.

In order to rescue construction sector from crisis and to establish a healthy structure for its well-being, costs must also be paid attention as they are very high in Turkey.

The factors which cause high costs can be ordered as follows:

-Generally, the floor-areas of the residences are large and there are unnecessary or useless areas within residences.

-Residences are constructed by luxurious and expensive materials, and therefore material extravagancy is caused.

-Pre-fabric ways of building constructions are not utilized and the conventional ways are still widespread.

-The main inputs of the construction sector, namely iron, cement and timber -which are mostly produced by public sector- are subject to frequent price increases.

-There is no standardization in the construction materials.

-The labour-force that works in the construction sector is unqualified and therefore inefficient.

These factors have varying relative shares in the high unit costs of residences.

6.2.2 Construction Sector in Development Plans

In our macro-plans, construction and residence sectors are seperately treated. In fact, residence sector is contained within the construction sector. The socio-economic importance of the residence sector is such that it necessiates a seperate treatment. Turkish planners have been considering residence and construction sectors seperately as a convention, since the first plan years.

In the first, second and third Five Year Plans, the subject which is insistantly stressed

is, "no more investments will be directed towards construction sector as compared to the current investments". The reason of this limitation was due to the belief that construction sector was not considered as a productive sector. This view is dominant in our first, second and third Five Year Plans. In fact, it is possible to agree with this view if we consider the economic conditions of those years. In an economy which had already started its agricultural mechanization and had not realized serious improvements, responsible leaders should not have given priority to construction sector in terms of the distribution of capital.

When we come to 1984 and 1985, construction sector had to be the locomotive sector of the economy, inevitably. This sector has such a feature that it has close ties with three-hundred supporting industries, and three-hundred production activities. On the other hand, in periods of high inflation, the most reliable source of economic guarantee is one's having a residence.

6.3 OVERALL ANALYSIS of TURKISH FLAT GLASS DOMESTIC MARKET

The three flat glass producing factories of Turkey, namely, Çayırova Glass Industry Incorporation, Anadolu Glass Industry Incorporation and Trakya Glass Industry Incorporation steer this side of the glass industry in Turkish economy. Their individual and combined performances determine the supply of flat glass as well as the price policies, to some extent.

If we start observing the flat glass industry of Turkey with figures, we can begin with the production quantities and values of the flat glass produced. In observing the quantities produced, we accept that quantities produced and quantities sold (domestic+export) are equal to each other as stocks are kept at reasonably low levels. On the other hand, quantities are measured both in terms of "tons" and "square meters" in flat glass definitions. Thus, the factory based production quantities, i.e.: the sales quantities, are as follows:

6.3.1 Cayirova Glass Industry Incorporation

TABLE 6.7 "Cayirova" Domestic Sales

Unit: Tons

1977	1978	1979	1980	1981	1982	1983	1984
82,740	76,159	74,585	43,739	78,720	55,540	35,667	38,718

Unit: '000 m^2

1977	1978	1979	1980	1981	1982	1983	1984
11,716	10,395	9,682	5,716	10,406	7,745	4,998	5,349

Source: Cam Pazarlama A.S.

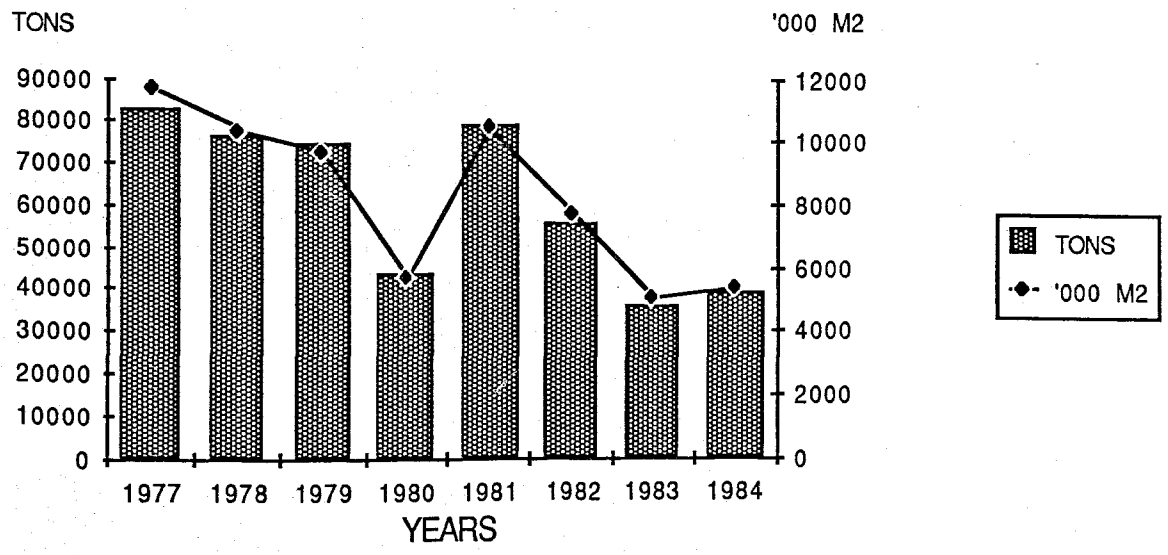


Figure 6.4 "Cayirova" Flat Glass Sales Quantities (Domestic)

As can be observed both from the figures and graphs, there was a decreasing trend between 1977-1980 in flat glass production and domestic sales quantities. Except for 1981, 1981-1984 interval was again a period of decreases for flat glass domestic sales.

In terms of sales revenues, the figures are as follows:

TABLE 6.8 "Cayirova" Domestic Sales Revenues

Unit: '000 TL (CURRENT)

1977	1978	1979	1980	1981	1982	1983	1984
722,881	806,117	1,459,112	1,970,450	5,078,113	4,662,887	4,629,766	6,481,191

Unit ='000 TL (CONSTANT) (1977=100)

1977	1978	1979	1980	1981	1982	1983	1984
722,881	523,453	546,484	387,122	735,958	530,476	411,169	393,038

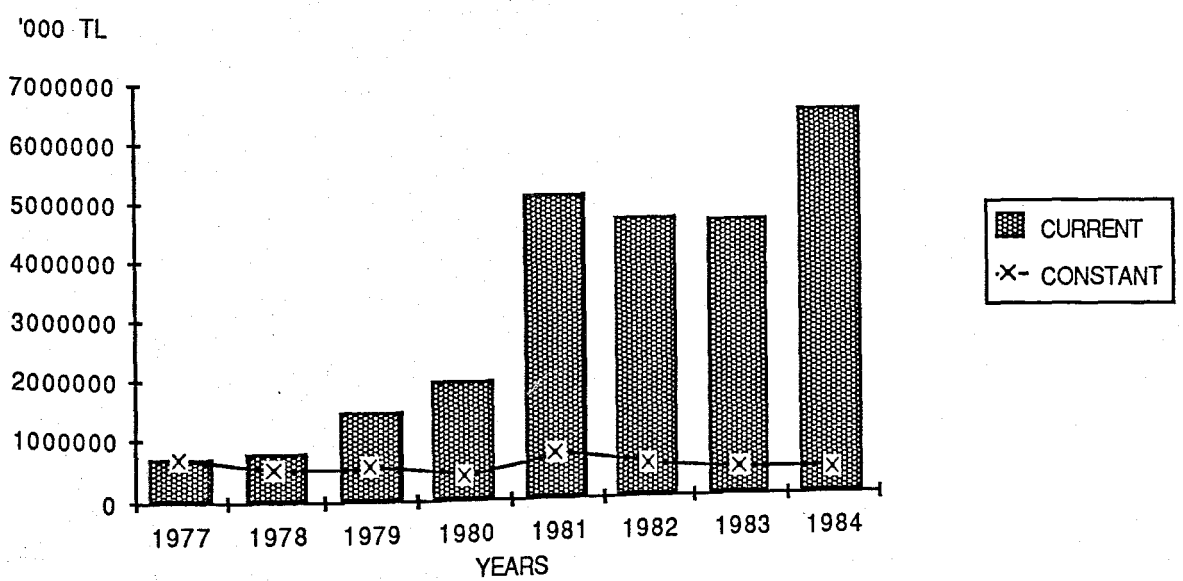


Figure 6.5 "Cayirova" Flat Glass Sales Revenus (Domestic)

The constant sales revenue figures of course give a different scatter plot as compared to the plot of current sales revenue figures, since they are deflated by the annual inflation rates given by the Istanbul Chamber of Commerce (Wholesale Price Indices, 1963=100 is adopted to 1977=100).

When we calculate the current unit price of flat glass, the figures for Çayırova factory are as follows:

TABLE 6.9 "Çayırova" Domestic Selling Prices

Unit: TL/TON (CURRENT)

1977	1978	1979	1980	1981	1982	1983	1984
8,737	10,585	19,563	45,050	64,509	83,955	129,805	167,395

The constant TL/TON unit prices are as follows considering the constant TL values of domestic sales. If we convert these current prices into constant 1977 prices, the constant unit price figures are;

Unit: TL/TON (CONSTANT) (1977=100)

1977	1978	1979	1980	1981	1982	1983	1984
8,736	6,873	7,327	8,851	9,349	9,551	11,528	10,151

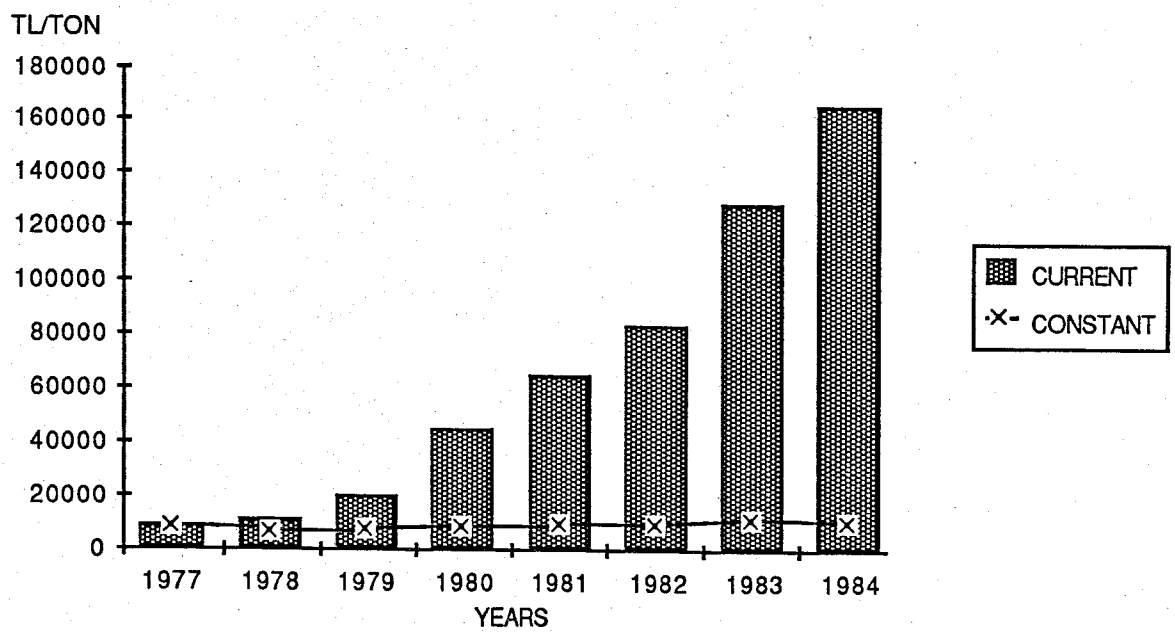


Figure 6.6 "Cayirova" Flat Glass Selling Prices (Domestic)

6.3.2 Anadolu Glass Industry Incorporation

TABLE 6.10 "Anadolu" Domestic Sales Quantities

Unit: Tons

1977	1978	1979	1980	1981	1982	1983	1984
37,733	45,873	49,237	45,226	38,953	35,074	25,624	28,558

Unit: '000 m^2

1977	1978	1979	1980	1981	1982	1983	1984
4,923	5,948	6,327	5,815	4,929	4,694	3,392	3,617

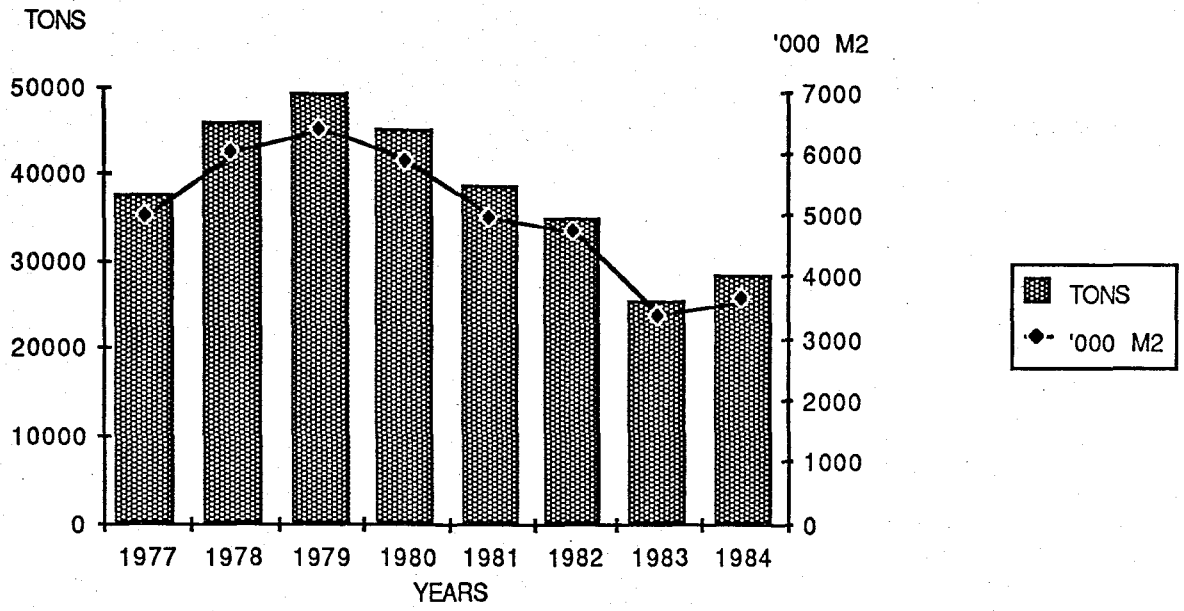


Figure 6.7 "Anadolu" Flat Glass Sales Quantities (Domestic)

The production and domestic sales quantities showed an increasing trend between 1977-1979. Beginning with 1980, this trend was in the opposite direction, except the negligible increase in 1984.

Sales revenues, as a result of the above given trend is as follows:

TABLE 6.11 "Anadolu" Domestic Sales Revenues

Unit: '000 TL (CURRENT)

1977	1978	1979	1980	1981	1982	1983	1984
353,409	520,611	1,011,748	1,950,965	2,506,076	3,095,595	3,672,356	5,596,343

Unit:'000 TL (CONSTANT) (1977=100)

1977	1978	1979	1980	1981	1982	1983	1984
353,409	338,059	378,932	383,294	363,199	352,172	326,142	339,378

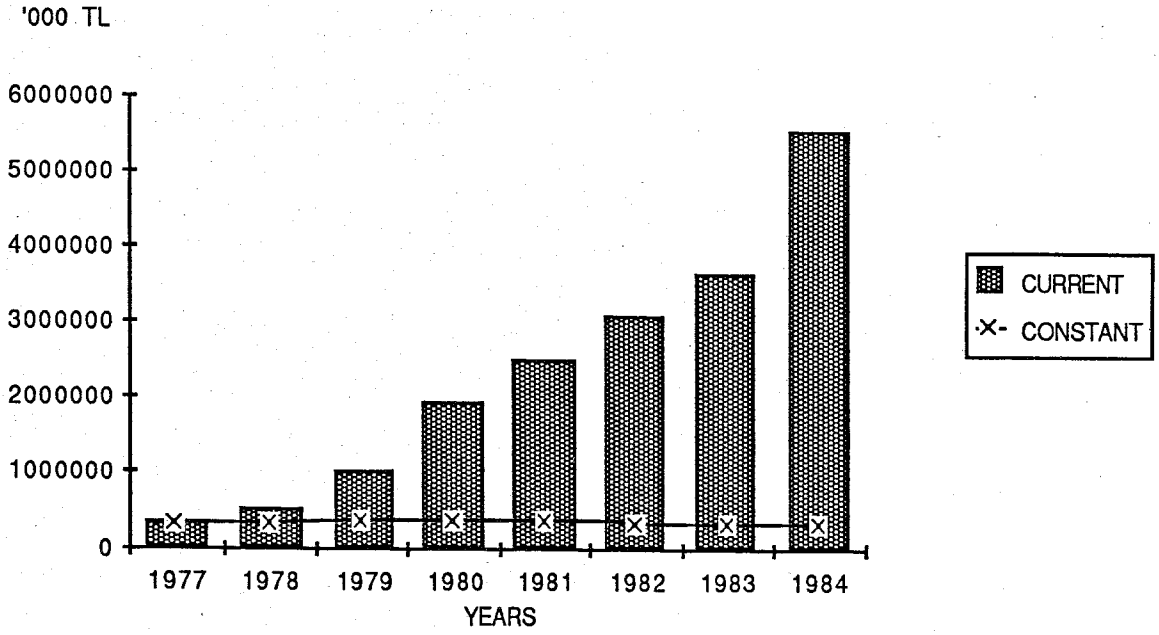


Figure 6.8 "Anadolu" Flat Glass Sales Revenues (Domestic)

TABLE 6.12 "Anadolu" Domestic Selling Prices

Unit:TL/TON (CURRENT)

1977	1978	1979	1980	1981	1982	1983	1984
9,366	11,349	20,549	43,138	64,336	88,259	143,317	195,964

Unit: TL/TON (CONSTANT) (1977=100)

1977	1978	1979	1980	1981	1982	1983	1984
9,366	7,369	7,696	8,475	9,324	10,041	12,728	11,884

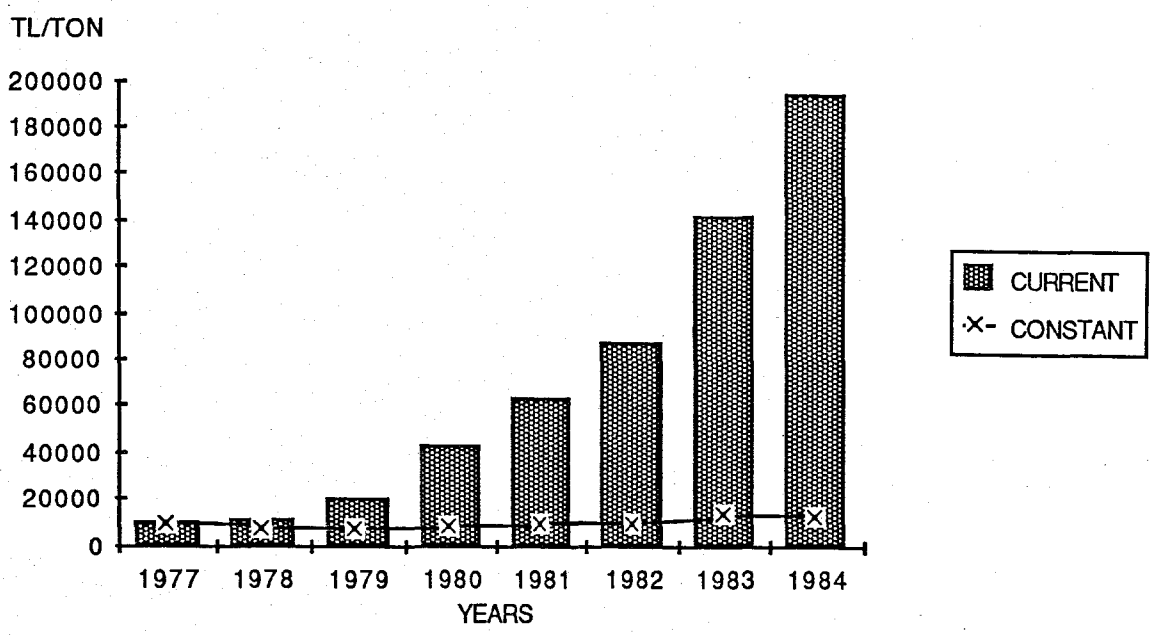


Figure 6.9 "Anadolu" Flat Glass Selling Prices (Domestic)

6.3.3 Trakya Glass Industry Incorporation

TABLE 6.13 "Trakya" Domestic Sales Quantities

Unit: Tons

1977	1978	1979	1980	1981	1982	1983	1984
-	-	-	-	12,600	58,986	74,759	73,967

Unit: '000 m^2

1977	1978	1979	1980	1981	1982	1983	1984
-	-	-	-	1,213	5,955	7,616	7,481

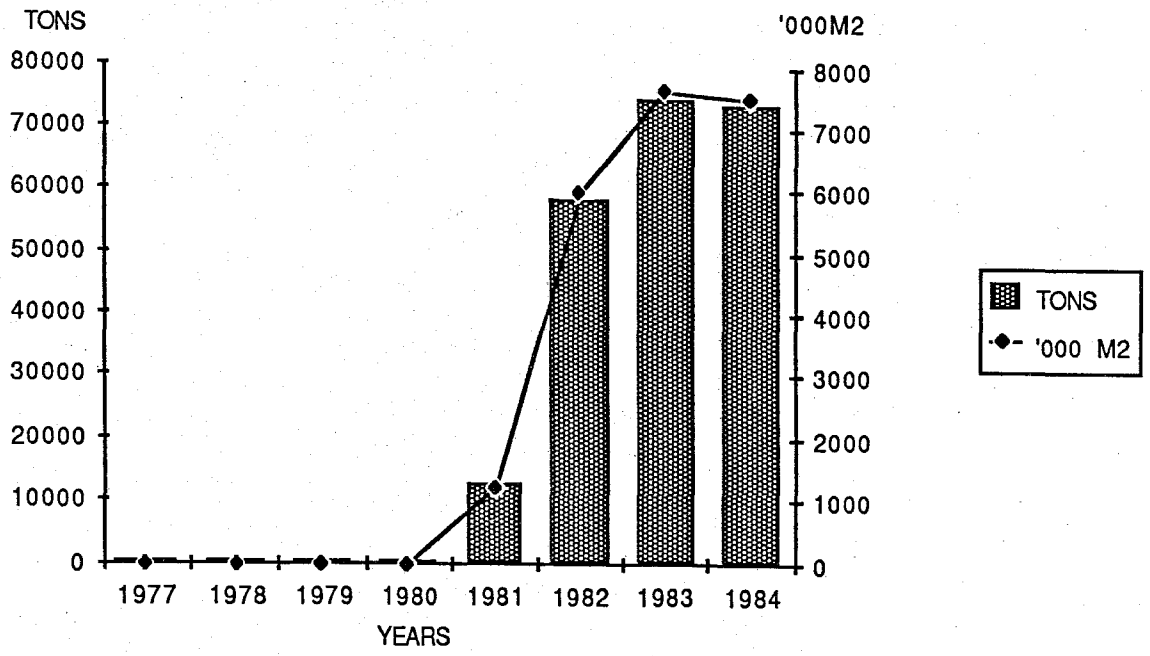


Figure 6.10 "Trakya" Flat Glass Sales Quantities (Domestic)

TABLE 6.14 "Trakya" Domestic Sales Revenues

Unit: '000 TL (CURRENT)

1977	1978	1979	1980	1981	1982	1983	1984
-	-	-	-	775,877	4,795,449	8,843,838	12,685,605

Unit: '000 TL (CONSTANT) (1977=100)

1977	1978	1979	1980	1981	1982	1983	1984
-	-	-	-	112,446	545,557	785,421	769,291

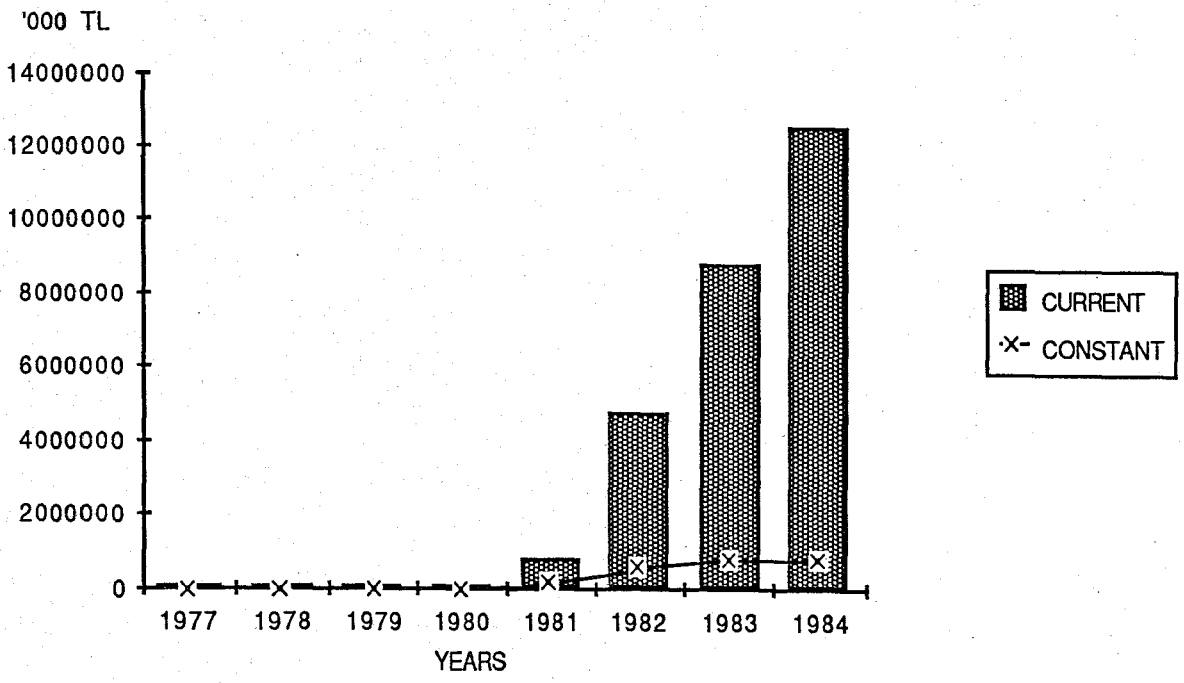


Figure 6.11 "Trakya" Flat Glass Sales Revenues (Domestic)

TABLE 6.15 "Trakya" Domestic Selling Prices

Unit: TL/TON (CURRENT)

1977	1978	1979	1980	1981	1982	1983	1984
-	-	-	-	61,578	81,298	188,298	171,504

Unit: TL/TON (CONSTANT) (1977=100)

1977	1978	1979	1980	1981	1982	1983	1984
-	-	-	-	8,924	9,310	10,506	10,400

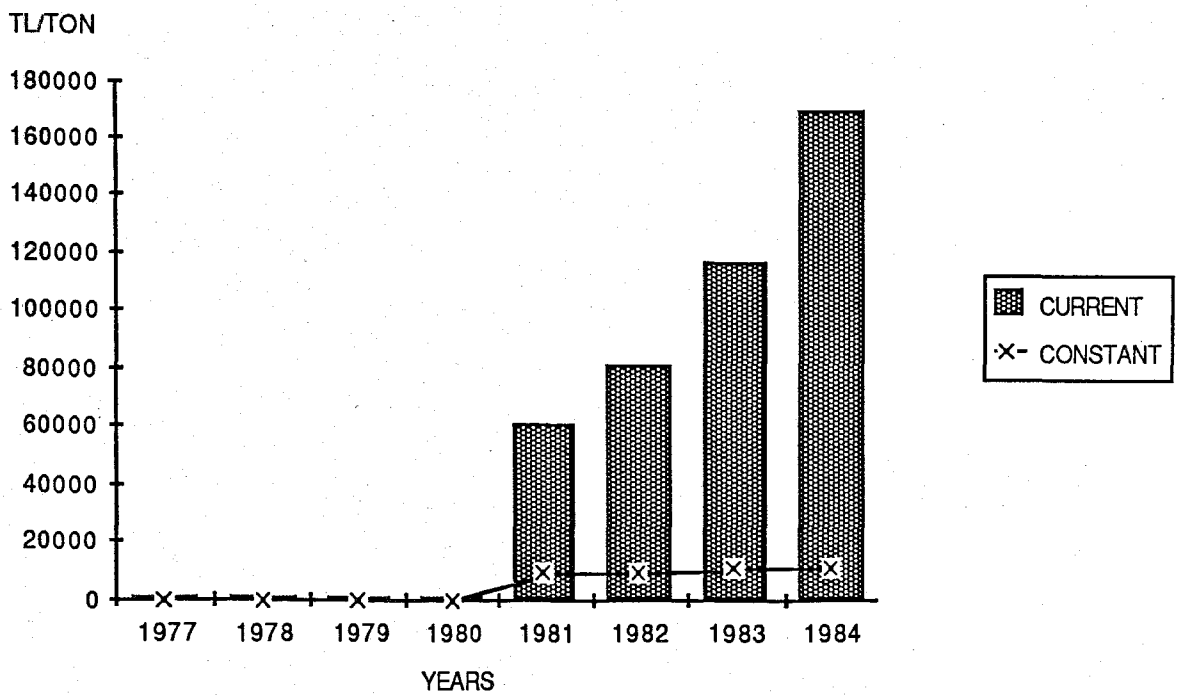


Figure 6.12 "Trakya" Flat Glass Selling Prices (Domestic)

CHAPTER VII

TURKISH FLAT GLASS EXPORT MARKET

7.1 TOTAL FLAT GLASS EXPORT ANALYSIS

In Turkey, glass industry products have been exported more after the practise of the stabilization policies of January 1980, same as some other industrial products. Our concern -flat glass- which is only one of the kinds of glass industry products is analysed within this perspective, in this chapter.

When we try to see the flat glass export performance of Turkey as a whole, the only producer of this glass kind being Turkish Glassworks Company, we have to observe the combined performances of the flat glass producing factories which are under the roof of the above named company. After looking at the matter from this global perspective, we try to analyze the changing performances of each of the three flat glass producing companies.

Total flat glass export quantities in terms of tons show a decreasing trend between 1977-1980 period. The total quantity decrease within this period is 71.7%. Beginning with 1981, an increasing trend is observable in exported flat glass quantity (tons). The overall increase in 1981-1984 period is 209%.

In 1977-1980 period, Trakya Glass was not put into operation but flat glass exports from Anadolu Glass decreased by 109%. The flat glass exports of Çayırova Glass increased only by 21.5%, after the increase in 1978 and 1979. Due to these double-sided effects, the total sales quantities of Anadolu Glass and Çayırova Glass factories caused a 71.7% decrease, between 1977-1980.

Beginning with 1981, Trakya Glass Ind. Inc. started its operation and little quantities of flat glass were exported. In 1981-1984 period, the individual export increases were 140.3% for Çayırova Glass, 69.8% for Anadolu Glass and 16,240% for Trakya Glass.

In terms of square meter quantities, the trend is same as that of the quantities in terms of tons. In 1977-1980 period, 55.2% decrease was realized in flat glass exports, in terms of square meters. The decrease was determined by the decrease in Anadolu Glass exports. On the other hand, total increase of export quantities in terms of square meters in 1981-1984 period was 246%. The individual factory export quantity increases were; 268% for Çayırova Glass, 69.2% for Anadolu Glass, 21571% for Trakya Glass (with Trakya starting operation in 1981).

7.1.1 Total Export Quantity Analysis

The figures and graphs of the performances in 1977-1984 period are given below:

TABLE 7.1 Factory Totals of Flat Glass Exports from Turkey

Unit: Tons

	1977	1978	1979	1980	1981	1982	1983	1984
CG	2,302	3,526	5,507	2,796	19,892	31,090	38,400	47,802
AG	14,099	12,526	8,222	6,756	27,099	34,955	35,069	46,001
TG	-	-	-	-	323	27,686	47,587	52,453
TOTAL	16,401	16,052	13,729	9,552	47,314	93,731	121,056	146,280

Quantity Average of 1977-1980 Period: 13,934

Quantity Average of 1981-1984 Period: 102,095

Source: Cam Pazarlama A.S.

TABLE 7.1 (continued) Factory Totals of Flat Glass Exports from Turkey

Unit: '000 m^2

	1977	1978	1979	1980	1981	1982	1983	1984
CG	330	434	726	358	2,314	4,072	4,891	8,512
AG	1,452	1,311	923	790	3,168	3,910	3,944	5,360
TG	-	-	-	-	24	2,619	4,466	5,177
TOTAL	1,782	1,745	1,649	1,148	5,506	10,601	13,301	19,049

Source: Cam Pazarlama A.S.

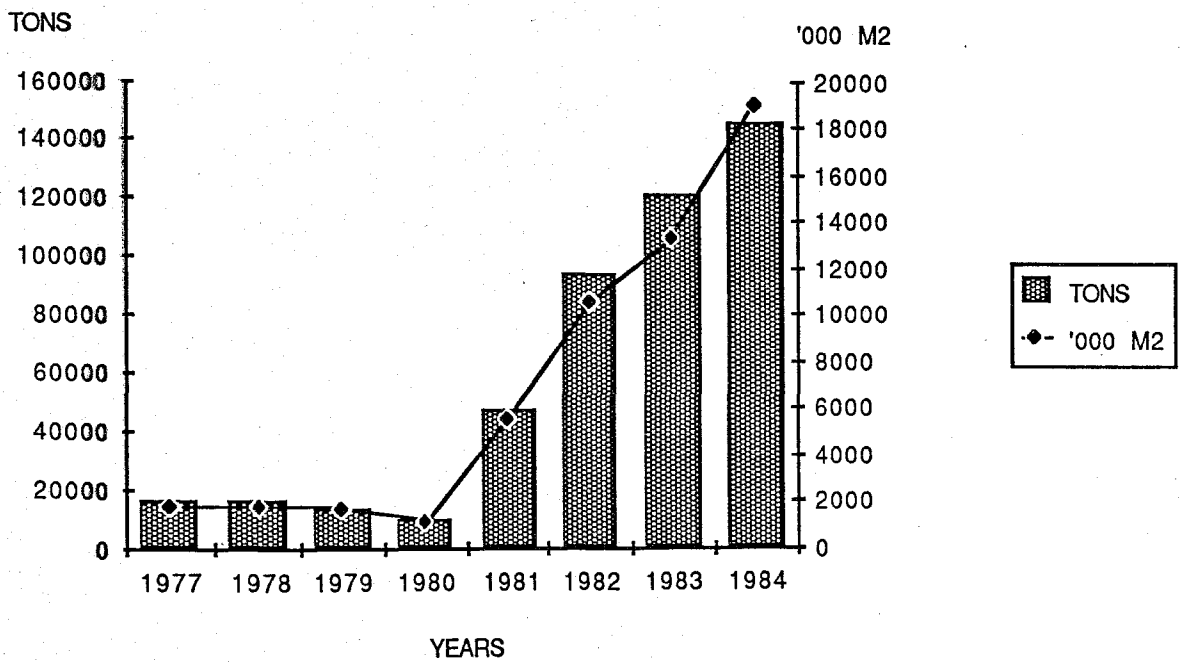


Figure 7.1 Total Flat Glass Export Quantities of Turkey (1977-1984)

7.1.2 Total Export Revenue Analysis

When we come to observe the revenues of the exported flat glass quantities, we see a

parallel trend to that of the exported quantities, in terms of U.S. dollars (FOB). That is to say, 59% decrease from 1977 until 1980 with respect to 112% increase from 1981 until 1984 was the global trend of the revenue obtained from export sales.

If we try to get rid of the appreciation of U.S. dollars with respect to Turkish Lira and deflate the U.S. dollar (FOB) values by the appreciation rates of U.S. dollar, then the constant revenues as well as the current revenues are as follows:

TABLE 7.2 Total Flat Glass Export Revenues of Turkey

Export Revenues (FOB '000 U.S. $) CURRENT

1977	1978	1979	1980	1981	1982	1983	1984
4,872	4,825	4,052	3,068	16,811	29,510	33,464	35,690

Source: Cam Pazarlama A.S.

U.S. $ Index

1977	1978	1979	1980	1981	1982	1983	1984
100.0	134.9	213.5	422.2	626.7	913.2	1280.1	2083.3

Source: The Central Bank Publications

Deflated Export Revenues (FOB '000 U.S. $) CONSTANT 1977=100

1977	1978	1979	1980	1981	1982	1983	1984
4,872	3,577	1,898	727	2,682	3,231	2,614	1,713

Source: Cam Pazarlama A.S.

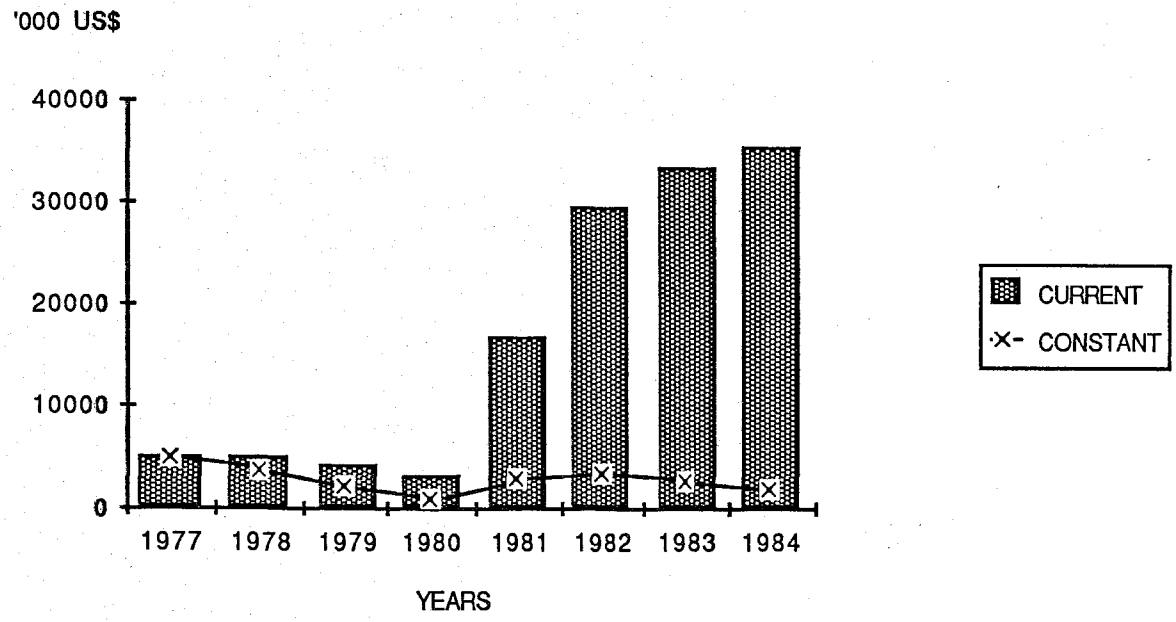


Figure 7.2 Total Flat Glass Export Revenues

When we start analyzing the FOB Turkish Lira revenues of the same export quantities, there is not a decreasing trend in these figures. In 1977-1980 interval, 174.8% increase, and in 1981-1984 interval 613.3% increase was observed. Of course, these figures are not free of the effect of inflation. Besides inflation, the depreciation of Turkish Lira is also contained within these revenue figures.

Thus the current and constant (1977=100) revenue figures are as follows:

TABLE 7.3 Total Flat Glass Export Revenues of Turkey

Export Revenues (FOB '000 TL) CURRENT

1977	1978	1979	1980	1981	1982	1983	1984
86,153	114,573	146,265	236,773	1,858,365	4,717,757	7,857,279	13,255,303

Inflation Index

1977	1978	1979	1980	1981	1982	1983	1984
100	154	267	509	690	879	1120	1649

Deflated Export Revenues (FOB '000 TL) CONSTANT (1977=100)

1977	1978	1979	1980	1981	1982	1983	1984
86153	74,398	54,780	46,517	269,328	536,718	701,543	803,839

After deflating the FOB '000 TL values of export revenues by the inflation index, the real trend is such that between 1977-1980, 85.2% decrease is observed. Between 1981-1984, an increase of 198.6% is realized. Before deflating the revenue figures by the inflation index the increase for 1981-1984 period was extremely high and was 613.3%. The trend obtained after deflating the revenue figures have shown 85.2% decrease for 1977-1980 period, whereas the trend showed an increase of 174.8% before deflating.

TABLE 7.4 Factory Totals of Flat Glass Export Revenues

Unit: FOB '000 US$ CURRENT

	1977	1978	1979	1980	1981	1982	1983	1984
CG	601	1,029	1,569	845	6,754	9,790	9,999	11,514
AG	4,271	3,796	2,483	2,223	9,946	11,260	10,865	11,081
TG	-	-	-	-	111	8,460	12,600	13,095
TOTAL	4,872	4,825	4,052	3,068	16,811	29,510	33,464	35,690

TABLE 7.5 Factory Totals of Flat Glass Export Revenues

Unit: FOB '000 US$ CONSTANT (1977=100)

	1977	1978	1979	1980	1981	1982	1983	1984
CG	601	763	735	200	1,078	1,072	781	553
AG	4,271	2,814	1,163	527	1,587	1,233	849	532
TG	-	-	-	-	18	926	984	629
TOTAL	4,872	3,577	1,898	727	2,683	3,231	2,614	1,714

EXPORT (FOB '000 TL) CURRENT

	1977	1978	1979	1980	1981	1982	1983	1984
CG	10,582	25,705	54,946	68,240	739,868	1,575,260	2,316,619	4,276,300
AG	75,571	88,868	91,319	168,537	1,103,989	1,790,753	2,592,580	4,115,483
TG	-	-	-	-	14,508	1,351,744	2,948,080	4,863,520
TOTAL	86,153	114,573	146,265	236,773	1,858,365	4,717,757	7,857,279	13,255,303

EXPORT (FOB '000 TL) CONSTANT (1977=100)

	1977	1978	1979	1980	1981	1982	1983	1984
CG	10,582	16,692	20,579	13,407	107,227	179,210	206,841	259,327
AG	75,571	57,706	34,201	33,110	159,998	203,726	231,480	249,574
TG	-	-	-	-	2,103	153,782	263,221	294,938
TOTAL	86,153	74,398	54,780	46,517	269,328	536,718	701,543	803,839

Between 1977-1984, the number of countries which flat glass exports were directed

reached thirty. If we try to analyze this period in two parts, we can see from Table 1 that the maximum number of countries in 1977-1980 period was ten. On the other hand, in 1981-1984 period, the number of countries that flat glass exports were directed reached thirty, which is three times more than that of 1977-1980 period.

In 1977-1980 period, the prices applied for the importing countries resulted in 308.73 FOB$/TON, on the average (Table 7.9). In 1981-1984 period, the average price was 265.48 FOB$/TON, being 43.25 FOB$/TON less than that of the 1977-1980 period in current figures.

The above mentioned points indicate that in 1977-1980 period, although the number of countries that flat glass had been exported was less than that of 1981-1984 period, the prices applied in the former period were relatively higher than that of the latter period. It is interesting to see this result. In other words, although the number of importing countries increased and expansion towards Nigeria, Hong-Kong, Australia, Spain, Ireland, Norway in 1983 and U.S.A., Switzerland, Japan, Yugoslavia and Finland in 1984 -for the first time- was realized, the cost of this expansion to different world markets was to sell with lower export prices.

After analyzing the unit export price structure of flat glass in 1977-1980 and 1981-1984 periods, we have compared the results for these two periods. In terms of export sales revenues, it is again appropriate to see the trend in two seperate periods, i.e.: 1977-1980 and 1981-1984.

While the current revenue figure for 1977 was 4,872,000 FOB $, it decreased to 3,268,000 FOB$ in 1980. This figure was obtained as a result of gradual decreases in export revenues. Thus the total decrease in export sales revenues was by 49.1%, at the end of 1977-1980 period.

When we begin observing the current export sales revenues for 1981-1984 period, there is a considerably high jump from 1980 to 1981. As 1981 is the first year after the initial applications of the stabilization policies, the effects of these applications were very sharp. Thus, the current export sales revenues for 1981 and 1984 were 16,811,700 FOB $ and 35,689,400 FOB $,

respectively. The overall increase in export sales revenues in 1981-1984 period, as can be seen from these figures, was by 112.3% (Table 7.7).

In terms of quantities exported, the figures were such that, beginning with 1977 a decreasing trend was observable. The export sales quantity decrease was 71.7% in 1977-1980 period (in terms of tons). In 1981-1984 period, the overall increase in quantities exported was 209%.

The average export sales quantity for 1977-1980 period was 13,934 tons whereas the average quantity for 1981-1984 period was 102,095 tons. The difference between the averages of these two periods was 88,161 tons (see 7.1.1).

It is somewhat clear that although exported flat glass quantities gradually decreased in 1977-1980 period, the price average was not in the same trend. In 1981-1984 period, the quantities exported continously increased with generally lower average prices. This is attributable to the purpose of finding new customers in the world market and thus applying competitive prices to the newly met markets (Table 7.9).

EXPORT DESTINATIONS OF FLAT GLASS FACTORIES IN TURKEY
(CAYIROVA+ANADOLU+TRAKYA GLASS INDUSTRIES)

	1977	1978	1979	1980	1981	1982	1983	1984
1	Iraq	Iran	Egypt	Iran	Iran	Iran	Iran	Iran
2	Syria	Syria	Iraq	Egypt	Libya	Iraq	Iraq	Iraq
3	Iran	Iraq	Syria	Jordan	Egypt	Egypt	Algeria	Egypt
4	Italy	Egypt	Iran	Libya	Iraq	Algeria	Egypt	Italy
5	Lebanon	Jordan	Jordan	Syria	Jordan	England	Italy	Algeria
6	Jordan	Italy	Italy	Cyprus	W.Germany	Greece	England	Greece
7	S.Arabia	Cyprus	Cyprus	Italy	Greece	Lebanon	W.Germany	S.Arabia
8	W.Germany	S.Arabia	France	Iraq	S.Arabia	S.Arabia	Greece	England
9	Austria				Syria	Jordan	Libya	Libya
10	Cyprus				Italy	Italy	Jordan	W.Germany
11					Cyprus	Syria	Morocco	Morocco
12					Sudan	W.Germany	S.Arabia	Jordan
13					Austria	Tunisia	Spain	Switzerland
14					England	Netherlands	Ireland	Netherlands
15					Tunisia	Cyprus	Australia	U.A.E.
16						U.A.E.	U.A.E.	Cyprus
17						Austria	Lebanon	Tunisia
18						Sudan	Cyprus	Austria
19						Morocco	Nigeria	U.S.A.
20						Libya	Netherlands	Lebanon
21						France	Tunisia	Japan
22						Kuwait	Austria	Bulgaria
23						Qatar	Sudan	France
24							Hong-Kong	Sudan
25							Syria	Qatar
26							Oman	Yugoslavia
27							U.S.A.	Finland
28							Kuwait	Sweden
29							Qatar	Norway
30							Norway	

Note: The countries are placed according to the descending order of export quantities (tons)

TABLE 7.6

EXPORT REVENUES OF FLAT GLASS FACTORIES IN TURKEY

(CAYIROVA+ANADOLU+TRAKYA GLASS INDUSTRIES) FOB '000 $

	1977	1978	1979	1980	1981	1982	1983	1984
1	1,252.00	2,117.00	1,787.10	1,254.80	8,239.20	9,402.00	10,883.80	10,581.80
2	848.00	1,177.00	614.90	844.30	2,746.60	7,868.00	10,920.80	9,563.40
3	736.00	636.00	626.90	411.70	2,062.80	5,204.00	2,168.60	5,316.40
4	606.00	600.00	603.40	186.30	2,408.10	1,864.00	2,439.50	1,888.90
5	478.00	144.00	256.20	150.40	512.00	791.00	917.50	1,935.20
6	366.00	79.00	87.60	144.80	172.80	687.00	1,086.40	1,713.30
7	259.00	62.00	70.00	123.20	180.30	674.00	676.30	765.10
8	137.00	10.00	5.90	152.50	130.80	583.00	641.50	685.50
9	99.00				106.70	557.00	804.90	744.70
10	91.00				60.90	311.00	606.70	479.30
11					81.10	565.00	303.30	447.20
12					60.40	168.00	432.70	436.40
13					26.90	256.00	193.10	144.60
14					13.10	104.00	176.30	122.90
15					10.00	148.00	143.70	143.20
16						72.00	184.10	165.90
17						51.00	198.10	107.30
18						71.00	149.40	76.00
19						46.00	71.40	51.60
20						48.00	92.40	81.70
21						21.00	92.60	46.10
22						16.00	63.00	78.60
23						3.00	71.50	38.00
24							42.50	47.20
25							53.40	10.80
26							19.90	8.60
27							13.40	3.40
28							8.70	3.40
29							5.10	2.90
30							4.00	
(CURRENT) TOTAL	4,872.00	4,825.00	4,052.00	3,268.00	16,811.70	29,510.00	33,464.60	35,689.40
CONSTANT (1977=100) TOTAL	4,872.00	3,577.00	1,898.00	727.00	2,682.00	3,231.00	2,614.00	1,713.00

TABLE 7.7

(CAYIROVA+ANADOLU+TRAKYA GLASS INDUSTRIES) TONS

	1977	1978	1979	1980	1981	1982	1983	1984
1	4,189.00	7,143.00	6,151.00	3,194.80	22,721.80	31,194.00	38,991.70	38,683.10
2	2,896.00	3,831.00	2,159.00	2,952.70	7,713.30	19,223.00	28,588.00	25,975.00
3	2,501.00	2,055.00	1,996.30	1,250.00	6,649.40	17,345.00	11,219.90	25,171.10
4	2,236.00	1,988.00	1,972.00	555.40	5,731.00	7,142.00	10,185.20	11,692.20
5	1,524.00	463.00	840.60	458.70	1,396.00	2,948.00	5,172.40	10,874.50
6	1,103.00	291.00	302.00	443.60	881.20	2,692.00	4,998.10	9,357.40
7	731.00	254.00	289.40	385.70	741.80	2,391.00	3,285.60	4,499.00
8	517.00	27.00	18.70	311.10	456.60	2,027.00	3,170.20	3,599.40
9	401.00				303.10	1,697.00	2,766.90	3,233.60
10	303.00				193.00	1,601.00	2,235.80	2,855.80
11					191.90	1,557.00	2,024.30	2,752.80
12					141.60	939.00	1,961.70	1,842.70
13					105.60	900.00	866.20	919.20
14					50.80	485.00	767.40	738.50
15					36.80	433.00	687.10	670.10
16						282.00	653.60	589.70
17						224.00	551.90	547.20
18						193.00	512.50	430.20
19						186.00	500.00	420.10
20						115.00	471.50	362.10
21						87.00	356.10	286.10
22						61.00	267.80	283.80
23						9.00	246.80	180.00
24							209.60	159.00
25							158.70	55.20
26							90.10	52.00
27							49.00	18.10
28							30.60	17.90
29							20.60	14.20
30							16.60	
TOTAL	16,401.00	16,052.00	13,729.00	9,552.00	47,313.90	93,731.00	121,055.90	146,280.00
AVERAGE	1,640.10	2,006.50	1,716.13	1,194.00	3,154.26	4,075.26	4,035.20	5,044.14
	ANNUAL AVERAGE OF 1977-1980 PERIOD			13,933.50	ANNUAL AVERAGE OF 1981-1984 PERIOD			102,095.20

Note: Annual Average of 1977-1980 period is calculated as follows: [1977+1978+1979+1980]/4
Annual Average of 1981-1984 period is calculated as follows: [1981+1982+1983+1984]/4

TABLE 7.8

(CAYIROVA+ANADOLU+TRAKYA GLASS INDUSTRIES) FOB$/TON

	1977	1978	1979	1980	1981	1982	1983	1984
1	298.88	296.37	290.54	330.16	362.61	301.40	279.13	273.55
2	292.82	307.23	284.81	285.94	356.09	409.30	382.01	368.18
3	294.28	309.49	314.03	329.23	310.22	300.03	193.28	211.21
4	271.02	301.81	305.98	335.43	420.19	260.99	239.51	161.55
5	313.65	311.02	304.78	327.88	366.76	268.32	177.38	177.96
6	331.82	271.48	289.97	326.42	196.10	255.20	217.36	183.10
7	354.31	244.09	241.88	319.42	243.06	281.89	205.84	170.06
8	264.99	370.37	315.51	490.20	286.47	287.62	202.35	190.45
9	246.88				352.03	328.23	290.90	230.30
10	300.33				315.54	194.25	271.36	167.83
11					422.62	362.88	149.83	162.45
12					426.55	178.91	220.57	236.83
13					254.73	284.44	222.93	157.31
14					257.87	214.43	229.74	166.42
15					271.74	341.80	209.14	213.70
16						255.32	281.67	281.33
17						227.68	358.94	196.09
18						367.88	291.51	176.66
19						247.31	142.80	122.83
20						417.39	195.97	225.63
21						241.38	260.04	161.13
22						262.30	235.25	276.96
23						333.33	289.71	211.11
24							202.77	296.86
25							336.48	195.65
26							220.87	165.38
27							273.47	187.85
28							284.31	189.94
29							260.20	204.23
30							240.96	
AVERAGE	296.90	301.48	293.44	343.09	322.84	287.93	245.54	205.61
	AVERAGE OF THE YEARS 1977-1980			308.73	AVERAGE OF THE YEARS 1981-1984			265.48

TABLE 7.9

COUNTRIES with FOB $/TON PRICES WHICH ARE BELOW AND ABOVE THE ANNUAL AVERAGE (1977-1980)

1977	1978	1979	1980
246.88 Austria	244.09 Cyprus	241.88 Cyprus	285.94 Egypt
264.99 W.Germany	271.48 Italy	284.81 Iraq	319.42 Italy
271.02 Italy	296.37 Iran	289.97 Italy	326.42 Cyprus
292.82 Syria	------ ------	290.54 Egypt	327.88 Syria
294.28 Iran	301.81 Egypt	------ ------	329.23 Jordan
------ ------	307.23 Syria	304.78 Jordan	330.16 Iran
298.88 Iraq	309.49 Iraq	305.98 Iran	335.43 Libya
300.33 Cyprus	311.02 Jordan	314.03 Syria	------ ------
313.65 Lebanon	370.37 S.Arabia	315.51 France	490.20 Iraq
331.82 Jordan			
354.31 S.Arabia			
ANNUAL 296.90 AVERAGE	ANNUAL 301.48 AVERAGE	ANNUAL 293.44 AVERAGE	ANNUAL 343.09 AVERAGE
5 OUT OF 10 COUNTRIES ARE 50%	3 OUT OF 8 COUNTRIES ARE 37.5%	4 OUT OF 8 COUNTRIES ARE 50%	7 OUT OF 8 COUNTRIES ARE 87.5%

FOB$/TON
1977-1980 FOUR-YEAR AVERAGE
308.73

TABLE 7.10 a

1981	1982	1983	1984
196.10 W.Germany	178.91 W.Germany	142.80 Nigeria	122.83 U.S.A.
243.06 Greece	194.25 Italy	149.83 Morocco	157.31 Switzerland
254.73 Austria	214.43 Netherlands	177.38 Italy	161.13 Japan
257.87 England	227.68 Austria	193.28 Algeria	161.55 Italy
271.74 Tunisia	241.38 France	195.97 Netherlands	162.45 Morocco
286.47 S.Arabia	247.31 Morocco	202.35 Greece	165.38 Yugoslavia
310.22 Egypt	255.20 Greece	202.77 Hong-Kong	166.42 Netherlands
315.54 Italy	255.32 U.A.E.	205.84 W.Germany	167.83 W.Germany
------ ------	260.99 Algeria	209.14 Australia	170.06 S.Arabia
352.03 Syria	262.30 Kuwait	217.36 England	176.66 Austria
356.09 Libya	268.32 England	220.57 S.Arabia	177.96 Algeria
362.61 Iran	281.89 Lebanon	220.87 Oman	183.10 Greece
366.76 Jordan	284.44 Tunisia	222.93 Spain	187.85 Finland
420.19 Iraq	287.62 S.Arabia	229.74 Ireland	189.94 Sweden
422.62 Cyprus	------ ------	235.25 Austria	190.45 England
426.55 Sudan	300.03 Egypt	239.51 Egypt	195.65 Qatar
	301.40 Iran	240.96 Norway	196.09 Tunisia
	328.23 Jordan	------ ------	204.23 Norway
	333.33 Qatar	260.04 Tunusia	------ ------
	341.80 Cyprus	260.20 Qatar	211.11 France
	362.88 Syria	271.36 Jordan	211.21 Egypt
	367.88 Sudan	273.47 U.S.A.	213.70 U.A.E.
	409.30 Iraq	279.13 Iran	225.63 Lebanon
	417.39 Libya	281.67 U.A.E.	230.30 Libya
		284.31 Kuwait	236.83 Jordan
		289.71 Sudan	273.55 Iran
		290.90 Libya	276.96 Bulgaria
		291.51 Cyprus	281.33 Cyprus
		336.48 Syria	296.86 Sudan
		358.94 Lebanon	368.18 Iraq
		382.01 Iraq	
ANNUAL 322.84 AVERAGE	ANNUAL 287.93 AVERAGE	ANNUAL 245.54 AVERAGE	ANNUAL 205.61 AVERAGE
8 OUT OF 15 COUNTRIES ARE 53.3%	14 OUT OF 23 COUNTRIES ARE 60.9%	17 OUT OF 30 COUNTRIES ARE 56.7%	18 OUT OF 29 COUNTRIES ARE 62.1%

FOB$/TON
1981-1984 FOUR-YEAR AVERAGE
265.4

TABLE 7.10 b

COUNTRIES WITH IMPORT QUANTITIES (TONS) WHICH ARE BELOW AND ABOVE THE ANNUAL AVERAGES

	1977	1978	1979	1980
1	303.00 Cyprus	27.00 S.Arabia	18.70 France	311.10 Iraq
2	401.00 Austria	254.00 Cyprus	289.40 Cyprus	385.70 Italy
3	517.00 W.Germany	291.00 Italy	302.10 Italy	443.60 Cyprus
4	731.00 S.Arabia	463.00 Jordan	840.60 Jordan	458.70 Syria
5	1,103.00 Jordan	1,988.00 Egypt	- - - - - - - -	555.40 Libya
6	1,524.00 Lebanon	- - - - - - - -	1,972.00 Iran	- - - - - - - -
	- - - - - - - -	2,055.00 Iraq	1,996.30 Syria	1,250.50 Jordan
7	2,236.00 Italy	3,831.00 Syria	2,159.00 Iraq	2,952.70 Egypt
8	2,501.00 Iran	7,143.00 Iran	6,151.00 Egypt	3,194.80 Iran
9	2,896.00 Syria			
10	4,189.00 Iraq			
	1,640.10 AVERAGE	2,006.50 AVERAGE	1,716.14 AVERAGE	1,194.06 AVERAGE
	6 OUT OF 10 COUNTRIES ARE 60%	5 OUT OF 8 COUNTRIES ARE 62.5%	4 OUT OF 8 COUNTRIES ARE 50%	5 OUT OF 8 COUNTRIES ARE 62.5%

TONS
AVERAGE OF THE YEARS 1977-1980
1,639.20

NOTE: The number of flat glass importing countries with prices below the annual average divided by the total number of importing countries in 1977-1980 period is; 20/34=58.8%.

TABLE 7.11 a

	1981	1982	1983	1984
1	36.80 Tunusia	9.00 Qatar	16.60 Norway	14.20 Norway
2	50.80 England	61.00 Kuwait	19.60 Qatar	17.90 Sweden
3	105.60 Austria	87.00 France	30.60 Kuwait	18.10 Finland
4	141.60 Sudan	115.00 Libya	49.00 U.S.A.	52.00 Yugoslavia
5	191.90 Cyprus	186.00 Morocco	90.10 Umman	55.20 Qatar
6	193.00 Italy	193.00 Sudan	158.70 Syria	159.00 Sudan
7	303.10 Syria	224.00 Austria	209.60 Hong-Kong	180.00 France
8	456.60 S.Arabia	282.00 U.A.E.	246.80 Sudan	283.80 Bulgaria
9	741.80 Greece	433.00 Cyprus	267.80 Austria	286.10 Japan
10	881.20 W.Germany	485.00 Netherlands	356.10 Tunusia	362.10 Lebanon
11	1,396.00 Jordan	900.00 Tunusia	471.50 Netherlands	420.10 U.S.A.
	- - - - - - - -	939.00 W.Germany	500.00 Algeria	430.20 Austria
12	5,731.00 Iraq	1,557.00 Syria	512.50 Cyprus	547.20 Tunusia
13	6,649.40 Egypt	1,601.00 Italy	551.90 Lebanon	589.70 Cyprus
14	7,713.30 Libya	1,697.00 Jordan	653.60 U.A.E.	670.10 U.A.E.
15	22,721.80 Iran	2,027.00 S.Arabia	687.10 Australia	738.50 Netherlands
16		2,391.00 Lebanon	767.40 Ireland	919.20 Switzerland
17		2,692.00 Greece	866.20 Spain	1,842.70 Jordan
18		2,948.00 England	1,961.70 S.Arabia	2,752.80 Morocco
19		- - - - - - - -	2,024.30 Morocco	2,855.80 W.Germany
20		7,142.00 Algeria	2,235.80 Jordan	3,233.60 Libya
21		17,345.00 Egypt	2,766.90 Libya	3,599.40 England
22		19,223.00 Iraq	3,170.20 Greece	4,499.00 S.Arabia
23		31,194.00 Iran	3,285.60 W.Germany	- - - - - - - -
24			- - - - - - - -	9,357.40 Greece
25			4,998.10 England	10,874.50 Algeria
26			5,172.40 Italy	11,692.20 Italy
27			10,185.20 Egypt	25,171.10 Egypt
28			11,219.90 Algeria	25,975.00 Iraq
29			28,588.00 Iraq	38,683.10 Iran
30			38,991.70 Iran	
	3,154.26 AVERAGE	4,075.26 AVERAGE	4,035.16 AVERAGE	5,044.14 AVERAGE
	11 OUT OF 15 COUNTRIES ARE 73.3%	19 OUT OF 23 COUNTRIES ARE 82.6%	24 OUT OF 30 COUNTRIES ARE 80%	23 OUT OF 29 COUNTRIES ARE 79.3%

TONS

AVERAGE OF THE YEARS 1981-1984
4,077.2

NOTE: The number of flat glass importing countries with prices below the annual average divided by the total number of importing countries in 1981-1984 period is; 77/97=79.4% of the total

TABLE 7.11 b

If we observe the tables with the average FOB$/TON prices and the FOB$/TON prices of the countries which are below the average of the year, we find out some more facts. The average prices of the period 1977-1980 being higher than that of the period 1981-1984 show that more than 50% of the importing countries are the ones where the prices are below the average of the year.

If we observe the average price figures in 1977-1980 and 1981-1984 periods, the average of the four-year averages is 308.73FOB $/TON and 265.48 FOB$/TON, respectively. In 1977-1980 period, 1977, 1978 and 1979 annual averages are below the four-year average. That is to say, as 1977, 1978 and 1979 annual averages are 296.90 FOB$/TON, 301.48 FOB$/TON and 293.44 FOB$/TON, respectively, only the average of 1980 which is 343.09 FOB$/TON, has an effect to increase the four-year average. These price figures indicate that, the year when highest prices were applied was 1980 in 1977-1980 interval. In 1981-1984 period, the annual average prices of 1983 and 1984 were below the four-year price average. As the four-year price average was 265.48 FOB$/TON, 1981 and 1982 annual price averages which were 322.84 FOB$/TON and 287.93 FOB$/TON were pushing the four-year average up. In 1983 and 1984, if we only consider the few marginal markets with very low prices in spite of the far distance between them and Turkey, their price averages are as follows: In 1983, if we only take into account Nigeria (142.80), Hong-Kong (202.77), Australia (209.14), Spain (222.93), Ireland (229.74) and Norway (240.96), their average is 208.06 FOB$/TON. This figure is below the average of the year, which is 245.54 FOB$/TON, by 37.48 FOB$/TON. In 1984, by only considering Yugoslavia (161.55), Lebanon (167.83), U.S.A. (162.45), Tunisia (157.31), Cyprus (166.12), Morocco (122.83), Libya (161.13), Italy (165.38), the average is 158.11 FOB$/TON. This figure is below the average of the year, which is 205.61 FOB$/TON by 47.5 FOB$/TON.

If we consider the quantities exported (tons) in 1977-1980 and 1981-1984 periods, the averages of the specific years as compared to the four-year averages imply that especially in 1981-1984 period the exported quantities are mostly below the annual averages. That is to say,

whereas the quantities exported to 58.8% of the total Turkish flat glass importers are below the annual quantity averages in 1977-1980 period, the quantities exported to 79.4% of the total Turkish flat glass importers are below the annual quantity averages in 1981-1984 period.

This result leads us to a very important conclusion. When we combine the results of export prices (FOB$/TON) and exported flat glass quantities (tons), we see that in 1977-1980 period, prices of 55.9% of the importing countries were below the annual average. On the other hand, 58.8% of the flat glass importing countries imported flat glass quantities below the annual quantity average. If we express these percentages from another point of view, 44.1% of the importing countries in terms of price classification and 41.2% of the importing countries in terms of quantity classification take place above the four-year average of 1977-1980 period (Price*Quantity=Total Revenue).

On the other hand, 41.2% of the importing countries in terms of price classification and 20.6% of the importing countries in terms of quantity classification take place above the four-year average of 1981-1984 period (Price*Quantity=Total Revenue).

These results show that, in 1981-1984 period, if we consider annual price averages and annual quantity averages as our point of reference, both the prices and quantities of exported flat glass had contributed marginally to Turkish economy through the total revenue they have created. Since only 58% of all the countries in price classification and 74% of all the countries in quantity classification are below each of the annual averages in analysing 1977-1984 period as a whole, total revenue thus obtained can be explicitly observed as having a marginal contribution to the economy in spite of the new world markets that Turkey had exported flat glass.

In other words, in 1981-1984 period the combined effect of annual price average and annual quantity average show how much more the export revenue increase contributed to Turkey. The contribution of 41.2% of the importing countries with annual import prices above the average and 20.6% of the importing countries with annual import quantities above the average affected the export revenue result. It is interesting that, we would expect more quantities to be

exported with low unit prices, but only for the sake of entering into different and new markets,even the quantities exported to the countries with very low export prices were also very little.

In the light of the above given discussions, if we give the main results of the regressions that we have solved to see the relation among the possible determining factors, they are as follows:

1) The linear equation that we have regressed by the independent variable;

x1 = Number of Residential Buildings in period (t)

and the dependent variable;

Y = Flat Glass Export Quantities (tons) in period (t)

indicate that, the above named x1 independent variable explains 53.7% of dependent variable Y (the details of which can be found in the Statistical Appendix, Export Market, Equation 1).

2) The linear equation that we have regressed by the independent variables;

x1 = Export Price (FOB TL/ m^2) in period (t)

x2 = Residence Floor Areas ('000 m^2) in period (t-2)

and the dependent variable;

Y = Flat Glass Export Quantities ('000 m^2) in period (t)

indicate that the independent variables (x1, x2) explain 71.29% of the dependent variable Y (the details of which can be found in the Statistical Appendix, Export Market, Equation 3).

3) The linear equation that we have regressed by the independent variables;

x1 = Flat Glass Export Price (FOB TL/ton) in period (t)

x2 = İstanbul Chamber of Commerce Wholesale Price Index (1977=100)

and the dependent variable;

Y = Flat Glass Export Sales Revenue (FOB TL'000) in period (t)

indicate that the independent variables (x1, x2) explain 94.02% of the dependent variable Y (the details of which can be found in the Statistical Appendix, Export Market, Equation 6).

4) The linear equation that we have regressed by the independent variables;

x1 = Flat Glass Export Quantities (tons) in period (t)

x2 = İstanbul Chamber of Commerce Wholesale Price Index (1977=100)

and the dependent variable;

Y = Flat Glass Export Sales Revenue (FOB TL'000) in period (t)

indicate that the independent variables (x1, x2) explain 81.98% of the dependent variable Y (the details of which can be found in the Statistical Appendix, Export Market, Equation 7).

7.2 FACTORY BASED ANALYSIS

7.2.1 Çayırova Glass Industry Incorporation

Çayırova Glass Industry Incorporation has exported flat glass to various countries of the world between 1977-1984. Whereas the maximum number of countries was only six in 1977-1980 period; in 1981-1984 period this maximum reached to twentytwo.

7.2.1.1 CG Export Price Analysis

The price and country ordering is given in Table 7.12 according to ascending FOB$/TON prices.

In our period of analysis, the lowest prices were applied to Cyprus, Iraq, Italy and Egypt. The price of Cyprus in 1979 was the lowest of all in 1977-1980 period, with 144 FOB$/TON.

TABLE 7.12 CG Export Price Analysis (1977-1980)

	Prices (FOB$/TON)				**Countries**			
	1977	**1978**	**1979**	**1980**	**1977**	**1978**	**1979**	**1980**
1)	242	271	144	276	Iraq	Italy	Cyprus	Egypt
2)	247	282	278	296	Austria	Iraq	Iraq	Iran
3)	265	291	282	319	W.Germany	Iran	Iran	Italy
4)	273	298	288	335	Italy	Egypt	Egypt	Libya
5)	-	-	290	486	-	-	Italy	Cyprus
6)	-	-	316	-	-	-	France	-

Average of each year:

257 286 266 342

Average of the annual averages:

288

In 1981-1984 period, the FOB$/TON price based ascending country ordering is as follows:

TABLE 7.13 CG Export Price Analysis (1981-1984)

	Prices (FOB$/TON)				**Countries**			
	1981	**1982**	**1983**	**1984**	**1981**	**1982**	**1983**	**1984**
1)	195	108	159	142	W.Germany	Netherlands	Morocco	U.S.A.
2)	243	171	160	152	Greece	W.Germany	Italy	Italy
3)	255	177	186	152	Austria	Italy	Greece	Switzerland
4)	272	229	190	152	Tunisia	Austria	Netherlands	Netherlands
5)	315	247	191	158	Egypt	Morocco	Algeria	Morocco
6)	316	248	207	158	Italy	Lebanon	W.Germany	Japan
7)	335	248	221	159	Iran	Algeria	England	W.Germany
8)	360	250	238	170	Libya	France	Tunisia	Greece
9)	404	253	238	174	Iraq	U.A.E.	Egypt	Algeria
10)	427	256	241	188	Sudan	Greece	Norway	Finland
11)	449	262	243	190	Cyprus	Kuwait	S.Arabia	Sweden
12)	-	274	256	192	-	Tunisia	Austria	S.Arabia
13)	-	275	260	198	-	England	Qatar	England
14)	-	285	271	204	-	S.Arabia	U.A.E.	Norway
15)	-	297	273	206	-	Iran	U.S.A.	U.A.E.
16)	-	308	278	212	-	Egypt	Iran	Egypt
17)	-	333	288	219	-	Qatar	Sudan	Lebanon
18)	-	350	341	263	-	Cyprus	Libya	Iran
19)	-	368	386	285	-	Sudan	Iraq	Cyprus
20)	-	405	399	288	-	Iraq	Cyprus	Sudan
21)	-	415	-	363	-	Libya	-	Libya
22)	-	-	-	370	-	-	-	Iraq

Average of each year:

325 274 251 209

Average of the annual averages:

265

In 1981-1984 period, the four-year price average was 265 FOB$/TON whereas that of 1977-1980 period was 288 FOB$/TON. There is a gradual decrease in annual average prices from 325 FOB$/TON to 209 FOB$/TON (between 1981 and 1984), which shows almost a 55.5% decrease. The number of flat glass importing countries rose from six of 1977-1980 period to twentytwo in 1981-1984 period, an increase of 267%.

It is interesting that, in 1981-1984 period, the countries with the lowest price application were the ones far away from Turkey. Namely, Netherlands, U.S.A., Morocco, Switzerland, Japan, Finland and Algeria. The lowest price countries of 1977-1980 period happened to be the highest price countries of 1981-1984 period. Namely, Iraq and Cyprus, besides Libya and Sudan were the highest price countries after 1980. On the other hand, while 47.4% of the importing countries took place below the annual price average of all the countries in 1977-1980 period, that of 59.5% was taking place below the annual average in 1981-1984 period. This result indicates that, in 1981-1984 period, a lot of new importers of flat glass were supplied with flat glass produced by Çayırova Glass Ind. Inc., prices being below the annual average. Thus, relatively more countries with relatively low level of prices were put into practise in 1981-1984 period as compared to 1977-1980 period in the customer list of Çayırova Glass Ind. Inc.

TABLE 7.14 CG Annual Export Price Averages vs. Averages Below and Above the Annual Averages

	1977	1978	1979	1980	1981	1982	1983	1984
BELOW AVERAGE	245	271	144	307	266	227	207	173
ANNUAL AVERAGE	257	286	266	342	325	274	251	209
ABOVE AVERAGE	269	295	291	486	395	337	306	286

ABOVE AVERAGE; is the average of the prices that take place above the annual average.

BELOW AVERAGE; is the average of the prices that take place below the annual average.

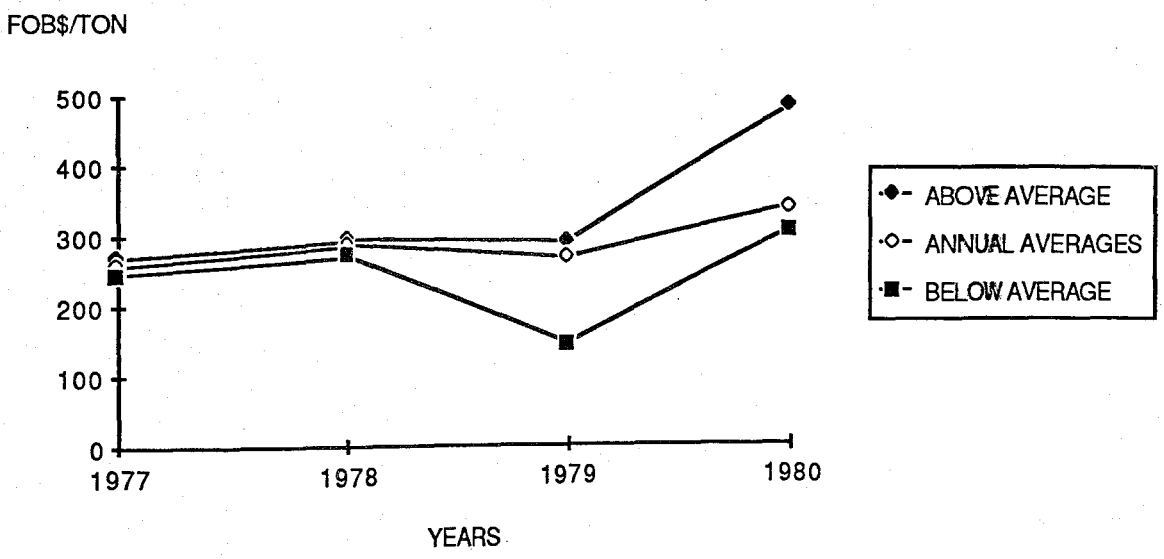


Figure 7.3 Annual Average Export Prices of CG as Compared to the Average Export Prices Below and Above the Annual Average (1977-1980)

In 1977-1980 period, the average of the prices above the annual average show a parallel trend with the annual average between 1977-1979 but suddenly make a jump in 1980. In other words, in 1980 the export prices above the annual average were considerably higher.

The average of the prices below the annual average showed a sharp decrease in 1979 and again a sharp jump in 1980.

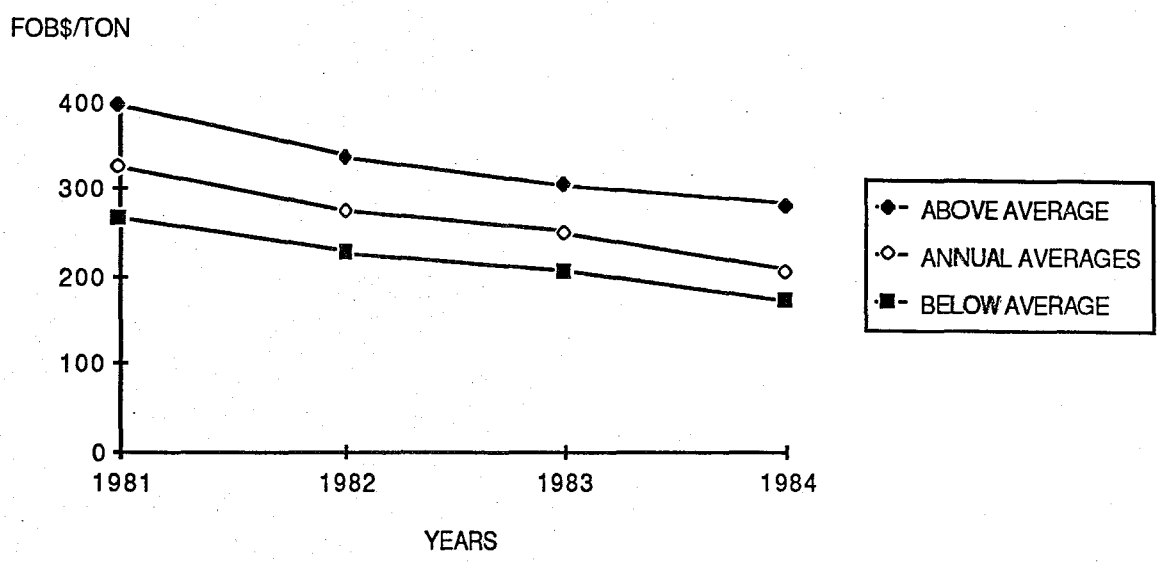


Figure 7.4 Annual Average Export Prices of CG as Compared to the Average Export Prices Below and Above the Annual Average (1981-1984)

In 1981-1984, the averages of the prices above and below the annual average were almost parallel to each other, showing a decreasing trend towards 1984.

7.2.1.2 CG Export Quantity Analysis

If we try to analyze the export performance of Çayırova Glass in terms of quantities, we observe the trend again in two separate periods:

TABLE 7.15 CG Export Quantity Analysis (1977-1980)

	Quantity (tons)				**Countries**			
	1977	**1978**	**1979**	**1980**	**1977**	**1978**	**1979**	**1980**
1)	425	291	13.2	792.0	Iraq	Italy	Cyprus	Egypt
2)	401	1,956	1,090.3	1,052.7	Austria	Iran	Iraq	Iran
3)	517	1,279	695.7	385.7	W.Germany	Egypt	Iran	Italy
4)	959	-	3,387.1	555.4	Italy	-	Egypt	Libya
5)	-	-	302.1	10.5	-	-	Italy	Cyprus
6)	-	-	18.7	-	-	-	France	-
Average of each year:								
	576	1,175	918	559				
Average of the annual averages:								
	807							

TABLE 7.16 CG Export Quantity Analysis (1981-1984)

	Quantity (tons)				Countries			
	1981	**1982**	**1983**	**1984**	**1981**	**1982**	**1983**	**1984**
1)	861.3	381	904.2	16.9	W.Germany	Netherlands	Morocco	U.S.A.
2)	741.8	721	1,284.5	4,036.6	Greece	W.Germany	Italy	Italy
3)	105.6	1,161	1,641.0	21.0	Austria	Italy	Greece	Switzerland
4)	36.8	140	488.8	477.9	Tunisia	Austria	Netherlands	Netherlands
5)	1,802.9	186	6,221.9	2,603.8	Egypt	Morocco	Algeria	Morocco
6)	193.0	367	376.2	48.1	Italy	Lebanon	W.Germany	Japan
7)	6,938.0	3,825	4,272.4	418.5	Iran	Algeria	England	W.Germany
8)	7,061.2	52	279.9	5,946.2	Libya	France	Tunisia	Greece
9)	1,933.1	261	5,802.0	5,551.5	Iraq	U.A.E.	Egypt	Algeria
10)	141.6	1,334	16.6	18.1	Sudan	Greece	Norway	Finland
11)	76.2	61	488.8	17.9	Cyprus	Kuwait	S.Arabia	Sweden
12)	-	744	18.0	243.9	-	Tunisia	Austria	S.Arabia
13)	-	1,743	19.6	2,523.5	-	England	Qatar	England
14)	-	947	145.8	14.2	-	S.Arabia	U.A.E.	Norway
15)	-	4,920	49.0	206.2	-	Iran	U.S.A.	U.A.E.
16)	-	3,404	7,745.4	5,266.6	-	Egypt	Iran	Egypt
17)	-	6	229.9	216.4	-	Qatar	Sudan	Lebanon
18)	-	237	1,135.4	7,624.1	-	Cyprus	Libya	Iran
19)	-	193	7,007.6	468.8	-	Sudan	Iraq	Cyprus
20)	-	10,342	368.9	132.8	-	Iraq	Cyprus	Sudan
21)	-	65	-	442.3	-	Libya	-	Libya
22)	-	-	-	11,506.7	-	-	-	Iraq

Average of each year:

1,808 1,480 1,925 2,173

Average of the annual averages:

1,847

The annual quantity averages of the years in 1977-1980 period were considerably lower than that of 1981-1984 period. The four-year average of 1977-1980 period was 807 tons whereas that of 1981-1984 period was 129% more and was 1,847 tons.

The marginal markets that we have observed in "price-country" analysis part match with the marginal markets in "quantity-country" analysis here. Namely, Norway, U.S.A., Switzerland, Japan and Finland are the countries that we exported the minimum quantities, in spite of the low prices.

TABLE 7.17 CG Annual Export Quantity Averages vs. Averages Below and Above the Annual Averages (1977-1984)

	1977	**1978**	**1979**	**1980**	**1981**	**1982**	**1983**	**1984**
BELOW AVERAGE	448	291	257	317	495	345	496	196
ANNUAL AVERAGE	576	1,175	918	559	1,808	1,480	1,925	2,173
ABOVE AVERAGE	959	1,618	2,239	922	5,311	4,847	6,204	5,632

ABOVE AVERAGE; is the average of the quantities that take place above the annual average.

BELOW AVERAGE; is the average of the quantities that take place below the annual average.

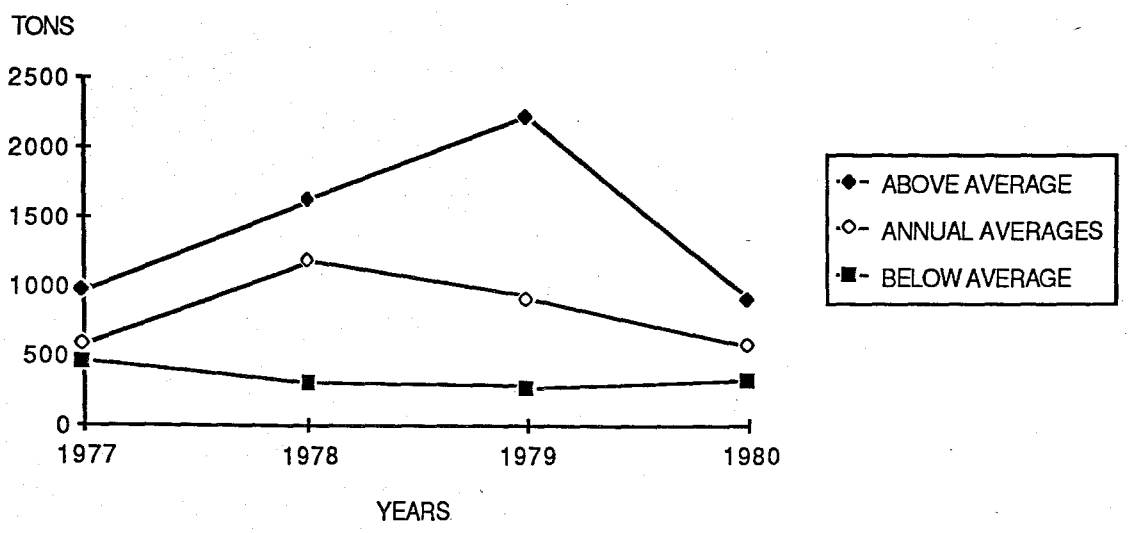


Figure 7.5 Annual Average Export Quantities of CG as Compared to the Average Export Quantities Below and Above the Annual Average (1977-1980)

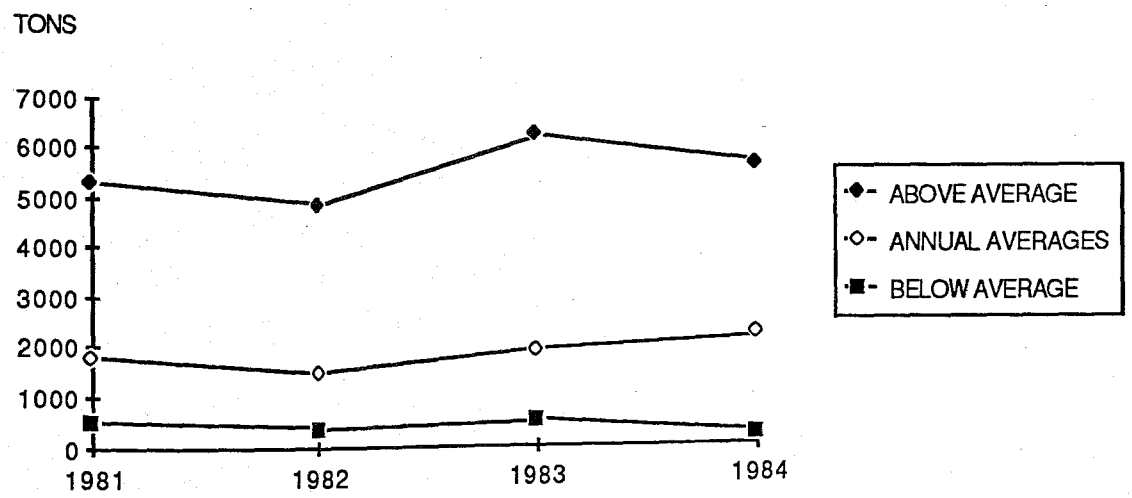


Figure 7.6 Annual Average Export Quantities of CG as Compared to the Average Export Quantities Below and Above the Annual Average (1981-1984)

7.2.2 Anadolu Glass Industry Incorporation

Anadolu Glass Industry Incorporation have exported flat glass to various countries of the world between 1977-1984 interval. The maximum number of flat glass importing countries from AG reached fifteen in 1981-1984 period whereas that of 1977-1980 period was only eight.

7.2.2.1 AG Export Price Analysis

The ordering according to ascending FOB$/TON prices is as follows:

TABLE 7.18 AG Export Price Analysis (1977-1980)

	Prices (FOB$/TON)				**Countries**			
	1977	**1978**	**1979**	**1980**	**1977**	**1978**	**1979**	**1980**
1)	269	244	247	290	Italy	Cyprus	Cyprus	Egypt
2)	293	298	292	323	Syria	Iran	Iraq	Cyprus
3)	295	307	294	328	Iran	Syria	Egypt	Syria
4)	300	309	305	329	Cyprus	Iraq	Jordan	Jordan
5)	305	309	314	347	Iraq	Egypt	Syria	Iran
6)	314	311	319	490	Lebanon	Jordan	Iran	Iraq
7)	332	370	-	-	Jordan	S.Arabia	-	-
8)	354	-	-	-	S.Arabia	-	-	-

Average of each year:

308 307 295 351

Average of the annual averages:

315

In our analysis, the lowest prices were applied to Cyprus, Italy and Egypt. The prices applied to Cyprus in 1978 and 1979 were the lowest of 1977-1980 period as a whole, with 244 and 247 FOB$/TON, respectively. That is to say, both in Çayırova Glass Ind. Inc. and in Anadolu Glass Ind. Inc., the lowest prices were applied to the same countries, namely, Cyprus, Iraq, Italy and Egypt in 1977-1980 period.

In 1981-1984 period, the FOB$/TON price based country ascending ordering is given in Table 7.19.

In 1981-1984 period, the four-year price average was 268 FOB$/TON, whereas that of 1977-1980 period was 315 FOB$/TON. There is a gradual decrease in annual average prices from 343 FOB$/TON in 1981 to 209 FOB$/TON in 1984, which indicates 64.1% decrease. The number of flat glass importing countries rose from eight of 1977-1980 period to fifteen in 1981-1984 period, indicating an increase of 87.5%. The lowest price countries of Anadolu Glass Ind. Inc. in 1981-1984 period were Morocco, Algeria, Tunisia, Egypt, S.Arabia, Qatar, Lebanon, W.Germany, Italy, England. These countries are either Middle-Eastern and North-African countries or developed West European countries.

TABLE 7.19 AG Export Price Analysis (1981-1984)

	Prices (FOB$/TON)				Countries			
	1981	1982	1983	1984	1981	1982	1983	1984
1)	258	174	113	132	England	W.Germany	Morocco	W.Germany
2)	286	204	174	136	S.Arabia	Netherlands	Algeria	Italy
3)	309	222	191	170	Egypt	Austria	England	S.Arabia
4)	318	229	192	174	Libya	France	S.Arabia	England
5)	367	259	233	178	Jordan	England	Egypt	U.A.E.
6)	375	259	262	181	Iran	Greece	Cyprus	Algeria
7)	405	264	264	196	Cyprus	Lebanon	Jordan	Tunisia
8)	428	286	275	196	Iraq	U.A.E.	Iran	Qatar
9)	-	290	390	206	-	S.Arabia	Iraq	Egypt
10)	-	294	-	214	-	Egypt	-	Libya
11)	-	303	-	237	-	Iran	-	Jordan
12)	-	324	-	253	-	Jordan	-	Cyprus
13)	-	328	-	260	-	Cyprus	-	Iran
14)	-	421	-	390	-	Libya	-	Iraq
15)	-	425	-	-	-	Iraq	-	-
Average of each year:								
	343	285	233	209				
Average of the annual averages:								
	268							

The highest price countries that Anadolu Glass Ind. Inc. exported flat glass in 1981-1984 period were Iraq, Iran, Cyprus, Jordan and Libya. As in the case of Çayırova Glass Ind. Inc., the lowest price countries of 1977-1980 period turned to be the highest price countries in 1981-1984 period.

In 1977-1980 period, while 59.3% of the countries were importing flat glass below

the annual price average from Anadolu Glass Ind. Inc., in 1981-1984 period 54.3% of the countries imported flat glass below the annual price average. When we compare Anadolu Glass Ind. Inc. with Çayırova Glass Ind. Inc., the four year price average of Çayırova Glass was below Anadolu Glass by 27$/TON in 1977-1980 period. On the other hand, in 1981-1984 period, the four-year price average of Çayırova Glass was only 3$/TON below Anadolu Glass. These simple comparisons indicate that, on the average, flat glass prices applied by Çayırova Glass were lower than that of Anadolu Glass. In terms of the flat glass export destinations, although Çayırova Glass exported to countries like Netherlands, Norway, Switzerland, Finland and Sweden for the first time [besides the former European (W.Germany, Austria, Greece, Italy, France, England), North-African (Tunisia, Egypt, Morocco, Algeria), Middle-Eastern (Lebanon, U.A.E., Kuwait, S.Arabia) and far east/west countries like U.S.A. and Japan], their import prices were below the annual averages, in 1981-1984 period. Anadolu Glass exported only as far as England, W.Germany, France, Austria, Greece, Italy as European countries; Egypt, Libya, Morocco, Algeria, Tunisia as North-African countries; S.Arabia, Lebanon, U.A.E., Qatar as Middle-Eastern countries in 1981-1984 period.

TABLE 7.20 AG Annual Export Price Averages vs. Averages Below and Above Annual Averages (1977-1984)

	1977	1978	1979	1980	1981	1982	1983	1984
BELOW AVERAGE	292	283	278	323	293	230	181	174
ANNUAL AVERAGE	308	307	295	351	343	285	233	209
ABOVE AVERAGE	333	325	313	490	394	334	298	271

ABOVE AVERAGE; is the average of the prices that take place above the annual average.

BELOW AVERAGE; is the average of the prices that take place below the annual average.

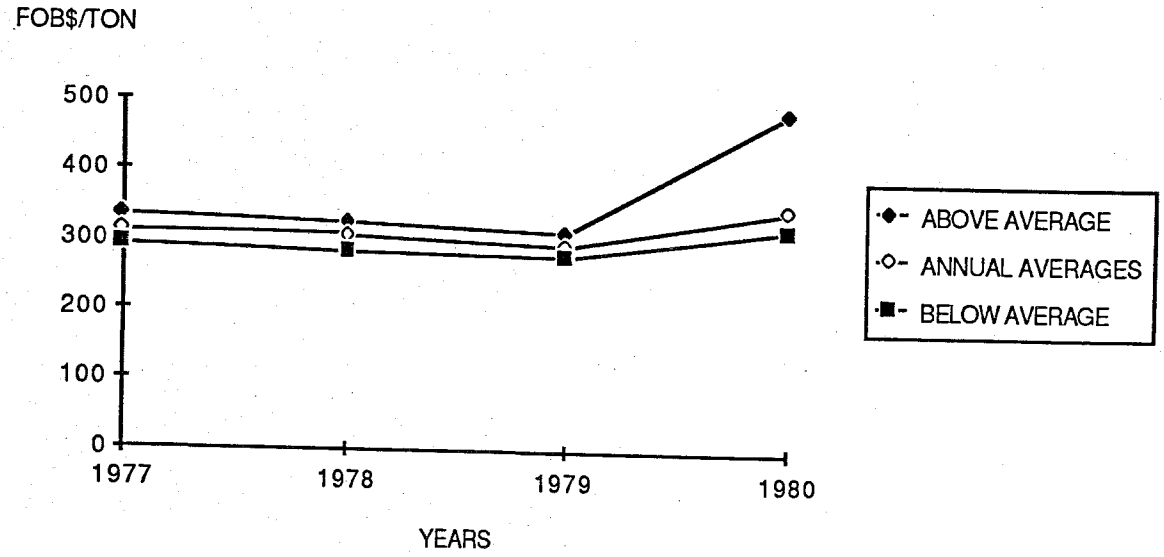


Figure 7.7 Annual Average Export Prices of AG as compared to the Average Prices Below and Above the Annual Average (1977-1980)

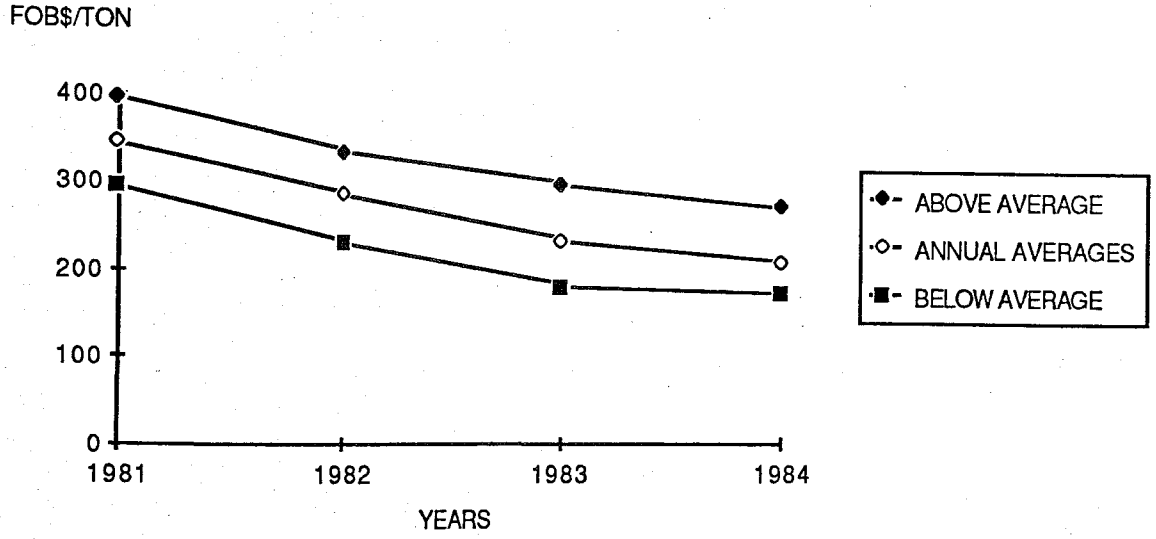


Figure 7.8 Annual Average Export Prices of AG as Compared to the Average Export Prices Below and Above the Annual Average (1981-1984)

7.2.2.2 AG Export Quantity Analysis

If we try to analyze the export performance of Anadolu Glass in terms of exported flat glass quantities, we observe the trend again in two separate periods.

TABLE 7.21 AG Export Quantity Analysis (1977-1980)

	Quantity (TONS)				**Countries**			
	1977	**1978**	**1979**	**1980**	**1977**	**1978**	**1979**	**1980**
1)	1,277	254	276.2	2,160.7	Italy	Cyprus	Cyprus	Egypt
2)	2,896	5,187	1,068.7	433.1	Syria	Iran	Iraq	Cyprus
3)	2,501	3,831	2,764.0	458.7	Iran	Syria	Egypt	Syria
4)	303	2,055	840.6	1,250.5	Cyprus	Iraq	Jordan	Jordan
5)	3,764	709	1,996.3	2,142.1	Iraq	Egypt	Syria	Iran
6)	1,524	463	1,276.3	311.1	Lebanon	Jordan	Iran	Iraq
7)	1,103	27	-	-	Jordan	S.Arabia	-	-
8)	731	-	-	-	S.Arabia	-	-	-

Average of each year:

1,762 1,789 1,370 1,126

Average of the annual averages:

1,512

TABLE 7.22 AG Export Quantity Analysis (1981-1984)

	Quantity (TONS)				Countries			
	1981	**1982**	**1983**	**1984**	**1981**	**1982**	**1983**	**1984**
1)	50.8	69	700.5	51.7	England	W.Germany	Morocco	W.Germany
2)	456.6	49	1,880.0	1,336.2	S.Arabia	Netherlands	Algeria	Italy
3)	4,846.5	9	612.3	2,559.2	Egypt	Austria	England	S.Arabia
4)	652.1	35	825.8	1,075.9	Libya	France	S.Arabia	England
5)	1,396.0	1,205	2,407.4	161.6	Jordan	England	Egypt	U.A.E.
6)	15,783.8	370	121.8	4,887.7	Iran	Greece	Cyprus	Algeria
7)	115.7	1,207	1,807.7	547.2	Cyprus	Lebanon	Jordan	Tunisia
8)	3,797.9	21	11,391.3	55.2	Iraq	U.A.E.	Iran	Qatar
9)	-	1,080	15,321.8	16,932.8	-	S.Arabia	Iraq	Egypt
10)	-	12,219	-	1,964.4	-	Egypt	-	Libya
11)	-	9,703	-	1,774.1	-	Iran	-	Jordan
12)	-	1,557	-	106.1	-	Jordan	-	Cyprus
13)	-	183	-	6,070.5	-	Cyprus	-	Iran
14)	-	38	-	8,478.8	-	Libya	-	Iraq
15)	-	7,210	-	-	-	Iraq	-	-
Average of each year:								
	3,387	2,330	3,897	3,286				
Average of the annual averages:								
	3,225							

The four-year quantity average of 1977-1980 period is 1,512 tons. On the other hand, the four-year quantity average of 1981-1984 period is 3,225 tons. These two four-year averages indicate that in 1981-1984 period, exported flat glass quantities increased by 113.3% as compared to 1977-1980 period. In case of Çayırova Glass, this increase was by 129%, which is 15.7% more than the increase in Anadolu Glass. If we speak about the absolute values of quantities, we see that Anadolu Glass exported more both in 1977-1980 and 1981-1984 periods. While the

four-year average of quantities exported by Çayırova Glass was 807 and 1,847 tons in 1977-1980 and 1981-1984 periods respectively, that of Anadolu Glass was 1,512 and 3,225 tons, in the same time intervals, respectively. The quantity of flat glass exported from Anadolu Glass was 87.4% more than that of Çayırova Glass in 1977-1980 period. In 1981-1984 period, Anadolu Glass exceeded the flat glass export quantities of Çayırova Glass by 74.6%.

TABLE 7.23 AG Annual Quantity Averages vs. Averages Below and Above Annual Averages

1977	1978	1979	1980	1981	1982	1983	1984
BELOW AVERAGE							
988	363	865	401	534	485	1,194	963
ANNUAL AVERAGE							
1,762	1,789	1,370	1,126	3,387	2,330	3,897	3,286
ABOVE AVERAGE							
3,054	3,692	2,380	1,851	8,143	9,711	13,357	9,092

ABOVE AVERAGE; is the average of the quantities that take place above the annual average.

BELOW AVERAGE; is the average of the quantities that take place below the annual average.

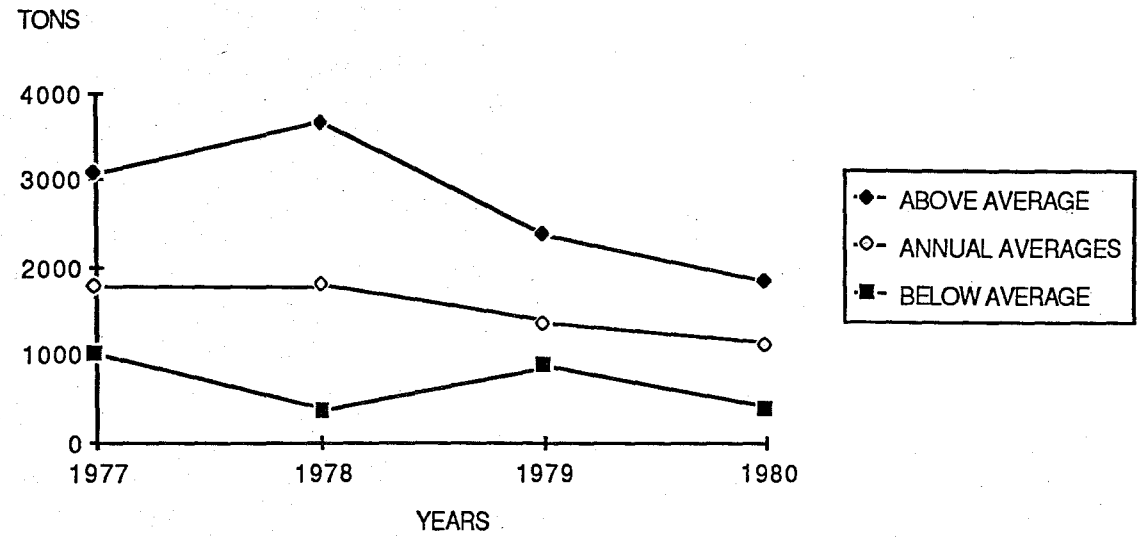


Figure 7.9 Annual Average Export Quantities of AG as Compared to the Average Export Quantities Below and Above the Annual Averages (1977-1980)

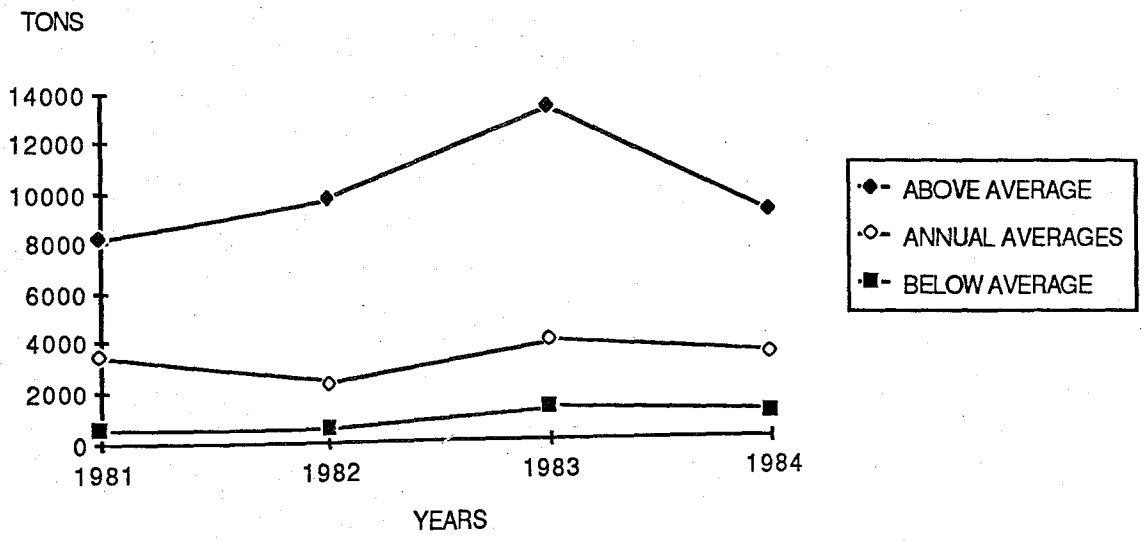


Figure 7.10 Annual Average Export Quantities of AG as Compared to the Average Export Quantities Below and Above the Annual Average (1981-1984)

7.2.3 Trakya Glass Industry Incorporation

Different from Çayırova Glass and Anadolu Glass, Trakya Glass will only be analyzed in 1981-1984 period. This is due to a very practical reason about the starting date of production in Trakya Glass. Trakya Glass started its production towards the end of 1981. Therefore, we shall not be able to draw conclusions by making comparisons between 1977-1980 and 1981-1984 periods. We shall analyze 1981-1984 period within itself and as compared to the same period experienced in Çayırova Glass and Anadolu Glass.

7.2.3.1 TG Export Price Analysis

The price ordering is as follows according to ascending FOB$/TON prices:

TABLE 7.24 TG Export Price Analysis (1981-1984)

	Prices (FOB$/TON)				Countries			
	1981	1982	1983	1984	1981	1982	1983	1984
1)	226	221	143	122	W.Germany	W.Germany	Nigeria	U.S.A.
2)	352	227	183	157	Syria	Austria	Italy	Switzerland
3)	-	239	191	162	-	Italy	Morocco	Japan
4)	-	253	203	165	-	Greece	Hong-Kong	Yugoslavia
5)	-	276	206	167	-	Algeria	W.Germany	S.Arabia
6)	-	291	209	170	-	Netherlands	Austria	W.Germany
7)	-	302	210	174	-	Iran	Algeria	Italy
8)	-	323	213	177	-	Lebanon	England	Austria
9)	-	326	220	194	-	Egypt	Greece	Netherlands
10)	-	333	221	195	-	Tunisia	Oman	Algeria
11)	-	333	223	197	-	Qatar	Spain	Libya
12)	-	363	226	206	-	Syria	Netherlands	Greece
13)	-	367	230	211	-	Iraq	Ireland	France
14)	-	379	234	234	-	Jordan	Austria	Morocco
15)	-	384	240	236	-	Cyprus	S.Arabia	Lebanon
16)	-	417	253	238	-	Libya	Egypt	U.A.E.
17)	-	-	256	239	-	-	Libya	Jordan
18)	-	-	271	241	-	-	Cyprus	Egypt
19)	-	-	282	277	-	-	Iran	Bulgaria
20)	-	-	284	280	-	-	Kuwait	Iran
21)	-	-	285	286	-	-	U.A.E.	Sudan
22)	-	-	304	334	-	-	Jordan	Iraq
23)	-	-	308	358	-	-	Sudan	Cyprus
24)	-	-	336	-	-	-	Syria	-
25)	-	-	343	-	-	-	Tunisia	-
26)	-	-	357	-	-	-	Iraq	-
27)	-	-	359	-	-	-	Lebanon	-
Average of each year:								
	289	315	251	218				
Average of the annual averages:								
	268							

As can be observed from the above given figures, excluding the jump in 1982, the trend of FOB$/TON prices are in the same direction with that of Çayırova and Anadolu Glass Ind. Inc. The share of the number of countries which take place below the average annual prices, within the total number of flat glass importers is 52.9%. That is to say, more than half of the importing countries were purchasing flat glass below the average annual prices, from Trakya Glass Ind. Inc.

The countries with prices below the annual average were again the ones far away from Turkey and they were new markets for Turkey. These are, namely, Nigeria, Hong-Kong, Oman, Spain, Ireland, Australia, Japan, U.S.A. and Yugoslavia. These new countries are 11.5% of all the flat glass importing countries from Trakya Glass in 1981-1984 interval.

Although Trakya Glass factory started its operation in 1981, the export performance of it was so considerable within our analysis period that we can explain this success by the following factors:

1)The quality of flat glass produced by the "Float Process",

2)The motivated potential demand in various world markets for float glass,

3)Competitive prices.

The countries with the lowest import prices were U.S.A., Nigeria, Switzerland, Japan and Yugoslavia. The countries with the highest import prices were Libya, Lebanon, Cyprus, Syria, Italy and Jordan.

TABLE 7.25 TG Annual Export Price Averages vs. Averages Below and Above Annual Averages (1977-1984)

	1977	1978	1979	1980	1981	1982	1983	1984
BELOW AVERAGE	-	-	-	-	226	258	210	177
ANNUAL AVERAGE	-	-	-	-	289	315	251	218
ABOVE AVERAGE	-	-	-	-	352	358	303	272

ABOVE AVERAGE; is the average of the prices that take place above the annual average.
BELOW AVERAGE; is the average of the prices that take place below the annual average.

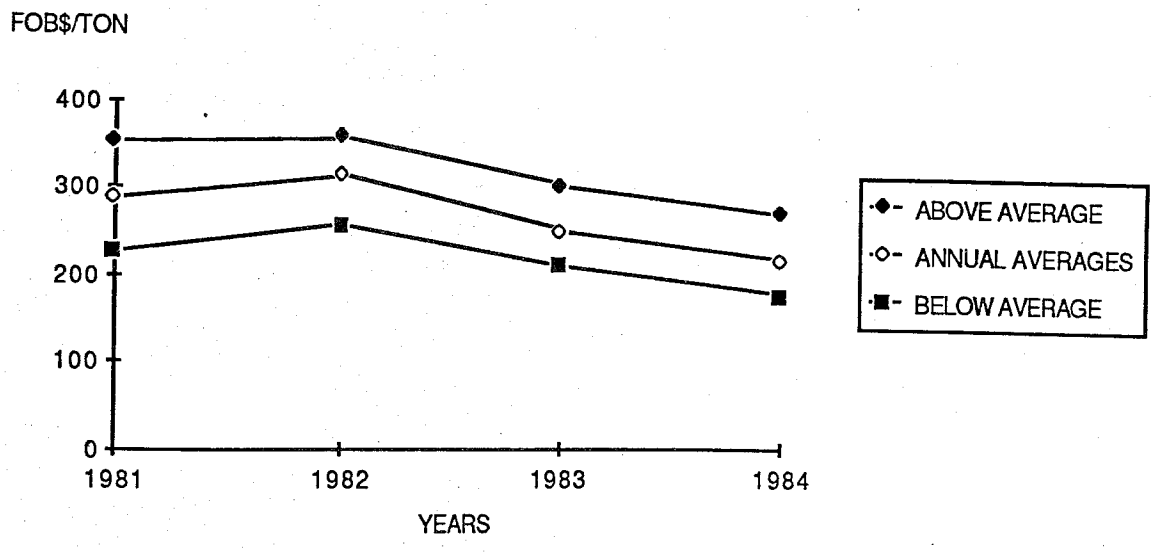


Figure 7.11 Annual Average Export Prices of TG as Compared to the Average Export Quantities Below and Above the Annual Average in 1981-1984 Period

7.2.3.2 TG Export Quantity Analysis

Due to the fact that Trakya Glass started its operation in 1981, same as the case in "price-country" analysis, "quantity-country" analysis is also made only for 1981-1984 period. Thus,

the quantities exported from Trakya Glass in 1981-1984 period is as follows:

TABLE 7.26 TG Export Quantity Analysis (1981-1984)

	Quantity (TONS)				**Countries**			
	1981	**1982**	**1983**	**1984**	**1981**	**1982**	**1983**	**1984**
1)	19.9	149	500.0	403.2	W.Germany	W.Germany	Nigeria	U.S.A.
2)	303.1	75	3,887.9	898.2	Syria	Austria	Italy	Switzerland
3)	-	440	419.6	238.0	-	Italy	Morocco	Japan
4)	-	988	209.6	52.0	-	Greece	Hong-Kong	Yogoslavia
5)	-	3,317	2,909.4	1,695.9	-	Algeria	W.Germany	S.Arabia
6)	-	55	687.1	2,385.6	-	Netherlands	Austria	W.Germany
7)	-	16,571	3,118.0	6,295.4	-	Iran	Algeria	Italy
8)	-	817	113.4	430.2	-	Lebanon	England	Austria
9)	-	1,722	1,529.2	260.6	-	Egypt	Greece	Netherlands
10)	-	156	90.1	435.3	-	Tunisia	Oman	Algeria
11)	-	3	866.2	826.9	-	Qatar	Spain	Libya
12)	-	1,557	78.9	3,411.2	-	Syria	Netherlands	Greece
13)	-	1,671	767.4	180.0	-	Iraq	Ireland	France
14)	-	140	249.8	149.0	-	Jordan	Austria	Morocco
15)	-	13	647.1	145.7	-	Cyprus	S.Arabia	Lebanon
16)	-	12	1,975.8	302.3	-	Libya	Egypt	U.A.E.
17)	-	-	1,631.5	68.6	-	-	Libya	Jordan
18)	-	-	21.8	2,971.7	-	-	Cyprus	Egypt
19)	-	-	19,855.0	283.8	-	-	Iran	Bulgaria
20)	-	-	30.6	24,988.5	-	-	Kuwait	Iran
21)	-	-	507.8	26.2	-	-	U.A.E.	Sudan
22)	-	-	428.1	5,989.5	-	-	Jordan	Iraq
23)	-	-	16.9	14.8	-	-	Sudan	Cyprus
24)	-	-	158.7	-	-	-	Syria	-
25)	-	-	76.2	-	-	-	Tunisia	-
26)	-	-	6,258.6	-	-	-	Iraq	-
27)	-	-	551.9	-	-	-	Lebanon	-

TABLE 7.26 (continued) TG Export Quantity Analysis (1981-1984)

Average of each year:			
162	1,730	1,762	2,281
Average of the annual averages:			
1,484			

The flat glass export quantity figures of Trakya Glass show a few different facts about the export destinations. Although the marginal export markets that flat glass directed from Çayırova and Anadolu Glass were especially the countries with low FOB$/TON prices, in case of Trakya Glass, the fact is different. For example, Nigeria, Hong-Kong, Spain, Ireland, U.S.A., Switzerland and Japan were the countries that Trakya Glass factory exported with the lowest FOB$/TON prices. The import prices of these countries were 143, 203, 223, 230, 122, 157, 162 FOB$/TON, respectively. The quantities that these countries imported were not the highest of all -they were definitely below the annual averages- but, they were more than the quantities of some other importing countries. In other words, while the flat glass quantities imported by Turkey's new customers Nigeria, Hong-Kong, Australia, Spain, Ireland, U.S.A., Switzerland and Japan were 500, 209.6, 687.1, 866.2,767.4, 403.2, 898.2 and 238 tons, respectively, that of Turkey's old importers of flat glass, namely, W.Germany, Austria, Netherlands, Qatar, Cyprus, Libya, Kuwait, Sudan, Tunisia, Jordan, imported -on the average- 1,366, 252, 132, 3, 17, 823, 31, 22, 116 and 212 tons, respectively. The quantities imported by the new importers reached 571.2 tons on the four-year average, while that of the above named old importers could only reach 297 tons. This result is observable only in case of Trakya Glass Ind. Inc. We can attribute this result to a few reasons. These reasons may be;

a)Demand for float glass by the above named new importers, i.e.: preferring to purchase float glass, and after being sure about the quality standard of Trakya Glass as compared to the standard they

require is appropriate, they import not very little but considerable quantities. The four-year average figure for these new importers (571.2 tons) is 38.5% of the four-year quantity average of all the countries that Trakya Glass exports.

b)The second result about our old importers' purchases being too low -only 297 tons on the four-year average basis- (20% of the four-year quantity average of all the countries that Trakya Glass exports), is -with a high probability- because these countries are actually the customers of Çayırova Glass and Anadolu Glass since the times that Trakya Glass was not in operation.

If we just have a look at the quantities that the above named old importers imported from Çayırova Glass and Anadolu Glass in 1981-1984 period, we can be sure about the following conclusion:

In 1981-1984 period, Çayırova Glass exported 466 tons to W.Germany, Austria, Netherlands, Qatar, Cyprus, Libya, Kuwait, Sudan, Tunisia and Jordan, as the four-year average. On the other hand, Anadolu Glass exported 421 tons to these countries, again as the four-year average. It is thus obvious that the quantity that Trakya Glass exported to the above named old importers less than the quantity exported to the new importers is mainly due to the kind of flat glass that Trakya Glass produces, i.e.: float glass. At the same time, the reason that flat and float glasses being suitable for different purposes, they may be imported by the above named old importers for their diversified flat and float glass demand. In other words, importing float glass may not exclude importing sheet glass. Depending on the needs of the importing country, the float glass quantity imported may exceed that of the total sheet glass import from the other two factories, in the following years. On the other hand, 466 tons exported from Çayırova Glass is 25.2% of the four-year average export quantity, whereas 421 tons exported from Anadolu Glass is 13% of the four-year average export quantity. Thus, although the absolute quantities exported from Çayırova and Anadolu Glass are higher than that of Trakya Glass to these old importers, the percentage shares of these two factories are not considerably higher than that of Trakya Glass which is 20%, i.e.: while that of Çayırova Glass and Anadolu Glass is 25.2% and 13%, respectively.

TABLE 7.27 TG Annual Quantity Averages vs. Averages Below and Above Annual Averages (1977-1984)

	1977	1978	1979	1980	1981	1982	1983	1984
BELOW AVERAGE	-	-	-	-	20	557	456	377
ANNUAL AVERAGE	-	-	-	-	162	1,730	1,762	2,281
ABOVE AVERAGE	-	-	-	-	303	9,944	6,334	7,674

ABOVE AVERAGE; is the average of the quantities that take place above the annual average.
BELOW AVERAGE; is the average of the quantities that take place below the annual average.

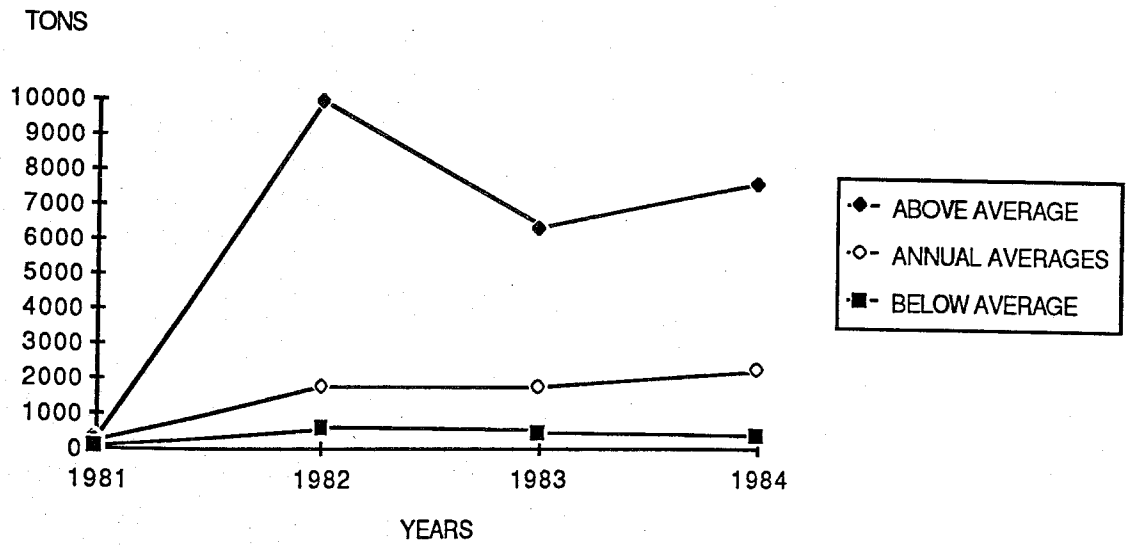


Figure 7.12 Annual Average Export Quantities of TG as Compared to the Average Export Quantities Below and Above the Annual Average (1981-1984)

7.3 EXPORT TAX REBATES

The application of the export tax rebate law was started in 1963 by the Export Tax Rebate Commission which was connected to the Ministry of Commerce.

By the tax rebate application in exports, the aim is to give competitive power to our products in international markets against the rivals and to give back the taxes that were charged from exporters. These are short-term targets. The long-term targets, on the other hand, are to change the structure of our exports and to increase exports.

Glass Industry is placed in the tax rebate applications by the list number four, and benefitted from the tax rebates as a result of the changes and tax rebate arrangements.

TABLE 7.28 Flat Glass Export Tax Rebates

The dates of the regulations about tax rebates	Upper Limit (%)	Lower Limit (%)	Export Border ($)	
02/02/1976	10	5	1,800,000	
18/06/1976	30	25	1,800,000	
26/06/1978	20	15	1,800,000	
11/06/1979	20	15	3,500,000	
03/04/1981	--->12.5<---		4,000,000	(+5)[1]
03/03/1982	--->12.5<---		15,000,000	(+10)[2]
12/12/1982	--->12.5<---		15,000,000	(+10)
19/04/1982	--->12.5<---		15,000,000	(+10)
28/12/1983	--->12.5<---		15,000,000	(+10)
24/07/1985	--->12.5<---		15,000,000	(+10)
25/12/1985	--->12.5<---		15,000,000	(+10)

[1] At every integer multiple of $4,000,000, tax rebate rate will be increased by 5%.

[2] At every integer multiple of $15,000,000, tax rebate rate will be increased by 10%.

In conjunction with our specific interest about flat glass, the tax rebate rates were as shown in Table 7.28 between years 1977-1984:

According to the above indicated tax rebate rates, verified export tax rebate values are as follows for flat glass:

Unit='000 TL. CONSTANT (1977=100)

	1977	**1978**	**1979**	**1980**	**1981**	**1982**	**1983**	**1984**
Flat glass verified export tax rebates	32,468	19,581	7,033	2,834	78,104	159,143	202,512	181,890

In these years, if we relate the amount of verified flat glass export tax rebates with total flat glass sales revenues:

Unit='000 TL. (1977=100)

Years	Flat Glass Export Revenues (FOB)	Verified Flat Glass Export Tax Rebates	%
1977	86,153	32,468	37.7
1978	74,398	19,581	26.3
1979	54,780	7,033	12.8
1980	46,517	2,834	6.2
1981	269,328	78,104	28.9
1982	536,718	159,143	29.7
1983	701,543	202,512	28.9
1984	803,839	181,890	22.6

In 1981-1984 period flat glass export sales revenues increased by 782.7%, as compared to 1977-1980 period. Export tax rebates increased by 904% in the same period. On the other hand, tax rebates constituted 19.1% of the export revenues when tax rebates are added to export revenues, in 1977-1980 period. The same relation between tax rebates and flat glass export sales revenues in 1981-1984 period is 21.2%.

The regression we have solved to see the relation between flat glass verified tax rebates (Y_t) and flat glass export selling price -FOB TL/TON- ($x1_t$), flat glass export sales revenues -FOB TL'000- ($x2_t$), have shown a significant model. The R^2 is 93.4% and adj. R^2 is 90.7%. F_c=35.38 and individual t-tests show that x1 is insignificant whereas x2 is significant. One unit of positive change in export sales revenue increases the tax rebates by 15%.

PART III

CHAPTER VIII

TURKISH FLAT GLASS DOMESTIC AND EXPORT MARKET PERFORMANCES COMBINED

8.1 OVERALL ANALYSIS

The domestic and export markets, after being analyzed seperately, is to be combined in this chapter. In other words, the individual conclusions obtained from the preceding chapters are to be blended in such a way that interactions between domestic and export markets that can not be discovered when analyzed individually can be explicitly observed.

It is appropriate to begin combining the domestic and export markets in two seperate time periods. As the applications of the stabilization policies were started in January-1980 and as the first considerable results were obtained beginning with 1981, our first period of analysis is 1977-1980 and second period of analysis is 1981-1984.

8.1.1 1977-1980 Combined Performance

In 1977-1980 period, total flat glass domestic and export sales quantities were as follows:

TABLE 8.1 Flat Glass Total Domestic and Export Sales (1977-1980)

Unit: Tons

	1977	1978	1979	1980
Flat Glass Total Sales				
Domestic	120,473	122,032	123,822	88,965
Export	16,401	16,052	13,729	9,553
TOTAL	136,874	138,084	137,551	98,518

Although domestic sales increased gradually until 1980 approximately by 3% -1980 being the year of strikes- production quantities started to decrease. Therefore, flat glass quantities sold decreased significantly in 1980, i.e.: by 39.2% in domestic market and by 39.6% in export market.

The shares of flat glass domestic and export sales in total flat glass sales is as follows in 1977-1980 period:

TABLE 8.2 Shares of Flat Glass Domestic and Export Sales (1977-1980)

Share of Flat Glass Sales (%)	1977	1978	1979	1980
Domestic	88.0	88.4	90.0	90.3
Export	12.0	11.6	10.0	9.7
TOTAL	100.0	100.0	100.0	100.0

The figures showing the percent shares of domestic and export market sales indicate that domestic flat glass sales increased little by little in 1977-1980 interval while export sales decreased by the rate of domestic sales increase.

If we turn back to the reasons behind the increases in domestic market flat glass sales, we can point out to the fact that, total number of buildings constructed in 1977-1979 period

showed approximately 19.4% increase. On the other hand, the floor-areas of the constructions increased by 17.6% again in this period.

If we ignore the domestic sales decrease in 1980, which is very much related with the limited production due to strikes, the decrease in the number of buildings constructed and the decrease in the floor-areas of the constructions being 25.6% and 19.9% respectively, affected the result negatively.

After 19.5% export sales decrease between 1977-1979 period, 43.7% decrease was mainly due to the experienced production bottlenecks in export sales of 1980.

The countries where flat glass exports were directed are as follows in 1977-1980 period:

TABLE 8.3 Flat Glass Export Destinations (1977-1980)

1977	**1978**	**1979**	**1980**
1)Iraq	Iran	Egypt	Iran
2)Syria	Syria	Iraq	Egypt
3)Iran	Iraq	Syria	Jordan
4)Italy	Egypt	Iran	Libya
5)Lebanon	Jordan	Jordan	Syria
6)Jordan	Italy	Italy	Cyprus
7)S.Arabia	Cyprus	Cyprus	Italy
8)W.Germany	S.Arabia	France	Iraq
9)Austria			
10)Cyprus			

Out of 34 countries that Turkey exported flat glass in 1977-1980 period, 19 countries are Middle-Eastern (55.9%), 4 countries are North-African (11.8%) and 11 are European (32.3%) countries.

If we give the indicators of domestic and export markets between 1977-1980 period,

these are as follows:

TABLE 8.4 Domestic vs. Export Market (1977-1980)

1977-1980 Period	**Domestic Market** (1977 = 100)	**Export Market** (1977 = 100)
Total Sales Revenue ('000 TL)	3,633,634	261,848 (FOB)
Total Sales Quantity (Tons)	455,292	55,734
Annual Average of the Selling Prices (TL/TON)	7,981	4,698

As can be seen from the above calculated figures (revenues based on 1977=100 prices), the revenue obtained as a result of domestic flat glass sales is about 14 times more than the export revenues in 1977-1980 period. The quantities sold in domestic market is about 8 times more than the quantities exported abroad. When we come to the price comparison of the two markets, namely domestic and export, the prices applied in the former is 69.9% higher than in the latter, in terms of annual average prices.

These figures, rates and comparisons make us believe to the fact that flat glass sales performance in terms of the quantities sold, prices charged and revenues obtained were heavily domestic market oriented. That is to say, quantities sold and the prices charged in domestic market were considerably higher than that of export market. Thus , the revenue -which is a multiplication product of the quantities sold and the prices charged- obtained from domestic market constitutes 93.3% of the total revenue, in 1977-1980 period (in constant 1977 prices).

After observing the important points about domestic and export markets of 1977-1980 period, it is time to begin analyzing 1981-1984 period again under domestic and export groupings.

8.1.2 1981-1984 Combined Performances

In 1981-1984 period, total flat glass domestic and export sales quantities were as follows:

TABLE 8.5 Flat Glass Total Domestic and Export Sales (1981-1984)

Unit: TONS

Flat Glass Total Sales	1981	1982	1983	1984
Domestic	130,273	149,600	136,050	141,243
Export	47,314	93,731	121,056	146,280
TOTAL	177,587	243,331	257,106	287,523

Export sales increased gradually and the rate of increase was 209% between 1981 and 1984. On the other hand, domestic sales increased by only 8.4% from 1981 to 1984, although 14.8% was the rate of increase in 1982 -followed by 9.9% decrease in 1983.

The shares of flat glass domestic and export sales in total flat glass sales is as follows in 1981-1984 period:

TABLE 8.6 Shares of Flat Glass Domestic and Export Sales (1981-1984)

Share of Flat Glass Sales (%)	1981	1982	1983	1984
Domestic	73.4	61.4	52.9	49.1
Export	26.6	38.6	47.1	50.9
TOTAL	100.0	100.0	100.0	100.0

The figures showing the percent shares of domestic and export market sales indicate

that domestic flat glass sales decreased gradually and considerably while export sales increased from one-fourth to half of annual sales totals, in 1981-1984 period.

The reason behind the gradual domestic sales decrease in flat glass is mainly due to the construction of less buildings. On the other hand, tight monetary policy in domestic market performances and export -led policy in export market performances have contributed to the results of 1981-1984 period.

The countries where flat glass exports were directed are as follows in 1981-1984 period:

TABLE 8.7 Flat Glass Export Destinations (1981-1984)

	1981	1982	1983	1984
1)	Iran	Iran	Iran	Iran
2)	Libya	Iraq	Iraq	Iraq
3)	Egypt	Egypt	Algeria	Egypt
4)	Iraq	Algeria	Egypt	Italy
5)	Jordan	England	Italy	Algeria
6)	W.Germany	Greece	Englnad	Greece
7)	Greece	Lebanon	W.Germany	S.Arabia
8)	S.Arabia	S.Arabia	Greece	England
9)	Syria	Jordan	Libya	Libya
10)	Italy	Italy	Jordan	W.Germany
11)	Cyprus	Syria	Morocco	Morocco
12)	Sudan	W.Germany	S.Arabia	Jordan
13)	Austria	Tunisia	Spain	Switzerland
14)	England	Netherlands	Ireland	Netherlands
15)	Tunisia	Cyprus	Australia	U.A.E.
16)	-	U.A.E.	U.A.E.	Cyprus
17)	-	Austria	Lebanon	Tunisia
18)	-	Sudan	Cyprus	Austria
19)	-	Morocco	Nigeria	U.S.A.
20)	-	Libya	Netherlands	Lebanon
21)	-	France	Tunisia	Japan
22)	-	Kuwait	Austria	Bulgaria
23)	-	Qatar	Sudan	France
24)	-	-	Hong-Kong	Sudan
25)	-	-	Syria	Qatar
26)	-	-	Oman	Yugoslavia
27)	-	-	U.S.A.	Finland
28)	-	-	Kuwait	Sweden
29)	-	-	Qatar	Norway
30)	-	-	Norway	-

Out of 97 countries that Turkey exported flat glass in 1981-1984 period, 31 countries are Middle-Eastern (31.9%), 24 are North-African (24.7%), 37 are European (38.1%), 5 are far-east/west countries (5.3%).

The main indicators of domestic and export markets between 1981-1984 period are as follows:

TABLE 8.8 Domestic vs. Export Market (1981-1984)

1981-1984 Period	**Domestic Market** (1977 = 100)	**Export Market** (1977 = 100)
Total Sales Revenue ('000 TL)	5,664,247	2,311,428 (FOB)
Total Sales Quantity (Tons)	557,166	408,381
Annual Average of the Selling Prices (TL/TON)	10,166	5,660

The revenue obtained as a result of the domestic flat glass sales had exceeded that of export flat glass sales by approximately 150%, in 1977 constant prices, in 1981-1984 period. The quantities sold in domestic market is about 36% more than that of the exported quantities. The price comparison between domestic and export markets shows that the annual average of the prices in the former market is almost 80% higher.

These results about 1981-1984 period really worth making a few comments when we put it side by side with 1977-1980 period. We know that beginning with 1981, the first outputs of the practises about 1980 stabilization policies were started to be obtained. Thus, the outputs of the export-oriented economic policies imply directly and indirectly that Turkey must export relatively more as compared to the periods before 1980, and must also earn more than she earns in the domestic market. Of course, selling more quantities and earning more revenues can not be thought independent of the prices charged. Since; if the very well known micro-economic equality i.e.:

Total Revenue=Price*Quantity

can be applied to macro-economic variables too, we must be able to say that

Total Revenue from Exports=Export Price*Export Quantity.

Therefore, it is indispensible to consider export price within the export side of our analysis as well as the domestic price to be considered in the domestic side of our analysis. Within this framework, we can explicitly conclude in conjunction with the above given domestic and export market indicators that, quantities exported and the revenues obtained in 1981-1984 period really increased as compared to 1977-1980 period with 1977 constant prices. The quantities sold domestically were 717% higher with respect to the quantities exported in 1977-1980 period. Domestically sold quantities could exceed that of exported quantities only by 36% in 1981-1984 period, as the quantities exported in 1981-1984 period exceeded the quantities exported in 1977-1980 period by 633%. Whereas exported quantities in 1981-1984 period were 633% more than that of 1977-1980 period, domestically sold quantities increased only by 22% after the beginning of the practises about the stabilization policies as compared to 1977-1980 period.

When we come to analyze the revenue aspect of 1981-1984 period, we again see that annual average of domestic sales revenues could exceed export sales revenues only by approximately 150% whereas this rate was 1,388% in 1977-1980 period. It is clear that, with constant 1977 prices, sales revenues obtained from export markets increased considerably in 1981-1984 period, but it was still behind the domestic market revenues. On the other hand, domestic sales revenues only increased by 56% in 1981-1984 periodwhen compared with 1977-1980 interval, whereas export sales revenues increased as much as 783%.

It is interesting that although the quantities sold and the revenues obtained both in domestic and export markets showed fluctuations with special reference to the economic policies practised in January 1980, we see a somewhat stable trend when we come to analyze the prices. That is to say, firstly, export prices are approximately 75% less than domestic prices both in

1977-1980 and in 1981-1984 periods. On the other hand, the rates of domestic price and export price increases were almost the same in 1981-1984 period as compared to 1977-1980 period. While domestic prices increased by 27%, export prices increased by 22%, which shows a very negligible difference, thus a rather parallel real increase in both markets. Therefore, if we ignore these real price increases of about 20% both in domestic and export markets in 1981-1984 period, the prices can be considered as being almost the same as that of 1977-1980 period with a very tiny difference.

Although we do not consider 20% real price increase a very serious increase within the inflationary structure of Turkey (1981-1984 cumulative inflation was 139%, average annual inflation 34%), 20% real price increase is a rather significant rate in export markets where prices are highly competitive.

Until now, we did not consider the positive effect of export tax rebates. In 1977-1980 period, export tax rebate rates were practised by upper and lower limits. By April 1981 these limits were no more utilized but a different application was put into practise. That was to benefit the exporters by a bonus rate after reaching every integer multiple of the export border. Therefore, the average annual tax rebate rates were 7.5%, 27.5%, 17.5%, 17.5% in 1977, 1978, 1979 and 1980, respectively. The export border was $1,800,000 until mid-1979 and then it was determined again as $3,500,000 to be valid until April 1981. In 1981, the new export border was determined as $4,000,000. By 1982 onwards, the export border was increased considerably up to $15,000,000, being valid in the remaining years of our analysis. The export tax rebate rate was 12.5% in 1981-1984 period for flat glass. This rate was to increase by 5% in 1981 and by 10% in 1982, 1983 and 1984 after reaching the export border by every integer multiple of the defined border.

When the verified export tax rebate revenues, that we have learned from the official sources, are added to the export revenues in the relevant years, the revenues increase by 37.7%, 26.3%, 12.8% and 6.2% in 1977-1980 interval, respectively. The contribution achieved by export tax rebates is totally 61,916,000, i.e.: 19.1% of total revenue with tax rebates. Therefore, the

revenue of 1977-1980 exports reached 322,764.

In 1981-1984 period, the verified flat glass export tax rebates totalled 621,649,000TL. This contribution created 21.2% increase in export revenues and the total revenue in 1981-1984 period reached 2,933,077.

When we turn back to domestic market in 1981-1984 period, we can remember the findings about the trend in the number of buildings constructed and the floor-areas of the buildings. That is to say, there was an increasing trend towards larger residential constructions. In 1983 and 1984, 16.2% was the rate of the increase in the number of buildings constructed and 33% was the rate of the increase in the floor areas of the buildings. Parallel to the trends especially in the residence construction sector, flat glass sales quantities increased only by 22.4% in 1981-1984 period as compared to 1977-1980 period.

The unit costs of residential constructions increased by 2%, 1.8%, 2% and 29% in 1981, 1982, 1983 and 1984, respectively, the unit costs of non-residential constructions increased by 2.5% in 1981 and then decreased by 7.5%, 2.4% and 28.8% in 1982, 1983 and 1984, respectively. These figures indicate that as the rates of unit-cost increases were not at very considerable levels in 1981-1984 period -excluding 1984- for both residential and non-residential constructions, the flat glass price increases might thus have affected unit-costs of these constructions either insignificantly or marginally.

8.2 EVALUATION OF THE PERFORMANCE IN DOMESTIC MARKET

In 1977-1980 period, total revenue obtained from domestic sales was 3,633,634,000 TL in constant 1977 prices. In 1981-1984 period, this figure increased by 55.9% and reached to 5,664,247,000 TL. The increase in revenues obtained from domestic sales is mainly due to the start-up of operation in Trakya Glass in 1981. As opposed to the fact that Trakya Glass

started operation, sales revenues of both Çayırova Glass and Anadolu Glass decreased by 5.3% in 1981-1984 period.

The reasons behind the results obtained in domestic sales revenues in 1977-1980 and 1981-1984 periods may either be the flat glass quantities domestically sold or the average annual domestic prices of flat glass.

a)Total Domestic Flat Glass Sales Quantity: in 1977-1980 period was 455,292 tons whereas that of 1981-1984 period was 22.3% more, i.e.: 557,166 tons. Individually speaking, domestic flat glass sales of Çayırova Glass and Anadolu Glass decreased by 32.9% and 38.9%, respectively in 1981-1984 period as compared to 1977-1980 period. The reason behind the 22.3% increase in 1981-1984 domestic sales was due to the operation start-up in Trakya Glass. Domestic sales quantity of Trakya Glass constituted 39.5% of the total sales whereas Çayırova Glass and Anadolu Glass constituted 37.5% and 23% of the total sales respectively, in 1981-1984 period.

b)Average Domestic Selling Prices of Flat Glass: In 1977-1980 period, the domestic selling price average was 7,981 TL/TON, with constant 1977 prices. The price average of 1981-1984 period was 10,166 TL/TON, 27.4% higher than the average of the former period again with constant 1977 prices. Individually speaking, average domestic price of Çayırova Glass was 7,947 TL/TON and that of Anadolu Glass was 8,227 TL/TON in 1977-1980 period. On the other hand, whereas the average prices of Çayırova Glass and Anadolu Glass were higher than the former period averages by 27.7% and 33.6% respectively, in 1981-1984 period, that of Trakya Glass was lower than the average prices of both of these factories by 1.0% and 9.5% respectively, in 1981-1984 period.

Thus, in 1981-1984 period -as compared to 1977-1980 period- domestic sales revenues and domestic sales quantities increased (by 55.9% and 22.3%, respectively) as a result of the inclusion of Trakya Glass to the flat glass production capacity of the country. At the same time,

both the domestic sales revenues and domestic sales quantities of Çayırova and Anadolu Glass decreased in 1981-1984 period. The only higher factors in 1981-1984 period were the average prices as compared to 1977-1980 period. In fact, average price of Trakya Glass was lower than both Çayırova Glass and Anadolu Glass, in 1981-1984 period, as the production was not yet realized in 1977-1980 period.

The shares of domestic market -in total performance including export market- in 1977-1980 and 1981-1984 periods were as follows:

TABLE 8.9 Domestic Sales Revenues and Quantities Within Total Revenues and Quantities

	1977-1980 (%)	1981-1984 (%)	Total (%)
Domestic Sales Revenue÷ Total Sales Revenue	39.1	60.9	100.0
Domestic Sales Quantity÷ Total Sales Quantity	45.0	55.0	100.0
Average Prices (TL/TON)	7,981.0	10,166.0	9,183.0

8.3 EVALUATION OF THE PERFORMANCE IN EXPORT MARKET

In 1977-1980 period, total revenue obtained from export sales was 261,848,000TL by constant 1977 prices. In 1981-1984 period, this figure increased by 783%. The increase in revenues obtained from export sales is not only due to the start-up of the operation in Trakya Glass but also due to the considerable increases in the export revenues of Çayırova Glass and Anadolu Glass. Export sales revenues of Çayırova Glass and Anadolu Glass increased by 1,129% and 321% respectively in 1981-1984 period, as compared to 1977-1980.

The results obtained in export sales revenues in 1977-1980 and 1981-1984 periods may either be due to the quantities exported or to the average annual export prices of flat glass.

a)Total Export Sales Quantities: in 1977-1980 period was 55,734 tons. This quantity reached to 408,381 tons in 1981-1984 period, indicating 633% increase as compared to 1977-1980 period. Individually, flat glass export sales of Çayırova Glass and Anadolu Glass increased by 871% and 244% respectively, in 1981-1984 period. The reasons behind 633% increase in export quantities of 1981-1984 period are; i)the inclusion of Trakya Glass to the flat glass production capacity of the country in 1981 and having 31.4% share in total flat glass export quantities of 1981-1984 period, ii)the individual shares of Çayırova Glass and Anadolu Glass increasing considerably and constituting 33.6% and 35% shares in total flat glass export quantities, respectively.

b)Average Export Selling Prices In 1977-1980 period, the export selling price average was 4,698 TL/TON with constant 1977 prices. The price average of 1981-1984 period was 5,660 TL/TON by constant 1977 prices, i.e.: 20.5% higher than the average of the former period. Individually, average export price of Çayırova Glass was 4,335 TL/TON and that of Anadolu Glass was 4,821 TL/TON, in 1977-1980 period. On the other hand, whereas the average prices of Çayırova Glass and Anadolu Glass were higher than their former period averages by 26.6% and 22.4% respectively, that of Trakya Glass was higher than the average price of Çayırova Glass but lower than that of Anadolu Glass in 1981-1984 period. The average price of Trakya Glass was higher than the average of Çayırova by 1.6% and lower than that of Anadolu Glass by 5.8%, in 1981-1984 period.

Thus, in 1981-1984 period export sales revenues increased by 783% and export quantities increased by 633%. The main contribution to these high rates of increase -both in export revenues and in export quantities- was stemming from the inclusion of Trakya Glass to the flat

glass production capacity of the country. At the same time, both the export sales revenues and export sales quantities of Çayırova Glass and Anadolu Glass increased, too. Export sales revenues increased by 1,129% in Çayırova Glass and 321% in Anadolu Glass within this period. Export sales quantities, on the other hand, increased by 871% and 244% in Çayırova Glass and Anadolu Glass, respectively in 1981-1984 period.

The shares of export market -in total performance including domestic market- in 1977-1980 and 1981-1984 periods were as follows:

TABLE 8.10 Export Sales Revenues and Quantities Within Total Revenues and Quantities

	1977-1980 (%)	1981-1984 (%)	Total (%)
Export Sales Revenues÷ Total Sales Revenue	10.2	89.8	100.0
Export Sales Quantity÷ Total Sales Quantity	12.0	88.0	100.0
Average Prices (TL/TON)	4,698.0	5,660.0	5,544.0

8.4 DOMESTIC MARKET VS. EXPORT MARKET

In 1977-1980 period, Çayırova Glass, Anadolu Glass and Trakya Glass Ind. Inc. have shown the below given performances:

TABLE 8.11 Fcatory Based Domestic and Export Market Performances (1977-1980)

DOMESTIC MARKET (1977=100)	**CG**	**AG**	**TG**	**TOTAL**
Total Sales Revenues ('000 TL)	2,179,940	1,453,694	-	3,633,634
Total Sales Quantity (Tons)	277,223	178,069	-	455,292
Average Annual Prices (TL/TON)	7,947	8,227	-	7,981
EXPORT MARKET (1977=100)				
Total Sales Revenues (FOB '000 TL)	61,260	200,588	-	261,848
Total Sales Quantity (Tons)	14,131	41,603	-	55,734
Average Annual Prices (FOB TL/TON)	4,335	4,821	-	4,698
(FOB$/TON)	**163**	**211**	**-**	**199**
TOTAL (1977=100)				
Total Sales Revenues (FOB '000 TL)	2,241,200	1,654,282	-	3,895,482
Total Sales Quantity (Tons)	291,354	219,672	-	511,026
Average Annual Prices (FOB TL/TON)	7,692	7,531	-	7,623
(FOB$/TON)	**163**	**211**	**-**	**199**

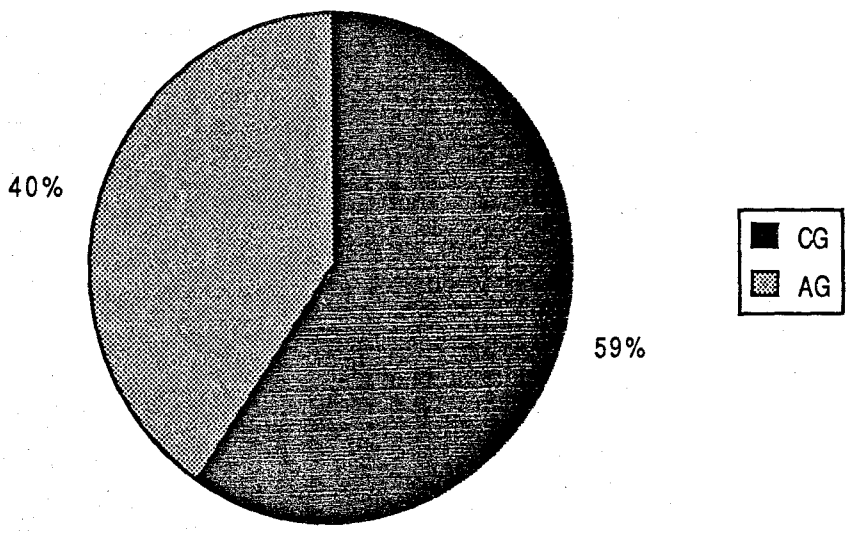


Figure 8.1 Factory Based Domestic Sales Revenues (1977-1980 Period)

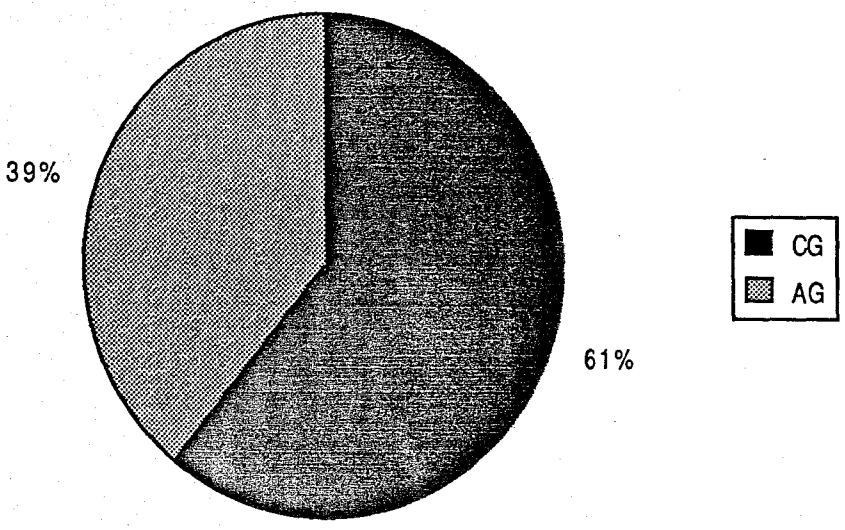


Figure 8.2 Factory Based Domestic Sales Quantities (1977-1980 Period)

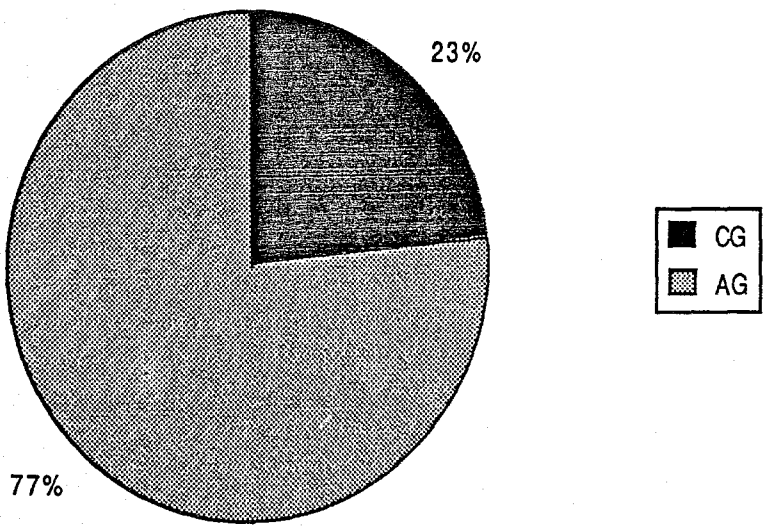


Figure 8.3 Factory Based Export Sales Revenues (1977-1980 Period)

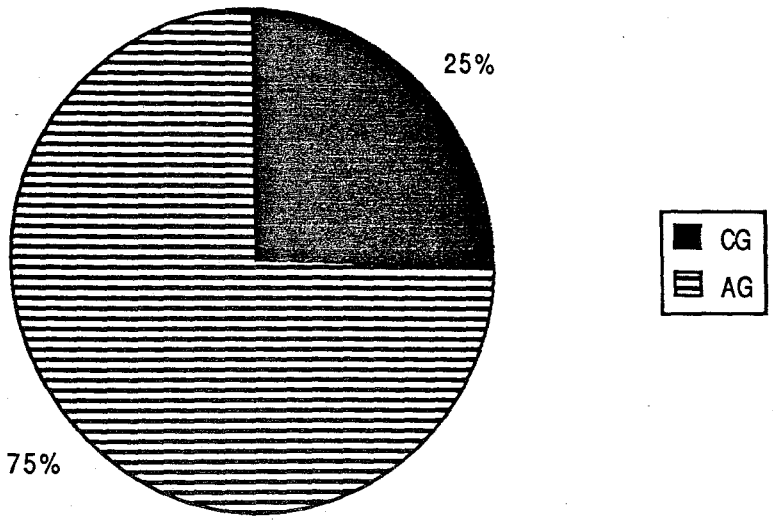


Figure 8.4 Factory Based Export Sales Quantities (1977-1980 Period)

In 1981-1984 period, Çayırova Glass, Anadolu Glass and Trakya Glass have shown the below given performances:

TABLE 8.12 Factory Based Domestic and Export Market Performances (1981-1984)

DOMESTIC MARKET (1977=100)	**CG**	**AG**	**TG**	**TOTAL**
Total Sales Revenues ('000 TL)	2,070,641	1,380,891	2,212,715	5,664,247
Total Sales Quantity (Tons)	208,645	128,209	220,312	557,166
Average Annual Prices (TL/TON)	10,145	10,994	10,044	10,166
EXPORT MARKET (1977=100)				
Total Sales Revenues (FOB '000 TL)	752,605	844,778	714,044	2,311,427
Total Sales Quantity (Tons)	137,184	143,124	128,049	408,381
Average Annual Prices (FOB TL/TON)	5,486	5,902	5,576	5,660
(FOB$/TON)	**25**	**29**	**20**	**25**
TOTAL (1977=100)				
Total Sales Revenues (FOB '000 TL)	2,070,641	2,225,669	2,926,759	7,975,674
Total Sales Quantity (Tons)	345,829	271,333	348,361	965,547
Average Annual Prices (FOB TL/TON)	5,987	8,203	8,402	8,260
(FOB$/TON)	**25**	**29**	**20**	**25**

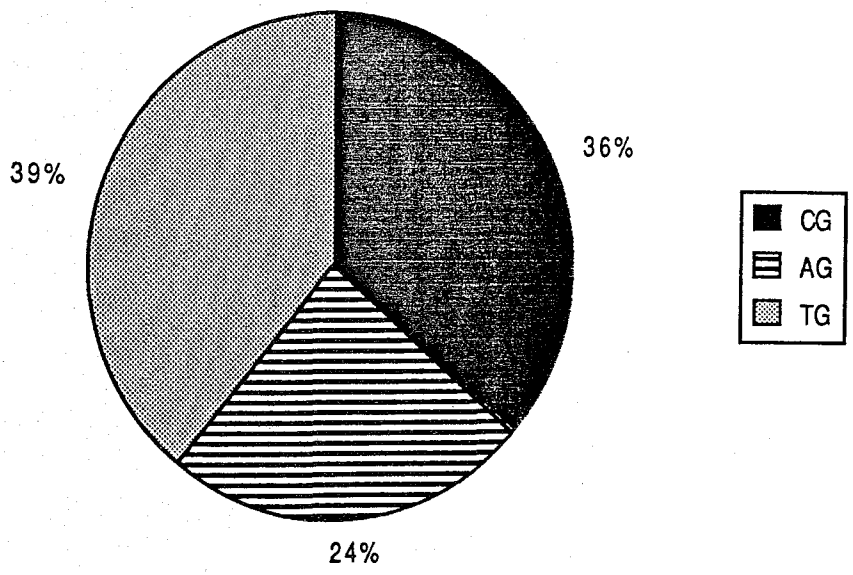


Figure 8.5 Factory Based Domestic Sales Revenues (1981-1984 Period)

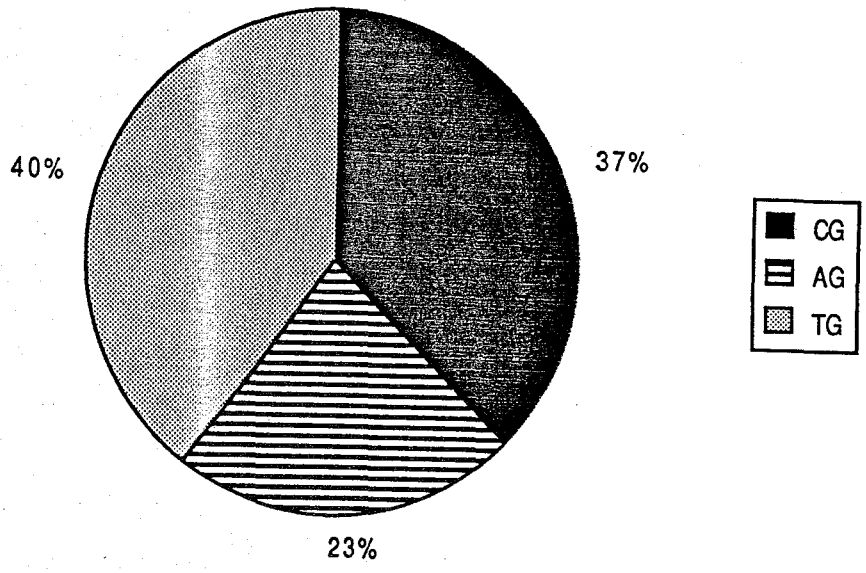


Figure 8.6 Factory Based Domestic Sales Quantities (1981-1984 Period)

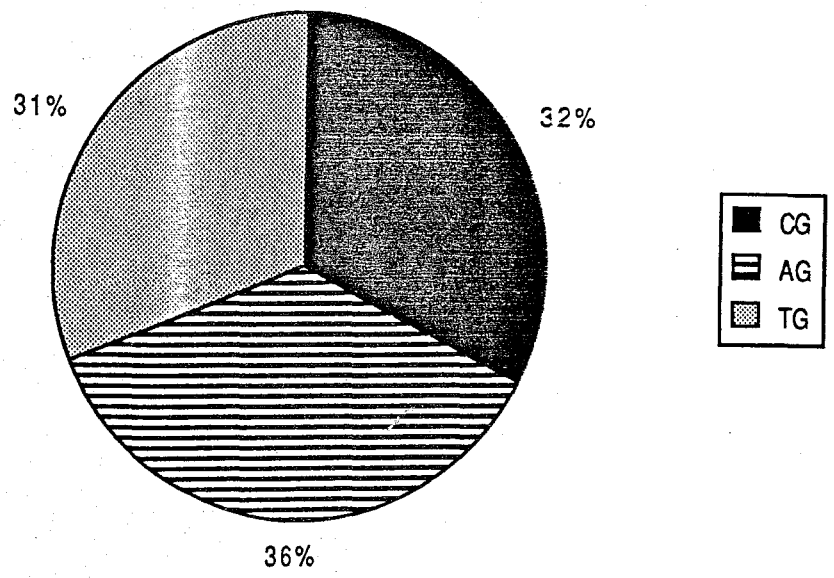


Figure 8.7 Factory Based Export Sales Revenues (1981-1984 Period)

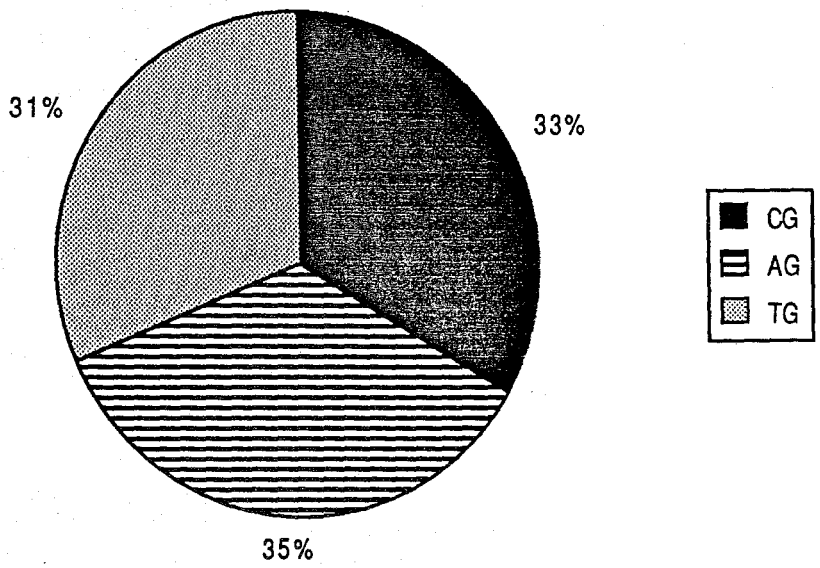


Figure 8.8 Factory Based Export Sales Quantities (1981-1984 Period)

TABLE 8.13 Factory Based Domestic and Export Market Performances (1977-1984)
[(1977-1980) + (1981-1984)]

DOMESTIC MARKET (1977=100)	**CG**	**AG**	**TG**	**TOTAL**
Total Sales Revenues ('000 TL)	4,250,581	2,834,585	2,212,715	9,297,881
Total Sales Quantity (Tons)	485,868	306,278	220,312	1,012,458
Average Annual Prices (TL/TON)	8,748	9,255	10,044	9,183
EXPORT MARKET (1977=100)				
Total Sales Revenues (FOB '000 TL)	813,856	1,045,366	714,044	2,573,275
Total Sales Quantity (Tons)	151,315	184,727	128,049	464,091
Average Annual Prices (FOB TL/TON)	5,379	5,659	5,576	5,544
(FOB$/TON)	**287**	**310**	**291**	**285**
TOTAL (1977=100)				
Total Sales Revenues (FOB '000 TL)	5,064,446	3,879,951	2,926,759	11,871,156
Total Sales Quantity (Tons)	637,183	491,005	348,361	1,476,549
Average Annual Prices (FOB TL/TON)	7,948	7,902	8,402	8,040
(FOB$/TON)	**38**	**70**	**20**	**46**

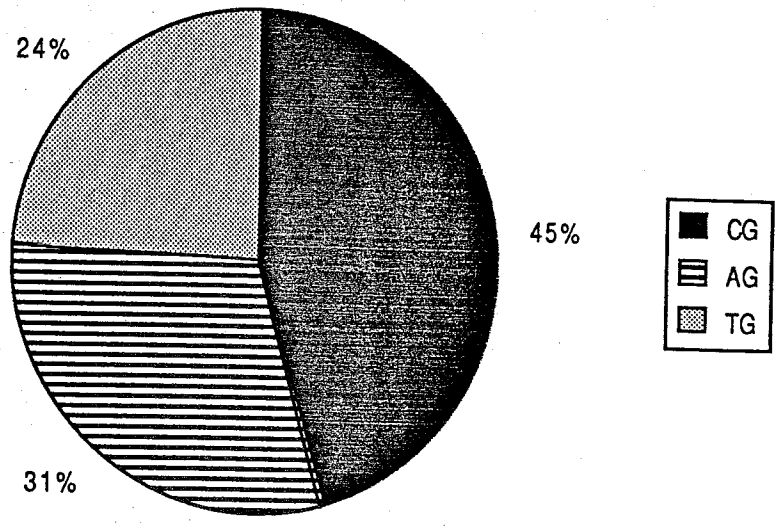


Figure 8.9 Factory Based Domestic Sales Revenues (1977-1984 Period)

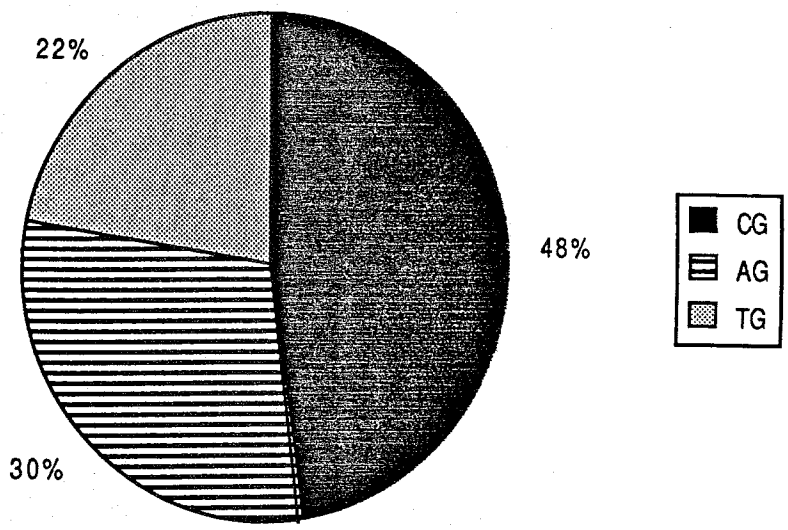


Figure 8.10 Factory Based Domestic Sales Quantities (1977-1984 Period)

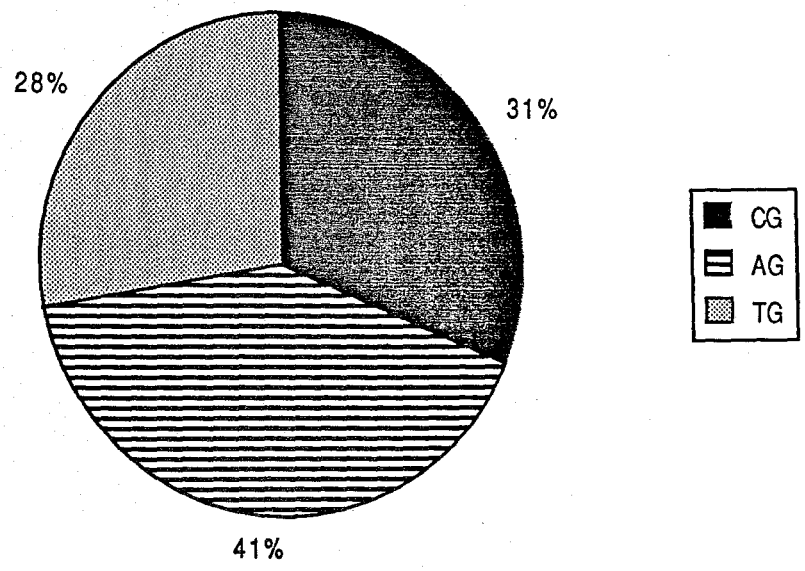


Figure 8.11 Flat Glass Export Sales Revenues (1977-1984 Period)

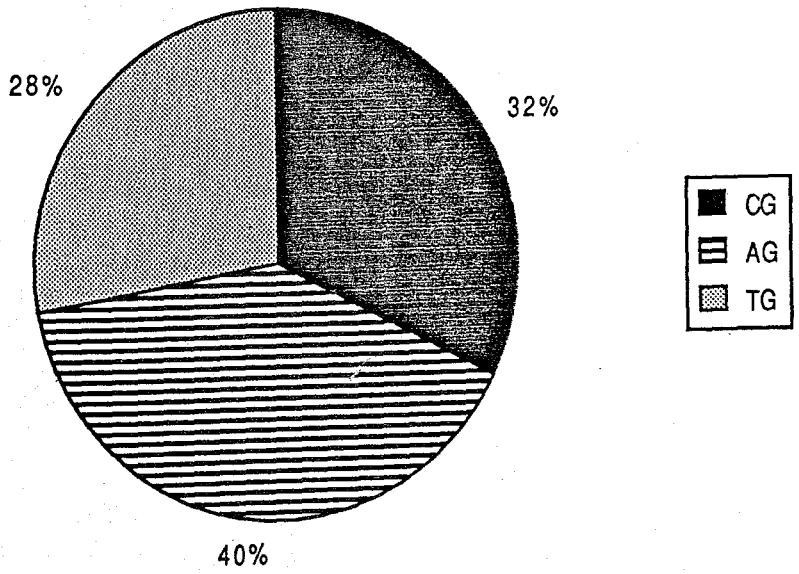


Figure 8.12 Flat Glass Export Sales Quantities (1977-1984 Period)

TABLE 8.14 Total Domestic Market Performance

TOTAL DOMESTIC MARKET

(1977=100)	1977-1980	1981-1984	% Change
Total Sales Revenue ('000TL)	3,633,634	5,664,247	55.9
Total Sales Quantity (Tons)	455,292	557,166	22.4
Average Annual Prices			
(TL/TON)	7,981	10,166	27.4

TOTAL DOMESTIC MARKET WITHIN THE TOTAL RESULTS

	(DOMESTIC)÷(DOMESTIC+EXPORT)	
	1977-1980	1981-1984
Total Sales Revenue (%)	93.3	71.0
Total Sales Quantity (%)	89.1	57.7

TABLE 8.15 Total Export Market Performance

TOTAL EXPORT MARKET

	1977-1980	1981-1984	% Change
Total Sales Revenue	261,848	2,311,428	782.7
Total Sales Quantity	55,734	408,381	633.0
Average Annual Prices			
(FOB TL/TON)	4,698	5,660	20.5
(FOB $/TON)	199	25	-8.0

TOTAL EXPORT MARKET WITHIN THE TOTAL RESULTS

	(EXPORT)÷(DOMESTIC+EXPORT)	
	1977-1980	1981-1984
Total Sales Revenue (%)	6.7	29.0
Total Sales Quantity (%)	10.9	42.3

Domestic and export market shares of the first and second periods within the whole period of analysis are as follows:

Domestic Market

1st period:
(1977-1980 Domestic Sales Revenue) ÷ (1977-1984 Total Domestic Sales Revenue) = 39.1%

2nd period:
(1981-1984 Domestic Sales Revenue) ÷ (1977-1984 Total Domestic Sales Revenue) = 60.9%

Domestic Revenues =	39.1%	+	60.9%	= 100.0%
	(1st period)	+	(2nd period)	= (Total)

Export Market

1st period:
(1977-1980 Export Sales Revenue) ÷ (1977-1984 Total Export Sales Revenue) = 10.2%

2nd period:
(1981-1984 Export Sales Revenue) ÷ (1977-1984 Total Export Sales Revenue) = 89.8%

Export Revenues =	10.2%	+	89.8%	= 100.0%
	(1st period)	+	(2nd period)	= (Total)

Domestic Market

1st period:

(1977-1980 Domestic Sales Quantity) ÷ (1977-1984 Total Domestic Sales Quantity) = 45.0%

2nd period:

(1981-1984 Domestic Sales Quantity) ÷ (1977-1984 Total Domestic Sales Quantity) = 55.0%

Domestic Quantities =	45.0%	+	55.0%	=	100.0%
	(1st period)	+	(2nd period)	=	(Total)

Export Market

1st period:

(1977-1980 Export Sales Quantity) ÷ (1977-1984 Total Export Sales Quantity) = 12.0%

2nd period:

(1981-1984 Export Sales Quantity) ÷ (1977-1984 Total Export Sales Quantity) = 88.0%

Export Quantities =	12.0%	+	88.0%	= 100.0%
	(1st period)	+	(2nd period)	= (Total)

Domestic Market

1st period: Average **price** of 1977-1980 period is **7,981** TL/TON.

2nd period: Average **price** of 1981-1984 period is **10,166** TL/TON.

[(1st period)+(2nd period)]: Average price of 1977-1984 period is 9,183 TL/TON.

1977-1980 average price was 15.1% below the 1977-1984 price average.

1981-1984 average price was 10.7% above the 1977-1984 price average.

Export Market

1st period: Average **price** of 1977-1980 period is **4,698** FOB TL/TON.

2nd period: Average **price** of 1981-1984 period is **5,660** FOB TL/TON.

[(1st period)+(2nd period)]: Average price of 1977-1984 period is 5,544 FOB TL/TON.

1977-1980 average price was 18.0% below the 1977-1984 price average.

1981-1984 average price was 2.1% above the 1977-1984 price average.

If we compare the 1st period price averages of both domestic and export markets, i.e.: [7,981 TL/TON] + [4,698 FOB TL/TON], the result is 69.9% higher in domestic market. In 1981-1984 period, the same ratio, i.e.: [10,166 TL/TON] ÷ [5,660 FOB TL/TON], the result is 80% higher again in domestic market.

If we try to interrelate 1981-1984 period domestic market prices -compared by export market prices- with respect to 1977-1980 period domestic and export merket prices; i.e.:

$$[\,(10{,}166 \div 5{,}660\,) \div (\,7{,}981 \div 4{,}698\,)\,] \;=\; 5.7\%$$

2ndperiod 1st period

The result indicates that domestic average prices with respect to export average prices in 1981-1984 period exceeded that of 1977-1980 period by 5.7%.

If we finally evaluate the 1977-1984 price averages in domestic and export markets, i.e.: [9,183 TL/TON] ÷ [5,544 TL/TON], the result shows that within our analysis period of eight years, TL/TON prices (1977=100) in domestic market were 65.6% higher than FOB TL/TON prices (1977=100) of export market.

PART IV

SUMMARY and CONCLUSIONS

Glass industry is one of the sub-branches of the manufacturing industries. Glass was firstly found as a natural mineral B.C. Then, the commercial importance of its chemical and physical structure induced people to produce artificial glass. Glass production -after becoming a technology in 19th century- is now easy for men and people use glass in various fields for various purposes.

Flat glass -being a kind of glass- is used as a construction material for windows and inside-doors of the buildings. It is also used as safety glass for automotive products, for insulation purposes, for ovens and for mirrors. Flat glass concept -covering sheet glass, plate glass, float glass and various forms of of rolled glass- at the same time defines different technologies to obtain these products. Since sheet and float glass are widely produced and sold flat glass kinds, we mean these two kinds while mentioning about flat glass.

Window glass production and sales have close relations with the construction sector of economies. Thus, domestic demand for window glass indicates the potential of flat glass domestic consumption when analyzed together with the construction sector of the economies. On the other hand, domestic consumption level of this product also determines the level of export sales.

There are usually important dates in every country's economic history. Some of these dates show their influence for many years whereas some affect the country like a point in time. "January 24" is a date which has been affecting Turkish economy 's different sectors in a continous manner since 1980. This date brought Turkey the "Stabilization Policies", name given by that time's government to implement them. Stabilization policies have been influencing Turkish

industrial activities at varying importance levels. Domestic and export market performances have thus been steered by the practises of these policies. Therefore, how much flat glass produced in terms of sheet and float kinds, how much product sold in domestic and export markets, and how much revenue obtained as a result of the practised quantity and price policies lead us to think about the results of the stabilization policies. We deal with the effects of these policies only in a specific field of economic activity, namely, flat glass sub-sector of the glass industry.

Domestic market flat glass performances in 1977-1984 period show that flat glass sub-sector of Turkish Glass Industry improved quantitatively and qualitatively. Quantitative improvements have started to be observable especially after the practises of the economic stabilization policies. The trend of increasing sales in export markets have been at quite significant levels after 1980. On the other hand, domestic sales have decreased as compared to pre-1980 period. Qualitative improvements in Turkish flat glass is mainly due to the introduction of float technology to the industry. The decision about the establishment of a float plant has its roots in 1977. Float technology -being the most contemporary kind of all the flat glass production methods- had contributed a lot to the quality aspect since 1981.

Total domestic sales revenues constituted 93.3% of the total revenues while total export sales revenues constituted 6.7% of the total revenues in 1977-1980 period. In 1981-1984 period, total domestic sales revenues constituted 71% of the total revenues while total export sales revenues constituted 29% of the total revenues.

Total domestic sales quantities constituted 89.1% of the total sales quantities while total export sales quantities constituted 10.9% of the total sales in 1977-1980 period. In 1981-1984 period, total domestic sales quantities constituted 68.6% of the total sales quantities while total export sales quantities constituted 31.4% of the total sales quantities.

These figures show that flat glass export sales TL revenues increased considerably in 1981-1984 period as compared to 1977-1980 period. On the other hand, quantities exported in 1981-1984 period also increased considerably.

The decrease in domestic market quantities and revenues in 1981-1984 period as compared to 1977-1980 period is due to diversifying the product towards export markets. Export sales quantities and revenues -within the total of quantities sold and revenues earned- increased as much as the decrease in domestic sales quantities and revenues.

The domestic sales quantity increase of 55.9% in 1981-1984 period as compared to the previous period is mainly due to the start-up of operation in Trakya Glass, in 1981.

Flat glass domestic sales revenues were 39.1% of total sales revenues in 1977-1980 period, whereas that of 1981-1984 period was 60.9%. Domestic sales quantities were 45.0% of total sales quantities in 1977-1980 period, whereas that of 1981-1984 period was 55%.

These percentages show that domestic sales revenues increased more in 1981-1984 period when compared with the increase in domestic sales quantities in the same period. Average domestic prices (TL/TON) of 1981-1984 period were 27.4% above that of 1977-1980 period. It is thus explicit that although relatively less quantities of flat glass were sold domestically, revenues increased more than quantity increase because of the high domestic prices.

Export sales revenues increased by 783% in 1981-1984 period as compared to 1977-1980 period. The increase in revenues obtained from export sales is not only due to the start-up of the operation in Trakya Glass Ind. Inc. but also due to the considerable increases in the export revenues of Çayırova Glass Ind. Inc. and Anadolu Glass Ind. Inc. In 1981-1984 period, export sales revenues of Çayırova and Anadolu Glass increased by 1,129% and 321% respectively, as compared to 1977-1980 period.

The quantity and price aspects of the above mentioned two periods indicate that more quantities of flat glass exports were realized in 1981-1984 period by the practises of the export-led stabilization policies. The price of domestically sold flat glass was higher than export prices in both pre-1980 and post-1980 periods. Export prices were thus below domestic prices. In 1981-1984 period, export prices of flat glass were relatively lower than that of 1977-1980 period's export prices. Thus, it is clear that the cost of entering into new world markets was explicitly supported by

the domestic market prices.

If we evaluate 1977-1984 period as a whole for domestic market and export markets, we see that the factory which sold most to domestic market was Çayırova Glass Ind. Inc. On the other hand, Anadolu Glass Ind. Inc. was the factory which exported the most among all the flat glass factories.

It is interesting that domestic sales revenues obtained in 1981-1984 period was 15.7% higher than that of the former period. The export sales revenues were 72% higher than that of former period. In domestic market, very little increase was observed in flat glass sales, i.e.: 6.9%, whereas in export market this increase was 67.9%.

That is to say, there was a considerably high increase in flat glass export quantities. On the other hand, price increase in export sales was below that of domestic market.

In 1977-1984 period as a whole, flat glass domestic prices (TL/TON) were 65.6% higher than flat glass export prices (FOB TL/TON).

The reasons behind the domestic market performances stem mainly from the fact that, large number of houses with small floor-areas have been constructed in 1977-1980 period. In 1981-1984 period, generally, less number of houses were constructed with larger floor-areas, since they promise higher profits to the constructors. The costs of buildings constructed (TL/m^2) seemed to have decreased in 1981-1984 period as the floor-areas were consciously increased by the constructors.

In a regression equation, 87.67% of dependent variable, namely "Number of Residential Houses in period (t)" is explained by unit cost (TL/m^2) of residential houses in (t-2) period and flat glass price index (t-2).

The results show that one unit of residential house unit cost increase affects the number of houses constructed positively. This result is opposite to that of we expected. On the other hand, one unit of flat glass price index increase affects the number of residential houses constructed, negatively. This result is coherent with our expectations (See Statistical Appendix,

Regression Results, Part B, Eq.1).

In another regression equation, 67.64% of the dependent variable "Floor Areas ('000m^2) of residential houses in period (t)" is explained by the number of residential houses in period (t-2) with central-heating systems; number of residential houses in period (t-2) with five or more floors; domestic flat glass sales ('000m^2) in period (t).

One unit of increase in both the number of residential houses in period (t) with central-heating systems and the number of residential houses in (t-2) period with five or more floors affect floor-areas of residential houses in period (t) positively. The first of these two variables has a stronger influence on the dependent variable.

The last independent variable, namely domestic flat glass sales ('000m^2) in period (t) affects the dependent variable negatively and negligibly.

These equations mainly show the relations between domestic flat glass demand and the building constructions with a few different variables (See Statistical Appendix, Regression Results, Part B, Eq.4).

In another regression equation, 74.79% of dependent variable "total flat glass sales (tons) in period (t)" is explained by the independent variable time (years 1977 to 1984).

There is positive (86.5%) correlation between flat glass total (domestic+export) sales and time variable. That is to say, every year, flat glass total sales increased approximately by 25,000 tons, according to the calculated coefficient (See Statistical Appendix, Regression Results, Part A1, Eq.1).

Another regression equation shows that 83.55% of dependent variable; "domestic flat glass demand ('000m^2) in period (t)" is explained by; flat glass domestic prices (TL/m^2) in period (t); areas of residences ('000m^2) in period (t-2); cost of residences (TL/m^2) in period (t-2).

The only significant coefficient being the areas of residences in period (t-2) affects domestic flat glass demand in period (t) positively (See Statistical Appendix, Regression Results, Part A1, Eq.7).

If we look at the reasons behind the export market performances, we see that relatively higher number of countries were importing Turkish flat glass after the application of the stabilization policies. This is mainly due to the competitiveness of the Turkish flat glass prices in the export market and the approved quality.

In a regression equation, 82.55% of dependent variable "flat glass export quantities (tons) in period (t)" is explained by the number of residential buildings in period (t-1).

As the flat glass demand created by the residential buildings increase in (t-1) period, the amount to be directed towards export markets of course becomes less in period (t), if we consider the production level restrictions.

Thus, we expect domestic demand to increase or at least stay at a constant level, as compared to export demand. The negative correlation between Y1 and x1 being quite high shows the strength of the relationship (See Statistical Appendix, Regression Results, Part A2, Eq.1).

Another regression show that 83.56% of dependent variable "flat glass export quantities (tons) in period (t)" is explained by; flat glass export price (FOB TL/TON) in period (t) and residential building floor-areas ('000m^2) in period (t-1).

One unit of increase in flat glass export price creates more supply of flat glass for export markets. On the other hand, as the floor-areas of residential buildings increase by one unit in (t-1) period, the quantities to be exported are negatively affected by more than one unit.

The relation between flat glass export sales in period (t) and the residential building floor-areas in period (t-1) is quite strong. The effect of the one-year lag in residential building floor-areas significantly determines the export sales quantities after one-year (See Statistical Appendix, Regression Results, Part A2, Eq.2).

81.59% of dependent variable "flat glass export sales revenues (FOB TL '000) in period (t)" is explained by flat glass export price (FOB TL/TON) in period (t).

One unit of export price increase in period (t) affects flat glass export sales revenues positively and considerably again in period (t) (See Statistical Appendix, Regression Results,

Export Part, Eq.5).

94.02% of dependent variable "flat glass export sales revenue (FOB '000 TL) in period (t)" is explained by; flat glass export price in period (t); İstanbul Chamber of Commerce Wholesale Price Index (1977=100).

The significant variable that determines Y is the inflation index. The positive effect of domestic inflation on the export revenues is such that, inflation increase naturally motivates flat glass TL prices to go up. The correlation between the current export revenue (FOB '000 TL) and the current prices (FOB TL/TON) is positive because, as export price (FOB TL/TON) increases, the revenue thus obtained is also influenced by this increase in the same direction (See Statistical Appendix, Regression Results, Export Part, Eq.6).

81.98% of dependent variable "flat glass export sales revenue (FOB '000 TL) in period (t)" is explained by; flat glass export quantities (tons) in period (t); İstanbul Chamber of Commerce Wholesale Price Index (1977=100).

The coefficient of only the first independent variable being significant implies that one unit of increase in flat glass export quantities (tons) in period (t) affects flat glass export sales revenues (FOB '000 TL) in period (t).

The correlation between the export revenue and the quantities exported is 88.4%. The correlation between Y and x2 is relatively lower, being 77.7% (See Statistical Appendix, Regression Results, Export Part, Eq.7).

Due to the tight monetary policy applications in domestic market, the purchasing power of individuals could not improve as real incomes were not above the annual inflation rates. Therefore, effective demand contracted.

In another regression, 93.15% of dependent variable "floor areas ('000m^2) of residential houses in period (t)" is explained by unit cost (TL/m^2) of residential houses in period (t-2) and average daily incomes (TL/day) of insured workers in (t-2) period.

Here, one unit of increase in residential house unit costs affects the residential house

floor-areas positively but by a very negligible magnitude. On the other hand, one unit of increase in the second independent variable namely average daily income of insured workers, negatively affects the demand for residential houses with large floor-areas negligibly (See Statistical Appendix, Regression Results, Part B, Eq.3).

Thus, finding new markets to sell Turkish products was a good alternative for compensating the contracting domestic demand. Besides the fact that tight monetary policy was a tool to constrain domestic consumption, higher domestic prices to balance lower export prices created a stronger effect. In our case, to rent or buy a flat was badly affected by the influence of high domestic flat glass prices.

55.9% of the Turkish flat glass importers were Middle-Eastern, 32.3% European and 11.8% North-African countries in 1977-1980 period. In 1981-1984 period, 38.1% of the importing countries were European, 31.9% Middle-Eastern, 24.7% North-African and 5.3% far east/west countries. These rates show that, after the application of stabilization policies, more exports were directed to European and North-African countries. Besides the increase of export share towards these two destinations, far east/west countries were met with for the first time. On the other hand, share of Middle-Eastern countries decreased considerably.

From the above given relations and the main reasons behind these relations, being seperated into 1977-1980 and 1981-1984 periods, changes in domestic and export market policies can be observed explicitly. These policy changes, which are macro-type, influenced main sectors of the economy including the flat glass subsector of glass industry. Therefore, preferences have changed in terms of selling the products to domestic or export markets; with high or low prices; with large or small quantities. Thus, it has been possible -within this study- to compare flat glass domestic and export market performances before and after January 24, 1980 stabilization measures.

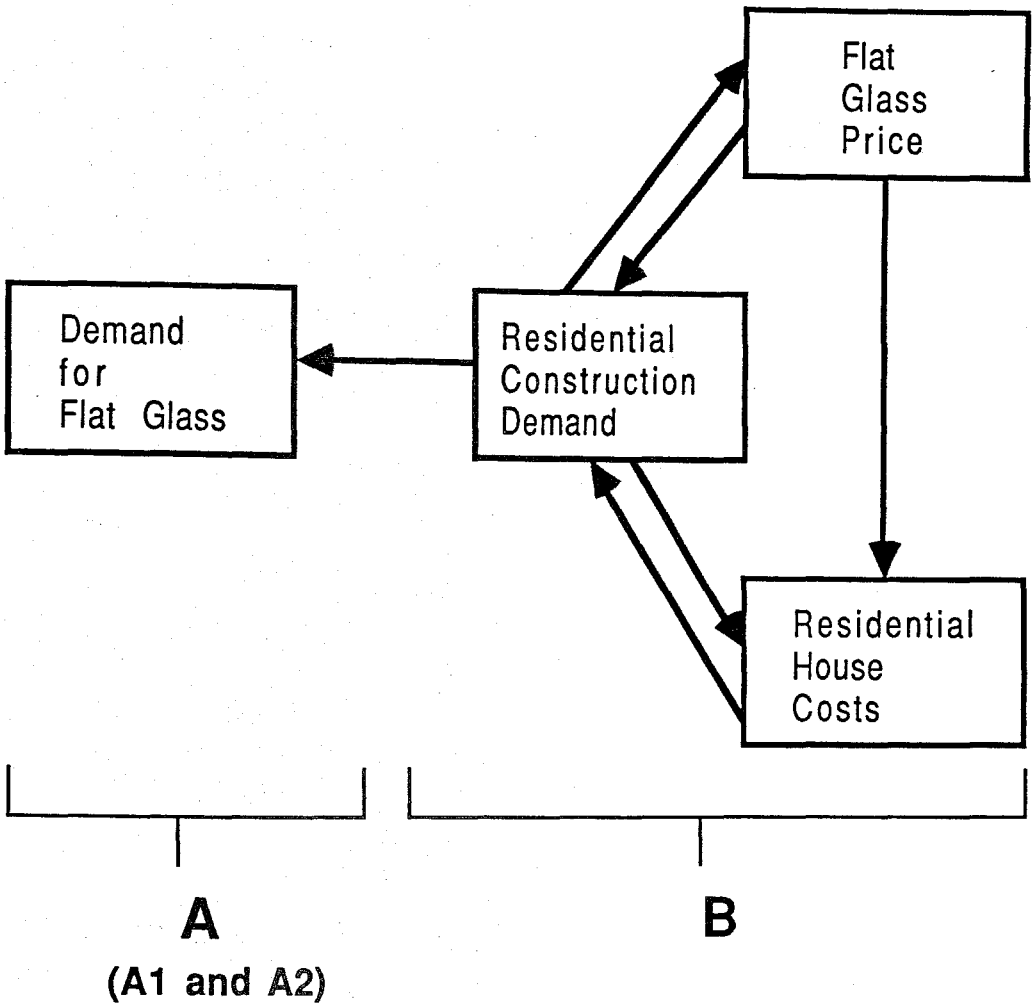
STATISTICAL APPENDIX

REGRESSION RESULTS

In our regression analysis, we have tried various alternatives of different kinds.

It would be nice to explain the reasons why we have tried to solve the below given regressions. In other words, the logic behind our approach to solve these regression equations and the variables contained within them need elaboration.

Below, we have tried to establish a relation between flat glass demand with respect to flat glass prices and residential house costs. As the residential construction demand is affected -to some extent- by flat glass prices and residential construction costs, besides more important factors, flat glass demand is therefore determined by these two variables in a somewhat indirect manner. These relations can be summarized in the below shown simple diagram:



To be able to draw healthy conclusions from the above given relations, we have first observed the relations in Part B. These relations will be explained below:

DOMESTIC MARKET

PART B:

Equation 1:

Number of Residential Houses in period (t) :$Y_{(t)}$

*Unit Cost (TL/m^2) of Residential Houses in (t-2) period :$x1_{(t-2)}$

*Flat Glass Price Index (1975=100) :$x2_{(t-2)}$

Equation 2:

Number of Residential Houses in period (t) :$Y_{(t)}$

*Unit Cost (TL/m^2) of Residential Houses in (t-2) period :$x1_{(t-2)}$

*Flat Glass Price Index (1977=100) :$x2_{(t)}$

Equation 3:

Floor Areas ('000 m^2) of Residential Houses in period (t) :$Y_{(t)}$

*Unit Cost (TL/m^2) of Residential Houses in period (t-2) :$x1_{(t-2)}$

*Average Daily Incomes (TL/day) of Insured Workers in (t-2) period :$x2_{(t-2)}$

Equation 4:

Floor Areas ('000 m^2) of Residential Houses in period (t) :$Y_{(t)}$

*Number of Residential Houses in (t-2) period with Central-Heating Systems :$x1_{(t-2)}$

*Number of Residential Houses in (t-2) period with Five or More Floors :$x2_{(t-2)}$

*Domestic Flat Glass Sales ('000m^2) in period (t) :$x3_{(t)}$

Equation 5:

Floor Areas ('000 m^2) of Residential Houses in period (t) $:Y_{(t)}$

*Flat Glass Sales (only 3mm. thickness) in period (t) $:x1_{(t)}$

*Number of Residential Houses in (t-2) period with Five or More Floors $:x2_{(t-2)}$

Equation 1: $Y_{(t)} = f(x1_{(t-2)}, x2_{(t-2)})$

The reason why we have tried to establish a relation among the above given variables is because, the number of houses which were started to be constructed two years ago are mostly finished within two years. Thus, since the starting year of our analysis is 1977, it would be nice to observe the effects of the developments with a "two-years'-lag" approach.

By the same logic, the costs of the residential house constructions -which were started two years ago- started to cumulate beginning in those times. Thus, the cumulative cost obtained when the houses are constructed is based on the price and cost structure of the past two years. The unit costs we have utilized in our analysis are calculated by dividing the value of a residential building to its total floor-area.

The flat glass price index, which indicates the real prices of flat glass after deflating the current flat glass prices by the inflation rate show the effect of flat glass prices on the number of residential houses. The second independent variable, namely flat glass price index, is again taken to be the index beginning with the past two years, before the start of our analysis, i.e.: t-2, is 1975.

We expect a negative relation between x1 and Y. In other words, when residential house construction costs increase in real terms, the number of residential houses constructed are expected to decrease. On the other hand, we expect a negligible but negative relation between the flat glass price index and the number of houses constructed.

Within this framework, the results we have obtained are as follows:

F_c = 17.78 whereas the $F_{\alpha,n-k}$ = 13.74

The model as a whole is acceptable with 99.99% confidence.

R^2 (it is a measure to indicate the proportion of the variation in the Y_t that the regression equation can explain) is 87.67%.

In terms of adjusted R^2 (adj. R^2), (which shows a comparatively smaller R^2 when there are irrelevant independent variables), the model is still meaningful and adj. R^2 = 82.74%.

The independent variables, namely x1 and x2, have the following coefficients and t-values:

		$x1_{(t-2)}$	$x2_{(t-2)}$	
t_c	:	4.256	-4.758	The individual t-test
$t_{n-k,\alpha}$ (a = 0.01)	:	3.707		results show that, $t_c > t_{n-k,\alpha}$. Therefore, the independent
ß	:	48.62	-12.60	variables x1 and x2 are significant.

$$Y_{(t)} = 20023.76 + 48.62x1_{(t-2)} - 12.60x2_{(t-2)}$$

In this equation, one unit of residential house unit cost increase affects the number of houses constructed positively and by 48.62 unit increase. This result is opposite to that of we expected. On the other hand, one unit of flat glass price index increase affects the number of residential houses constructed negatively and by 12.6 units. This result is coherent with our expectations.

Equation 2: $Y_{(t)} = f(x1_{(t-2)}, x2_{(t=1977\ constant\ values)})$

In the second regression analysis, we have a different x2 variable.

In this analysis, we expect the unit cost of residential houses in (t-2) period to affect the number of residential houses constructed in (t) time period negatively. On the other hand, thinking that window glasses are used in the last stages of the building constructions, flat glass index for (t) time period is chosen to see the effect of window glasses on the number of residential houses constructed. We expect again a negative but smaller coefficient as compared to the case with $x2_{(t-2)}$ since $x2_{(t-2)}$ is at a relatively early stage to affect the number of residential houses to be constructed. In other words, in our $x2_{(t)}$ case, if the constructor is putting the window glasses of the building, it means that he has almost finished the construction stage. Thus, the building is ready to be sold or rent.

The R^2 of the equation is 84.54%, being 3.13% less than that of the first equation, and adj. R^2 is 78.36%, being 4.38% less than that of the previous equation.

This change in the result of R^2 and adj. R^2 is highly attributable to the individual effect of $x2_{(t)}$, as compared to $x2_{(t-2)}$. On the other hand, the correlation of $x1_{(t-2)}$ and $Y_{(t)}$ with $x2_{(t)}$ might also have affected the general result.

The coefficients and the calculated t-values with respect to table t-values of x1 and x2 are as follows:

		$x1_{(t-2)}$	$x2_{(t)}$	
t_c	:	3.47	-4.13	$F_c = 17.78$
$t_{n-k,\alpha}$ ($\alpha = 0.02$)	:	3.143		$_{\alpha}F_{n-k} = 13.74$
ß	:	44.03	-9.00	

These results indicate that, F gives a significant result as a whole besides the significant individual t-test results of the variables $x1_{(t-2)}$ and $x2_{(t)}$ at a = 0.02 level. Our expectation of negative relation between Y and x1 is not obtained as a result of this regression analysis. The equation with the relevant parameters is as follows:

$$Y_{(t)} = 23575.28 + 44.03x1_{(t-2)} - 9x2_{(t)}$$

The effect of $x1_{(t-2)}$ is less than that of the first equation by 4.59 units. In other words, one unit of $x1_{(t-2)}$ increase affects Y by 44.03 units which is 4.59 units less than the first equation. $x2_{(t)}$ is obtained in the same direction with what we were expecting it to be. On the other hand, the absolute magnitude of the coefficient of $x2_{(t)}$ is less than that of the first equation by 3.6 units. We can thus conclude that the flat glass price index for (t) time period affects the number of residential houses less when compared with the same variable at (t-2) time period. This result is also consistent with our expectations about the effect of the flat glass price index on the number of residential houses constructed.

Equation 3: $Y_{(t)} = f(x1_{(t-2)}, x2_{(t-2)})$

In this equation, we try to analyze the effect of residential house unit costs in (t-2) time period and the average daily incomes of insured workers in (t-2) time period with respect to the floor areas of the residential houses in (t) time period, again.

Here, we expect a negative relation between $x1_{(t-2)}$ and $Y_{(t)}$. When the unit costs of

residential houses increase, the floor area of a residential house decreases. The second independent variable $x2_{(t-2)}$ is expected to be in a positive relation with $Y_{(t)}$. In other words, when the income levels are low, the economic power to buy or rent a large house is less. When the income levels are high, the economic power to buy or rent a large house is relatively more than the former case.

The overall significance of the model is quite well and, by $R^2 = 93.15\%$ and adj. $R^2 = 81.48\%$, most of the dependent variable $Y_{(t)}$ is explained by $x1_{(t-2)}$ and $x2_{(t-2)}$.

The individual significances of the independent variables are as follows:

		$x1_{(t-2)}$	$x2_{(t-2)}$
t_c	:	40.08	-46.74
$t_{n-k,\alpha}$ ($\alpha = 0.01$)	:	3.707	
ß	:	3.42	-4.56

The figures show that independent variables are significant individually. The directions of the relations are somewhat opposite to what we have expected. In other words, when the unit costs of residential houses increase, the floor areas of residential houses also increase. On the other hand, when the daily average incomes of insured workers increase, the demand for residential houses with larger floor areas decrease. Although the coefficients of $x1_{(t-2)}$ and $x2_{(t-2)}$ are in opposite directions than we expected them to be, the power of the coefficients -as absolute numbers- are not very considerable.

The equation obtained as a result of these variables is as follows:

$$Y_{(t)} = 2.409 + 3.42x1_{(t-2)} - 4.56x2_{(t-2)}$$

(40.08) (-46.74)

As can be seen from the coefficients, one unit of increase in residential house unit costs affects the residential house floor areas positively but by a negligible magnitude. On the other hand, one unit of increase in the second independent variable $x2_{(t-2)}$, namely average daily income of insured workers, negatively affects the demand for floor areas of residential houses negligibly.

This result is not in the expected direction.

Equation 4: $Y_{(t)} = f(x1_{(t-2)}, x2_{(t-2)}, x3_{(t)})$

In our fourth equation, we have tried to analyze the relations among the residential house floor areas (Y) and residential buildings with central-heating systems (x1), residential houses with five or more floors (x2) and the domestic flat glass sales (x3). All these three independent variables are thought to have positive relations with the demand for residential house floor areas. In other words, they contribute to higher demand for residential houses with larger floor areas.

Our assumptions are as follows:

a) $x1_{(t-2)}$:A residential house with a central-heating system is somewhat an indicator of the fact that the floor areas of the residential houses are large enough to necessiate central-heating. Thus, when there are many residential houses with central-heating systems, this may be considered as an indicator of the fact that the floor areas devoted for residential houses are quite a lot. Therefore, we expect x1 to affect Y positively.

b) $x2_{(t-2)}$:The residential buildings with five or more floors serve for the needs of more families when compared to that of residential buildings, with floors less than five. Therefore, the total number of residential floor areas increase as far as the number of floors increase. So, it is appropriate to expect a positive relation between x2 and Y.

c) $x3_{(t)}$:The domestic sales of flat glass affects the residential house floor-areas not considerably but almost none. Because, the relation between x2 and Y is considerable

when Y takes the place of x2 and x2 takes the place of Y. So, we do not expect x2 to determine Y in our analysis. Thus, a negative and inconsiderable effect will be observed.

The figures obtained as a result of our regression analysis are as follows:

		$x1_{(t-2)}$	$x2_{(t-2)}$	$x3_{(t)}$	Constant Term
t_c	:	2.008	2.417	-1.447	-0.215
$t_{n-k,\alpha}$ ($\alpha = 0.80$)	:	1.476			
ß	:	6.86029	1.00653	-0.87378	-3328.1253

Fc = 2.78

R^2 = 67.64%

Adj. R^2 = 43.369%

Thus, the equation is as follows:

$$Y_{(t)} = -3328.1253 + 6.86029x1_{(t-2)} + 1.00653x2_{(t-2)} - 0.87378x3_{(t)}$$

Equation 5: $Y_{(t)} = f(x1_{(t)}, x2_{(t-2)})$

In this equation, we try to analyze the effect of flat glass sales (with only 3mm. thickness) in period (t) and the residential houses with five or more floors in period (t-2) with respect to the residential house floor-areas in period (t).

The overall significance of the model is not at a considerable level. The individual t-test and coefficient results are as follows:

		$x1_{(t)}$	$x2_{(t-2)}$	Constant Term
t_c	:	1.794	0.742	-0.127
$t_{n-k,\alpha}$ ($\alpha = 0.90$)	:	1.943		
ß	:	1.545	2.762	-1503.6

F_c = 2.05

R^2 = 45.089%

Adj. R^2 = 23.125%

The residential house floor areas in period (t) is explained by the 3mm. flat glass sales in period (t) and the residential houses with five or more floors in period (t-2).

$Y_t = -1503.6 + 1.545x1_{(t)} + 2.762x2_{(t-2)}$

PART A1:

Equation 1:

Total Flat Glass Sales (tons) :$Y_{(t)}$

*Time (Years) 1977-1984 :$x_{(t)}$

Equation 2:

Total Flat Glass Sales in period (t) :$Y_{(t)}$

*Total Flat Glass Sales in period (t-1) :$x1_{(t-1)}$

Equation 3:

Total Flat Glass Sales in period (t) :$Y_{(t)}$

*Total Flat Glass Sales in period (t-2) :$x1_{(t-2)}$

Equation 4:

Total Flat Glass Sales ('000 m^2) in period (t) :$Y_{(t)}$

*Areas of Residences ('000 m^2) in period (t-2) :$x_{(t-2)}$

Equation 5:

Domestic Flat Glass Sales ('000 m^2) in period (t) :$Y_{(t)}$

*Areas of Residences ('000 m^2) in period (t) :$x_{(t)}$

Equation 6:

Domestic Flat Glass Sales (tons) in period (t) :$Y_{(t)}$

*Number of Residences in period (t-2) :$x_{(t-2)}$

Equation 7:

Domestic Flat Glass Demand ('000 m^2) in period (t) :$Y_{(t)}$

*Flat Glass Domestic Prices (TL/m^2) (1977=100) :$x1_{(t)}$

*Areas of Residences ('000 m^2) in period (t-2) :$x2_{(t-2)}$

*Cost of Residences (TL/m^2) in period (t-2) :$x3_{(t-2)}$

Equation 8:

Domestic Flat Glass Sales	$:Y_{(t)}$
*Flat Glass Prices in period (t)	$:x1_{(t)}$
*Number of Residences in period (t)	$:x2_{(t)}$
*Cost of Residences in period (t-2)	$:x3_{(t-2)}$

Equation 9:

Domestic Flat Glass Sales (tons) in period (t)	$:Y_{(t)}$
*Number of Residences in period (t-2)	$:x1_{(t-2)}$

Regression Results Evaluated

Equation 1:

$Y = a + bx1$

Y = Total Sales (tons) in period (t)

x1= Time (years) in period (t)

R^2 = 74.794%

Adj. R^2 = 70.593%

F = 17.80

$$Y_{(t)} = \underset{(-4.203)}{-48564801.6} + \underset{(4.219)}{24614.7x1_{(t)}}$$

The model, as a whole, is significant where time explains total sales by 74.794%.

*There is a considerably significant relation between time and total flat glass sales (domestic+export). After each year, flat glass total sales increases by 24615 tons.

*The correlation between total flat glass sales (tons) and time (years) is +86.5%, which is a quite strong result.

Equation 2:

$Y = a + bx1$

Y = Total Flat Glass Sales in period (t)

$x1$ = Total Flat Glass Sales in period (t-1)

$R^2 = 69.673\%$

Adj. $R^2 = 64.619\%$

$F = 13.784$

$$Y_{(t)} = \underset{(0.28)}{13557.65} + \underset{(3.713)}{1.036x1_{(t-1)}}$$

The model, as a whole, is significant.

*There is neither a very high nor a very low relation between the flat glass total sales of present and past years.

*Present year's flat glass total sales is explained by the past year's flat glass total sales by 69.673%. On the other hand, one unit of increase in past year's flat glass total sales affects present year's flat glass total sales by 1.036 units.

*The correlation between present year's and the past year's flat glass total sales is +83.5%, which

is a strong result.

Equation 3:

$Y = a + bx1$

Y = Total Flat Glass Sales in period (t)

x1 = Total Flat Glass Sales in period (t-2)

R2 = 34.55%

Adj. R^2 = 23.64%

F = 3.167

$$Y_{(t)} = 45024.90 + 0.93845x1_{(t-2)}$$

(0.553) (1.78)

The model as a whole is insignificant. The calculated value F=3.167 is less than the table value, i.e.: $F_{n-k} = 5.99$. Total sales of flat glass in (t-2) period explains 34.55% of the present year's total flat glass sales.

*Neither the constant term nor the coefficient of x1 are considerably significant parameters. One unit of increase in the total flat glass sales in (t-2) period affects flat glass total sales in (t) period only by 0.938 units, positively. The t-test for this coefficient does not give a significant result, either.

*The correlation between Y and x1 is +58.8%, which is not a strong result.

Equation 4:

$Y = a + bx1$

Y = Total Flat Glass Sales ('000 m^2) in period (t)

x1 = Areas of Residences ('000 m^2) in period (t-2)

R^2 = 30.74%

Adj. R^2 = 19.20%

F = 2.66

$$Y_{(t)} = 43340.12 + 0.9769x1_{(t-2)}$$

(3.343) (-1.63)

The model as a whole is insignificant since F(calculated)=2.66 whereas F(table)=5.99. Areas of residences in (t-2) period explains only 30.74% of the total flat glass sales in (t) period. This percentage figure is quite insufficient to explain the dependent variable.

*In this equation, although the coefficient of x1 is not significant, constant term parameter is a significant value. One unit of increase in the residence areas in (t-2) period affects the flat glass total sales in (t) period only by 0.9769 units.

*The correlation between Y and x1 is -55.4%. In other words, although the correlation is not high, Y and x1 affect each other in opposite directions.

Equation 5:

Y = a + bx1

Y = Domestic Flat Glass Sales ('000 m^2) in period (t)

x1 = Areas of Residences ('000 m^2) in period (t)

R^2 = 8.169%

Adj. R^2 = -7.136%

F = 0.53337

$$Y = 19003.209 - 0.14123x1$$
$$(4.54) \quad (-0.731)$$

The model, as a whole, is insignificant since the calculated F-value is very low. x1 explains Y by only 8.169%.

*The parameter of x1 is insignificant whereas the constant term is significant. The insignificant x1 parameter affects Y negatively by 0.14123 units, when one of x1 increase is realized.

*In fact, although we could expect that there would be parallelism between the increase in residence areas and domestic flat glass sales (in terms of square meters), the result we have obtained does not confirm this expectation.

*The correlation coefficient between Y and x1 is again very low as well as affecting each other inversely.

Equation 6:

$Y = a + bx1$

Y = Domestic Flat Glass Sales (tons) in period (t)

x1 = Number of Residences in period (t-2)

$R^2 = 6.803\%$

Adj. $R^2 = -8.729\%$

$F = 0.438$

$$Y_{(t)} = 18679.621 - 0.12614x1_{(t-1)}$$
$$(4.525) \quad (-0.662)$$

The model, as a whole, is insignificant as the calculated F-value is very low. On the other hand, the parameter of x1 is also insignificant whereas the parameter of constant term is significant.

*The independent variable x1 explains the dependent variable Y by only 6.803%.

*One unit of increase in x1 affects Y negatively by 0.12614 units.

*As the number of residences in (t-2) period represents the finished houses, the flat glass usage in these houses have unfortunately finished in (t-2) period. That is to say, although we aim to interrelate the number of residences whose constructions were started two years ago and their flat glass requirements towards the end of their constructions, the inconsistency of the above results with our expectations is probably due to x1 figures which do not represent the residences started to be constructed in (t-2) period but the residences started to be constructed before (t-2) period and finished in (t-2) period. So, the domestic sales quantity of flat glass in (t) period is of course the quantity sold not for the residences which were finished two years ago, but for the residences which were started two years ago and finished in (t) period.

*The correlation between Y and x1 is -26.1%, which indicates that when there is one unit of increase in the number of residences in period (t-2), domestic flat glass sales in period (t) also not increase. Generally speaking, the result is not very meaningful.

Equation 7:

$Y = a + bx1 + cx2 + dx3$

Y = Domestic Flat Glass Demand ('000 m^2)

x1 = Flat Glass Domestic Prices (TL/m^2) 1977=100

x2 = Areas of Residences ('000 m^2) in period (t-2)

x3 = Cost of Residences (TL/m^2) in period (t-2)

R^2 = 83.55%

Adj. R^2 = 71.213%

F = 6.77214

$$Y_{(t)} = \underset{(5.122)}{15863.83} - \underset{(0.266)}{0.27947x1_{(t)}} + \underset{(-4.268)}{0.04533x2_{(t-2)}} + \underset{(0.368)}{0.92398x3_{(t-2)}}$$

The model, as a whole, is significant. 83.55% of domestic flat glass sales ('000 m^2) is explained by flat glass domestic prices (TL/m^2, 1977=100), areas of residences in (t-2) period ('000 m^2), and the cost of residences in (t-2) period (TL/m^2).

*The coefficients of variables x1 and x3 are insignificant whereas that of the constant term and x2 are significant. That is to say, the significance of the whole model is mostly determined by the constant term and x2. One unit of increase in the areas of residences ('000 m^2) in period (t-2) affects domestic flat glass sales positively by 0.04533 units.

*The correlations among Y, x1, x2 and x3 are as follows:

	Y	x1	x2	x3
Y :	1.0			
x1:	-90.5%	1.0		
x2:	-26.1%	40.7%	1.0	
x3:	-26.3%	39.9%	59.1%	1.0

These correlations show that, domestic flat glass demand and the constant 1977 prices for domestic flat glass sales are highly correlated (90.5%). This correlation is a negative one, indicating that when domestic flat glass prices increase domestic flat glass demand decreases. This result is very much in line with the theory of demand.

The second highest correlation (59.1%) is between x2 and x3, namely, the areas of residences in period (t-2) and the cost of finished residences in period (t-2) where TL is in constant

1977 values. As we have constant TL values divided by areas of residences, the unit cost of finished residences decrease if the areas increase. Knowing that the residence areas do not show a considerably increasing trend, sometime decreasing but generally a constant trend within 1977-1984 interval, it is possible to expect that the unit cost figure is mostly determined by constant 1977 value of finished residences. The coefficient indicates that the correlation between unit cost of finished residences in (t-2) period and the areas of residences in (t-2) period affect each other more than 50%, positively. This result is related with our idea about the floor-areas of residences constructed are usually large as it is more profit-promising. In other words, the costs of these kinds of residences are expected to be high as the more quantities of construction materials are needed for large floor-areas as well as the high tendency of using luxurious construction materials. Therefore, if the areas of the residences are large, the construction costs of these residences are high, too. Thus, areas of residences determine the costs of them.

The other variables in order of high correlations are as follows:

a) x1 <---> x2 : 40.7%

b) x1 <---> x3 : 39.9%

c) Y <---> x3 : -26.3%

d) Y <---> x2 : -26.1%

a)Domestic flat glass constant selling price variable (TL/m^2) in period (t) is correlated by the areas of residences in period (t-2) by 40.7%.

These two variables have such an interrelation that the areas of residences in (t-2) period is somewhat a potential demand for flat glass. Thus, considering the areas of the residences in (t-2) period as the implicit determining factor of price, we would expect to have a traditional negative relation between price and demand. The correlation result we have obtained is not in this direction.

b)Domestic flat glass constant selling prices (1977=100) and the unit cost of finished residence constructions in (t-2) period have 39.9% correlation.

Domestic flat glass constant selling prices are expected to influence the unit cost of finished residence constructions, to some extent. In other words, domestic constant selling price of flat glass takes place in the unit cost of finished residence constructions. The individual effect of the flat glass selling price is not very clearly observable due to the fact that the effect of flat glass being covered in the unit cost of finished residence constructions in (t-2) period. Therefore, the correlation between x1 and x3 being 39.9% is mostly attributable to the relation between unit cost of finished residential constructions containing flat glass in it implicitly in (t-2) period and the domestic flat glass constant 1977 selling price.

c)If we observe the correlation between the domestic demand for flat glass $Y_{(t)}$ and the unit cost of finished residence constructions $x3_{(t)}$ we see a negative and very low correlation (-26.3%).

Domestic demand for flat glass is very much induced by the residential constructions which were started sometime ago and are likely to finish. Therefore, as soon as the residential constructions specify their flat glass demand and use it in their buildings, the cost created by this item is added to the total unit cost of the residential construction. The cost of flat glass covered in the unit cost of a residential building has price and quantity factors. In other words, besides the effect of price, quantity is also an important factor of cost in determining the flat glass cost within the unit cost of a residential construction. Thus, the domestic demand for flat glass arising from the residential constructions is as much as the flat glass to be used for windows. As the rate of residential construction increase is low and the flat glass used is about 30% of the floor-areas of the constructions (see part (d) for the reason of this percentage figure), the negative and low relation is not very suprising.

d)Domestic flat glass demand in period (t) and the areas of residences in period (t-2), i.e.: Y and x2, are negatively correlated by 26.1%.

The areas for residence constructions in (t-2) period are expected to create a flat glass demand after almost two-years period. Thus, the domestic flat glass demand in period (t) occurs as a result of the finished residence constructions which were started two years ago. Our figures for residence areas show the total floor areas of residences. In this framework, the share of areas devoted for window glasses are almost one-third of the total floor area of a residence. This is probably due to the fact that there are still widely used brick-made walls seperating the rooms in residences. Therefore, only one-third of residence areas are subject to flat glass consumption especially for windows. We expected that if the areas of residences in (t-2) period increased, domestic demand for flat glass would also increase in period (t). This expectation is unfortunately not satisfied with the result. In other words, when the areas of residences in (t-2) period increase, domestic demand for flat glass in (t) period decreases.

Equation 8:

Y = a + bx1 + cx2 + dx3

Y = Domestic Flat Glass Sales ('000 m^2) in period (t)

x1 = Flat Glass Prices (TL/m^2) in period (t)

x2 = Number of Residences in period (t)

x3 = Cost of Residences (TL/m^2) in period (t-2)

R^2 = 60.203%

Adj. R^2 = 30.354%

F = 2.01696

$$Y_{(t)} = \underset{(3.44)}{51116.98919} - \underset{(-1.534)}{2.24368x1_{(t)}} - \underset{(-2.219)}{0.27868x2_{(t)}} - \underset{(-2.309)}{15.97336x3_{(t-2)}}$$

The model, as a whole, is insignificant due to the value of calculated F. 60.203% of the domestic flat glass sales in period (t) is expalined by flat glass prices (TL/m^2) in period (t), number of residences constructed in period (t) and the TL/m^2 cost of residences in period (t-2).

The coefficients of the constant term, x2 and x3 are significant whereas that of x1 is not. One unit of increase in the number of residences in period (t) affects domestic flat glass sales in period (t) negatively, by 0.28 units. This absolute value is almost equal to zero. We could expect Y in period (t) to be affected by the number of constructed residences in period (t). In fact, the correlation coefficient between Y and x2 is (-26.4%) not a strong one.

When there is one unit of increase in the cost of constructed residences in period (t-2), domestic flat glass sales quantities in period (t) are affected negatively by 15.97 units. This result is coherent with demand theory. So, the negative correlation between Y and x3 is reasonable (-26.3%).

Although the t-test does not give a considerably significant result for the coefficient of x1, the correlation between Y and x1 is consistent with demand theory, too. One unit of increase in the flat glass prices in period (t) affects domestic flat glass sales in period (t) negatively, by 2.24 units.

If we look at the other correlation results, the values are as follows:

	Y	x1	x2	x3
Y :	1.0			
x1:	16.8%	1.0		
x2:	-26.4%	-74.4%	1.0	
x3:	-26.3%	14.0%	-62.2%	

The highest correlation is between x1 and x2 by -74.4%. Flat glass selling prices and the number of residences -both in period (t)- show a demand-supply type relation. When the number of constructed residences are high, flat glass prices are low. This result is highly due to the

fact that there is not enough demand for using flat glass in residence constructions when we take into account the constructed and finished residences, as they have already used flat glass.

The second highest correlation is between x2 and x3, which is -62.2%. The number of residences in period (t) and the unit cost of residences in period (t-2) are in negative relation with each other. That is to say, as a result of the unit cost increase in residences in (t-2) period, the number of residences in (t) period decreases, being affected by a lag.

The following highest correlation is between Y and x2, by -26.4%. Domestic flat glass sales quantity in period (t) and the number of constructed residences in period (t) are negatively correlated. The value of the correlation does not indicate a high relation between Y and x2. This is due to the fact that flat glass demand and the number of constructed residences do not affect each other in the same time period, (t). They could affect each other with some time lag, positively.

The correlation between Y and x3 is almost same as that of Y and x2; i.e.: -26.3%. High unit cost of residences in (t-2) period affects the flat glass demand in period (t) negatively, as flat glass has a certain share in unit cost of residences. Therefore, the negative relation between Y and x3 is acceptable.

The correlation between Y and x1 is 16.8%. Domestic flat glass sales in period (t) and the flat glass prices in period (t) are not expected to affect each other positively. Thus, the magnitude and direction of the correlation is not as we expected.

The x1 and x3 correlation is only 14%. Flat glass prices in period (t) and the unit cost of residences in period (t-2) are not related with each other explicitly. Although flat glass takes place in the unit cost of residences, the different time periods in the x1 and x3 relation is somewhat impossible to create a reasonable correlation.

Equation 9:

$Y = a + bx1$

Y = Domestic Flat Glass Sales ('000 tons) in period (t)

x1 = Number of Residences in period (t-2)

R^2 = 28.24%

Adj. R^2 = 16.28%

F = 2.36

$$Y_{(t)} = 187348.74 - 0.97428x1_{(t-2)}$$
$$(4.684) \quad (-1.537)$$

The model, as a whole, is insignificant. 28.24% of the domestic sales quantities in period (t) is explained by the number of residences in period (t-2). This rate is not quite good and the amount of Y, being explained by x1, is not sufficient. This fact may imply that there are some other variables which would help to explain Y by a higher percentage.

The constant term gives a significant t-test result whereas that of x1 is not as good as the constant term. One unit of increase in the number of residences in (t-2) period affects flat glass domestic sales quantity in period (t) negatively by 0.97 units, which is almost equal to one. As x1 represents the number of constructed and finished residences in (t-2) period, the demand for flat glass begins and ends at that immediate time. Therefore, when the number of residences increase by one unit in (t-2) period, flat glass sales decrease almost by one unit in period (t).

The correlation between Y and x1 is 53.1% and negative. Thus, due to the time lag between these two variables, they affect each other almost by 50 percent in opposite directions.

PART A2:

Equation 1:

Flat Glass Export Quantities (tons) in (t) period :$Y_{(t)}$

*Number of Residential Buildings in (t-1) period :$x1_{(t-1)}$

Equation 2:

Flat Glass Export Quantities (tons) in (t) period :$Y_{(t)}$

*Flat Glass Export Price (FOB TL/TON) in (t) period :$x1_{(t)}$

*Residential Building Floor Areas ('000 m^2) in (t-1) period :$x2_{(t-1)}$

Equation 3:

Flat Glass Export Quantities ('000 m^2) in (t) period :$Y_{(t)}$

*Flat Glass Export Price (FOB TL/TON) in (t) period :$x1_{(t)}$

*Residential Building Floor Areas ('000 m^2) in (t-2) period :$x2_{(t-2)}$

Regression Results Evaluated

Equation 1: $Y_{(t)}=f(x1_{(t-1)})$

The reason why we have tried to establish a relation between the number of residential buildings in (t-1) period and the flat glass export quantities (tons) in (t) period is because of our expectation that the quantities of exported flat glass will be influenced by the domestic flat

glass sales. We wanted to see how much is the effect of the number of residential buildings which use domestic flat glass, on the export quantities of flat glass.

The dependent variable Y is explained by x1 quite well. As R^2=82.55% and adj. R^2=79.64%, we can say that, flat glass export quantities are explained significantly by x1. On the other hand, the F-value is also quite well in giving significance to the whole model.

The individual t-test results give us significant constant term and x1 coefficients. One unit of increase in the number of residential buildings in (t-1) period create 4.37 units of decrease in flat glass export quantities in (t) period. In other words, as the flat glass demand created by the residential buildings increase in (t-1) period, the amount to be directed towards export markets of course becomes less in period (t) if we consider the production level restrictions and thus expect domestic demand to increase or at least stay at a constant level, as compared to export demand.

Thus, the result obtained is significant enough and the negative correlation between Y and x1 is quite high, showing the strength of the relationship.

Equation 2: $Y_{(t)}=f(x1_{(t-1)}, x2_{(t-1)})$

The reason why we have tried to interrelate flat glass export quantities in period (t) with flat glass export price in period (t) and residential building floor-areas in period (t-1) is due to our belief that price affects quantity supplied and the domestic flat glass demand -having relation with the floor-areas of the residential buildings- affects quantities to be exported.

83.56% of Y(t) is expalined by $x1_{(t)}$ and $x2_{(t-1)}$ (adj. R^2 being 76.98%). The F-value is sufficient enough to make the model significant as a whole.

Individual t-test results are such that the coefficients of x1 and x2 are significant whereas that of the constant term is insignificant.

The coefficient of x1 being significant as a result of the t-test indicates that one unit

of increase in flat glass export price creates more supply of flat glass for export markets by 3.5 units. On the other hand, as the floor-areas of residential buildings increase by one unit, in (t-1) period, the quantities to be exported are negatively affected by 3.91 units.

If we observe the correlation results, we see that $Y_{(t)}$ and $x1_{(t)}$ are 70.1% correlated positively whereas $Y_{(t)}$ and $x2_{(t-1)}$ are 90.9% correlated negatively. In other words, the relation between the flat glass export sales in period (t) and the residential building floor-areas in period (t-1) is quite strong. The effect of the one-year lag in residential building floor areas significantly determines the export sales quantities after one-year.

The negative correlation between $x1_{(t)}$ and $x2_{(t-1)}$ is possibly due to the fact that as the floor-areas of residential buildings increase in (t-1) period, more flat glass demand arises in domestic market. As domestic demand increases, prices also increase in domestic sales in the same period, i.e.: (t-1). On the other hand, the export price of flat glass one period after this event, related with the decrease in potential quantity to be supplied for export market, decreases, too. The strength of the relation between $x1_{(t)}$ and $x2_{(t-1)}$ is not very low, but acceptable (-69.1%).

Equation 3: $Y_{(t)}=f(x1_{(t)}, x2_{(t-2)})$

The reason why we have tried to interrelate flat glass export quantities in period (t) with flat glass export price in period (t) and the residential building floor-areas in period (t-2) is because we think that there is a price-quantity relation, and the floor-areas of the residential buildings in (t-2) period indicate the level of domestic flat glass sales and thus the export sales potential, due to the constraints in production.

The dependent variable Y is explained by x1 and x2, by R^2=83.33% (adj. R^2=76.66%). The model is significant as a whole (F=12.50).

If we try to observe the individual t-tests, all the three coefficients, i.e.: coefficients

of the constant term, x1 and x2 are significant.

One unit of increase in the flat glass export price in period (t) increases export sales quantities by 14.3 units again in period (t). In other words, as explained in supply theory, when price increases quantity supplied also increases. It is rational to export more if there is opportunity to sell with higher prices. Therefore, the result is in line with our expectations.

When the second independent variable, namely the floor-areas of the residential buildings increase by one unit in period (t-2), flat glass export quantities decrease by 3.16 units. This result is also in line with our expectations. In other words, the impact of the demand increase in domestic market in period (t-2) due to the increase in residential building floor-areas, exists two periods later, i.e. in period (t). The existing effect in period (t) determines the flat glass quantities to be exported. Since the production level of a plant is limited by its capacity, the amount to be given to domestic market consumption will thus determine the amount to be exported. Thus, if domestic sales increase, it is natural to expect export sales to decrease.

The results show that Y and x2 have the highest correlations (-72.9%) among all the correlation results. The correlation between Y and x1 is also good enough (70.1%). The correlation between x1 and x2, i.e.: flat glass export prices (FOB TL/TON) in period (t) and the residential building floor-areas ('000 m^2) in period (t-2), is both negative and low. In other words, the strength of the relationship between x1 and x2 is quite low.

The only and most significant difference between this equation and Equation 2 is the absolute values of the correlations. The correlations between $Y_{(t)}$ and $x2_{(t-1)}$ besides x1(t) and $x2_{(t-1)}$ in Equation 2 were higher, whereas the correlations between Y(t) and $x2_{(t-2)}$ besides $x1_{(t)}$ and x2(t-2) in Equation 3 were lower, mainly due to the effect created by the lag applied for x2 (t-1 in Equation 2, t-2 in Equation 3).

EXPORT MARKET

Export Equation 1:

Flat Glass Export Quantities (tons) in (t) period :$Y_{(t)}$

*Number of Residential Buildings in (t) period :$x1_{(t)}$

Export Equation 2:

Flat Glass Export Quantities (tons) in (t) period :$Y_{(t)}$

*Number of Residential Buildings in (t-2) period :$x1_{(t-2)}$

Export Equation 3:

Flat Glass Export Quantities ('000 m^2) in (t) period :$Y_{(t)}$

*Export Price (FOB TL/m^2) in (t) period :$x1_{(t)}$

*Residence Floor Areas ('000m^2) in (t-1) period :$x2_{(t-1)}$

Export Equation 4:

Flat Glass Export Quantities ('000 m^2) in (t) period :$Y_{(t)}$

*Flat Glass Export Price (FOB TL/m^2) in (t) period :$x1_{(t)}$

*Residence Floor Areas ('000m^2) in (t-2) period :$x2_{(t-2)}$

Export Equation 5:

Flat Glass Export Sales Revenue (FOB TL '000) in (t) period :$Y_{(t)}$

*Flat Glass Export Price (FOB TL/TON) in period (t) :$x1_{(t)}$

Export Equation 6:

Flat Glass Export Sales Revenue (FOB TL '000) in period (t) :$Y_{(t)}$

*Flat Glass Export Price (FOB TL/TON) in period (t) :$x1_{(t)}$

*İstanbul Chamber of Commerce Wholesale Price Index (1977=100) :$x2_{(1977=100)}$

Export Equation 7:

Flat Glass Export Sales Revenue (FOB TL '000) in (t) period :$Y_{(t)}$

*Flat Glass Export Quantities (tons) in (t) period :$x1_{(t)}$

*Istanbul Chamber of Commerce Wholesale Price Index (1977=100) :$x2_{(1977=100)}$

Equation 1: $Y(t)=f(x1_{(t)})$

In this equation, we have tried to analyze the effect of the number of residential buildings in period (t) with respect to the flat glass export quantities (tons) in period (t).

Here, we expect a negative relation between these two variables. As the number of residential buildings increase in period (t), domestic demand for flat glass also increases. Therefore, the remaining quantities of flat glass to be exported automatically decrease in period (t).

The overall significance of the model is sufficient (F=6.969). x1(t) explains 53.7% of

Y(t) (adj. R^2=46.027%).

The individual significance of the independent variable is as follows:

		$x1_{(t)}$
t_c	:	-2.64
$t_{n-k,\alpha}$ (α=0.05)	:	2.365
ß	:	-3.47

$x1_{(t)}$ can be considered as significant and one unit of increase in the number of residential buildings in period (t) causes flat glass export sales quantities to decrease by 3.47 units.

The strength of the relationship between $Y_{(t)}$ and $x1_{(t)}$ is -73.3%.

The equation obtained as a result of the above explained points is as follows:

$$Y_{(t)} = 264100.81 - 3.47x1_{(t)}$$
$$(3.328) \quad (-2.64)$$

The correlation matrix is;

	Y	x1
Y :	1.0	-0.733
x1:	-0.733	1.0

Equation 2: $Y_{(t)}=f(x1_{(t-2)})$

In this equation, we have tried to analyze Equation 1 with x1 in (t-2) period.

Here, we expect almost the same type of results as in Equation 1. This time, the only difference in our expectation is x1 being less important in explaining Y. In other words, we expect the effect of the residential building numbers in period (t-2) to be less on the flat glass export quantities in period (t). This is because the (t) period effect of x1 on Y should be more than the (t-2) period effect as two more years of lag defined by (t-2) is too long to affect the flat glass export sales quantities in period (t).

The overall significance of the model is sufficient by F=6.809. x1(t-2) expalins 53.16% of $Y_{(t)}$ (adj. R2=45.35%).

The individual significance of the independent variable is as follows:

		$x1_{(t-2)}$
t_c	:	-2.609
$t_{n-k,\alpha}$ (α=0.05)	:	2.365
ß	:	-3.83

$x1_{(t-2)}$ can be considered as significant and one unit of increase in the number of residential buildings in period (t-2) causes flat glass export sales quantities to decrease by 3.83 units. In other words, numerically, $x1_{(t-2)}$ affects $Y_{(t)}$ more (by -3.83 units) in terms of decreasing flat glass export quantities whereas $x1_{(t)}$ affects $Y_{(t)}$ less (by -3.47 units).

The correlation between $x1_{(t-2)}$ and $Y_{(t)}$ is 72.9%.

The equation obtained as a result of the above explained points is as follows:

$$Y_{(t)} = 295993.42 - 3.8318x1_{(t-2)}$$
$$(3.206) \qquad (-2.609)$$

The correlation matrix is;

	Y	x1
Y :	1.0	-0.729
x1:	-0.729	1.0

Equation 3: $Y_{(t)}=f(x1_{(t)}, x2_{(t-1)})$

In our third equation, we have tried to analyze the effect of flat glass export price (FOB TL/m^2) in period (t) and the residential building floor-areas ('000 m^2) in period (t-1) on the flat glass export quantities ('000 m^2) in period (t).

The first of these independent variables is expected to have a positive relation with Y, whereas the second one is expected to be negatively related.

The overall significance of the model is sufficient by F=6.208. $x1_{(t)}$ and $x2_{(t-1)}$ help to explain Y by 71.29% (adj R^2=59.81%).

The individual significances of the independent variables are as follows:

		$x1_{(t)}$	$x2_{(t-1)}$
t_c	:	0.966	-1.786
$t_{n-k,\alpha}$ (α=0.2)	:	1.440	
ß	:	0.09883	-0.89671

While we can consider the t-test result of x2 as significant at a relatively low a level (a=0.20), it is not easy to say so for $x1_{(t)}$.

One unit of increase in the residential building floor-areas in period (t-1) causes flat glass export sales quantities to decrease by 0.896 units, after one period of lag. The level of decrease is close to one. Therefore, the decrease created by the unit increase in $x2_{(t-1)}$ on $Y_{(t)}$ is almost at the same level.

The correlations between Y and the independent variables is strong and are shown below.

The equation obtained as a result of the above explained points is as follows:

$$Y_{(t)} = 23178.825 + 0.09883x1_{(t)} - 0.89671x2_{(t-1)}$$

(1.815) (0.966) (-1.786)

The correlation matrix is;

	Y	x1	x2
Y :	1.0		
x1:	0.728	1.0	
x2:	-0.812	-0.69	1.0

Equation 4: $Y_{(t)}=f(x1_{(t)}, x2_{(t-2)})$

In this equation, we have tried to make the same analysis as in Equation 3, but this time with $x2_{(t-2)}$ instead of $x2_{(t-1)}$.

Here we expect the effect of $x2_{(t-2)}$ to be less than the effect of $x2_{(t-1)}$ in explaining $Y_{(t)}$ (see Export Equation 2).

The overall significance of the model is less than that of Equation 3 and F is 5.85 whereas the F of Equation 3 was 6.208. $x1_{(t)}$ and $x2_{(t-2)}$ help to explain $Y_{(t)}$ by 70.06% (adj. R^2=58.08%).

		$x1_{(t)}$	$x2_{(t-2)}$
t_c	:	2.544	1.688
$t_{n-k,\alpha}$ (α=0.2)	:	1.440	
ß	:	0.197	-0.629

$x1_{(t)}$ and $x2_{(t-2)}$ can be considered significant, although at a low level (a=0.20).

One unit of increase in the flat glass export prices (FOB TL/m^2) in period (t) causes $Y_{(t)}$ to increase by a very little amount, i.e.: 0.197. As our unit of export quantities is defined by m^2 here, the influence of price FOB TL/m^2 on the quantity change is quite marginal.

One unit of increase in the second independent variable $x2_{(t-2)}$ decreases Y by 0.629 units.

While the correlation between Y and x1 is high, the correlation between Y and x2 is relatively lower.

The equation obtained as a result of the above given points is as follows:

$$Y_{(t)} = 14886.96 + 0.197x1_{(t)} - 0.629x2_{(t-2)}$$
$$(1.711) \quad (2.544) \quad (1.688)$$

The correlation matrix is;

	Y	x1	x2
Y :	1.0		
x1:	0.728	1.0	
x2:	-0.559	-0.214	1.0

Equation 5: $Y_{(t)}=f(x1_{(t)})$

In this equation, we have tried to analyze the relation between the flat glass export sales revenue (FOB TL '000) in period (t) and the flat glass export price (FOB TL/TON) in period (t).

We all know that price and quantity are the determinants of revenue. Therefore, we wanted to see how price helps to determine revenue only by itself. Here, we expected to see that flat glass export price, in period (t) is significantly an important term.

The model is both significant as a whole and individually ($F=26.585$, $t_{x1}=5.156$). $x1_{(t)}$ explains 81.59% of $Y_{(t)}$ (adj. $R^2=78.52\%$).

The individual t-test result for x1 is as follows:

		$x1_{(t)}$
t_c	:	5.156
$t_{n-k,\alpha}$ (α=0.01)	:	3.499
ß	:	1214.197

Besides being significant, the coefficient of x1 indicates that when one unit of price is increased, 1214.197 units of increase is obtained in export revenues. It is important to point out to the fact that both the revenue and price figures that we utilized here are current. So, the effect of inflation is contained within these results.

The correlation between $Y_{(t)}$ and $x1_{(t)}$ is 90.3%.

As a result of the above mentioned points, the equation we have obtained is as follows:

$$Y_{(t)} = 1100102.432 + 1214.197x1_{(t)}$$
$$(-1.33) \qquad (5.156)$$

The correlation matrix is;

	Y	**x1**
Y :	1.0	
x1:	0.903	1.0

Equation 6: $Y_{(t)}=f(x1_{(t)}, x2_{(t=1977\ constant)})$

In this equation, we have tried to see how much effect inflation -when introduced as another variable- creates on the current values of both price and revenue. Therefore, instead of using 1977=100 values of revenues and prices, we have put inflation index as another variable affecting both $Y_{(t)}$ and $x1_{(t)}$.

The model as a whole is significant (F=39.29). 94.02% of $Y_{(t)}$ is explained by both $x1_{(t)}$ and $x2_{(1977=100)}$ (adj. R^2=91.63%).

The individual results of independent variables are as follows:

		$x1_{(t)}$	$x2_{(1977=100)}$
t_c	:	-0.777	7.155
$t_{n-k,\alpha}$ (α=0.01)	:	3.499	
ß	:	-0.25997	11.698

In this analysis, it is interesting that $x1_{(t)}$ is insignificant whereas $x2_{(t)}$ is considerably significant. Therefore, the influence created by one unit increase of x2 is 11.698 units of increase in Y. Although current export prices helped to increase current revenues by 1214.197 units, unit increase of constant export prices created a decreasing effect on constant export revenues. After one unit of increase in constant export prices, 0.26 units of decrease occurs in constant export revenues.

If we look at the correlations, we see that constant export revenues are highly correlated with the inflation index. In our previous equation, as the current price variable was containing inflation within it, the correlation coefficient between export revenues (Y) and export price (x1) was quite high (90.3%). Here, as the specific effect of inflation is extracted and seperately

evaluated and constant price related with the export revenues, a relatively lower correlation coefficient (57.2%) is obtained. Thus, we can argue that the 90.3% correlation in the previous equation shows the combined effect of constant price increase and inflation. Therefore, the individual effect of constant export prices are really very insignificant in explaining the constant export revenue variable.

The correlation coefficient between the constant export revenue and the inflation index is quite high, almost close to 100%. The correlation between the constant export prices and the inflation index (59%) is around the level of correlation between the export revenues and the inflation index (57.2%).

The equation we have obtained as a result of the above given points is as follows:

$$Y_{(t)} = -2072.38 - 0.25997x1_{(t)} + 11.698x2_{(t=1977)}$$

$$(-2.233) \quad (-0.777) \qquad (7.155)$$

The correlation matrix is;

	Y	x1	x2
Y :	1.0		
x1:	0.572	1.0	
x2:	0.966	0.59	1.0

To be able to explain the positive effect of domestic inflation on the export revenues, we can argue that, inflation increase naturally motivates flat glass TL prices to go up.

The correlation between the current export revenue (FOB TL '000) and the current prices (FOB TL/TON) is positive because, as export price (FOB TL/TON) increases, the revenue thus obtained is also influenced by this increase in the same direction. The same is valid for the

correlation between x1 and x2. If inflation increases, the influence of this increase will be reflected to almost all the prices at varying levels. Therefore, the positive correlations between Y and x1, x1 and x2 are reasonable.

Equation 7: $Y_{(t)}=f(x1_{(t)}, x2_{(t=1977\ constant)})$

In this equation, we have tried to analyze the second important determinant of revenue (here, in terms of export revenues; FOB TL '000) which is the quantity aspect (tons).

We expect exported quantities to contribute to the revenue to be earned, positively. The inflation index here is to neutralize the current values of the export revenues by only considering the domestic inflation.

The model is significant as a whole (F=11.3769) while 81.98% of the model as a whole is explained by x1 and x2 (adj. R^2=74.78%).

The individual significances of the independent variables are as follows:

		$x1_{(t)}$	$x2_{(1977=100)}$
t_c	:	2.45	-1.028
$t_{n-k,\alpha}$ (α=0.05)	:	2.442	
ß	:	77.74	-4047.12

While x1 gives a significant coefficient, x2 is insignificant in terms of the t-test result. One unit of increase in export quantities causes the export revenue to increase by 77.74 units. Although the coefficient is insignificant for x2, we can still argue that one unit of increase in the inflation index negatively influences the export revenues, as the values of real revenues (Current Revenue ÷ Inflation Index = Real Revenue) deteriorate.

The correlation coefficient between the export revenue and the quantities exported is 88.4% which can be considered as a rather strong positive relation representative. The correlation between Y and x2 is relatively lower, being 77.7%. The highest correlation existing between x1 and x2 (94.9%) is quite reasonable. If domestic prices rise as a result of inflation increase, domestic demand for flat flat glass decreases. Thus, the decrease in demand means decrease in total domestic sales of that glass. If domestic sales decrease, the part of production which is not domestically sold is directed towards export markets. Therefore, quantities exported increase as domestic inflation increases.

The equation we have obtained as a result of the above given points is as follows:

$$Y_{(t)} = 151532.259 + 77.74x1_{(t)} - 4047.12x2_{(1977=100)}$$

$$(0.167) \quad (2.45) \quad (-1.028)$$

The correlation matrix is;

	Y	x1	x2
Y :	1.0		
x1:	0.884	1.0	
x2:	0.777	0.949	1.0

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