





# **THE ECONOMICS OF TOBACCO IN TURKEY**

**New evidence and demand estimates**

**Zeynep Önder**

**November 2002**

## Health, Nutrition and Population (HNP) Discussion Paper

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# Health, Nutrition and Population (HNP) Discussion Paper

## ECONOMICS OF TOBACCO CONTROL PAPER NO. 2

### **The Economics of Tobacco in Turkey: *New Evidence and Demand Estimates***

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Paper prepared for the World Bank, with funding from the  
US Centers for Disease Control/Office on Smoking and Health

**Abstract:** This report reviews the key issues in the economics of tobacco control in Turkey, including taxation, tobacco control policies, income, price and expenditure elasticity of cigarettes and the link between poverty and tobacco use. In the first part of the report, information is presented on tobacco and cigarette production, cigarette consumption, and government policies related to tobacco, especially taxation and tobacco control. The second part analyses aggregate cigarette consumption. Using aggregate level data from 1960 to 2000, price, tax and income elasticities for cigarettes are estimated. In addition, substitution elasticities among three types of cigarettes, filter, non-filter and foreign cigarettes, are calculated. A simulation analysis estimates the impact that an increase in excise tax would have on cigarette consumption and government tax revenues. The third section examines demand for cigarettes in Turkey at household level using the 1994 Household Expenditure and Consumption Survey. Using these data, some key economic policy issues related to cigarettes are discussed including the impact that changes in the cigarette tax rate and price of cigarettes would have on the smoking prevalence rate and number of cigarettes smoked, controlling for social and demographic factors affecting the decision to smoke. A simulation analysis is conducted to examine the impact of changes of cigarette taxes on government tax revenues and cigarette consumption.

**Keywords:** cigarette consumption Turkey; tobacco tax; tobacco control in Turkey; demand for cigarettes in Turkey; price elasticity of demand for cigarettes in Turkey.

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## FOREWORD

In 1999, the World Bank published “Curbing the Epidemic: governments and the economics of tobacco control”, which summarizes the trends in global tobacco use and the resulting immense and growing burden of disease and premature death. By 1999, there were already 4 million deaths from tobacco each year, and this huge number is projected to grow to 10 million per year by 2030, given present trends in tobacco consumption. Already about half of these deaths are in high-income countries, but recent and continued increases in tobacco use in the developing world is causing the tobacco-related burden to shift increasingly to low- and middle-income countries. By 2030, seven of every ten tobacco-attributable deaths will be in developing countries. “Curbing the Epidemic” also summarizes the evidence on the set of policies and interventions that have proved to be effective and cost-effective in reducing tobacco use, in countries around the world.

Tax increases that raise the price of tobacco products are the most powerful policy tool to reduce tobacco use, and the single most cost-effective intervention. They are also the most effective intervention to persuade young people to quit or not to start smoking. This is because young people, like others with low incomes, tend to be highly sensitive to price increases.

Why are these proven cost effective tobacco control measures –especially tax increases– not adopted or implemented more strongly by governments? Many governments hesitate to act decisively to reduce tobacco use, because they fear that tax increases and other tobacco control measures might harm the economy, by reducing the economic benefits their country gains from growing, processing, manufacturing, exporting and taxing tobacco. The argument that “tobacco contributes revenues, jobs and incomes” is a formidable barrier to tobacco control in many countries. Are these fears supported by the facts?

In fact, these fears turn out to be largely unfounded, when the data and evidence on the economics of tobacco and tobacco control are examined. The team of about 30 internationally recognized experts in economics, epidemiology and other relevant disciplines who contributed to the analysis presented in “Curbing the Epidemic” reviewed a large body of existing evidence, and concluded strongly that in most countries, tobacco control would not lead to a net loss of jobs and could, in many circumstances actually generate new jobs. Tax increases would increase (not decrease) total tax revenues, even if cigarette smuggling increased to some extent. Furthermore, the evidence show that cigarette smuggling is caused at least as much by general corruption as by high tobacco product tax and price differentials, and the team recommended strongly that governments not forego the benefits of tobacco tax increases because they feared the possible impact on smuggling, but rather act to deter, detect and punish smuggling.

Much of the evidence presented and summarized in “Curbing the Epidemic” was from high income countries. But the main battleground against tobacco use is now in low- and middle-incomes countries. If needless disease and millions of premature deaths are to be prevented, then it is crucial that developing counties raise tobacco taxes, introduce comprehensive bans on all advertising and promotion of tobacco products, ban smoking in public places, inform their citizens well about the harm that tobacco causes and the benefits of quitting, and provide advice and support to help people who smoke and chew tobacco, to quit.

In talking to policy-makers in developing countries, it became clear that there was a great need for country-specific analytic work, to provide a basis for policy making, within a sound economic framework. So the World Bank and the Tobacco Free Initiative of the World Health Organization (as well as some of the WHO regional offices and several other organizations, acting in partnership or

independently) began to commission and support analysis of the economics of tobacco and tobacco control in many countries around the world.

The report presented in this Economic of Tobacco Discussion Paper makes a valuable contribution to our understanding of the issues and likely economic impact of tobacco control in a specific country-setting. Our hope is that the information, analysis and recommendations will prove helpful to policy makers, and help result in stronger policies to reduce the unnecessary harm caused by tobacco use.

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## 1. INTRODUCTION

Turkey has become one of the largest consumers of cigarettes. While world cigarette consumption declined by 4 percent between 1990 and 1999, in Turkey, it rose by 52 percent; the third largest increase in the world after Pakistan and Bulgaria, according to U.S. Department of Agriculture data. Turkey's domestic cigarette consumption increased from 73,270 million tons in 1990 to 111,500 million tons in 1999 (Table 1.1). Per capita consumption of cigarettes was 136 packs per adult in 1999.

**Table 1.1 - Domestic Cigarette Consumption in 1990 and 1999 in Five Countries with Fastest Increase, and in the World**

Countries	Domestic Consumption in 1990 (million tons)	Domestic Consumption in 1999 (million tons)	Percentage Change in Domestic Consumption 1990-99
Pakistan	31,934	54,500	71.66 %
Bulgaria	12,200	19,000	55.74 %
<b>Turkey</b>	<b>73,270</b>	<b>111,500</b>	<b>52.18 %</b>
Indonesia	140,936	207,685	47.36 %
The Netherlands	23,251	30,124	29.56 %
<b>World (Total)</b>	<b>4,538,890</b>	<b>4,351,770</b>	<b>-4.12 %</b>

Source: USDA World Cigarette Consumption in Selected Countries.

The rapid increase in tobacco consumption in Turkey will cause a large increase in the burden of disease and premature death in years to come. Evidence shows that half of all long-term tobacco users are killed as a result of their addiction to tobacco products, and half of these deaths occur prematurely. A huge body of scientific research has clearly established that tobacco use raises the risk of developing many diseases, including cancer of the lung, bladder, kidney, larynx, mouth, pancreas and stomach, heart attacks, strokes and other circulatory diseases, and respiratory diseases including emphysema.

Global evidence also shows clearly that there is a set of policies and interventions that can be highly effective in reducing tobacco use, encouraging smokers to quit, and deterring young people from starting to smoke. These are: using tax rates to raise prices of cigarettes and other tobacco products; complete bans on all advertising and promotion of tobacco products and associated logos and trademarks; bans on smoking in public places, especially in enclosed spaces; good information on the health risks caused by tobacco use and the benefits of quitting, including strong, large clear warnings on cigarette packages, and help for people who want to quit.

People who oppose strong measures to reduce tobacco use usually comment that tobacco makes an important economic contribution, through creating jobs and incomes, and generating tax revenue. This study shows that even in Turkey, one of the largest tobacco growing and tobacco exporting countries in the world, tobacco contributes only a very limited amount to exports, jobs and production. Tobacco exports account for only about 1% of all Turkey's export value, and a much smaller net amount, since tobacco and cigarette imports have been growing considerably. Cigarette producers employ only 0.13% of the workforce in Turkey, and although there are about 600,000 farmers who grow tobacco, most grow relatively small amounts (less than half a hectare on average, and the total land under tobacco is only around 1% of all cultivated land in Turkey).

Cigarettes taxes provide an estimated 6% of total government revenues, but this share has been decreasing as Turkey's economy has developed, diversified and modernized. Moreover, the policy of supporting tobacco farmers by buying agreed quotas of tobacco leaf at fixed prices has been a large fiscal burden in some years.

This study was undertaken to review the data on the economic contribution that tobacco makes to Turkey's economy, and the information on tobacco use. There are no studies (that we were able to find) that show the extent of the economic damage that tobacco use causes, in health care costs borne by the state and by individuals, in lost earnings and productivity because of sickness and premature death of smokers and others who inhale their smoke, and in the opportunity cost especially to families, especially of smokers from low-income households, who spend scarce family resources on cigarettes instead of on products that could improve the health or well-being of the family. The analysis of household data shows that although cigarette prices have only a limited impact on smoking prevalence (the decision whether or not to smoke), they have a much stronger impact on the decision as to how much to smoke. At higher prices, the percentage of smokers would drop a little, but smokers –especially smokers with lower incomes– would cut back significantly.

The study's most important conclusions are that higher tobacco taxes would help reduce tobacco use and generate government revenue, but that in themselves they will not be enough. Additional strong measures need to be taken and enforced, to reduce tobacco use in Turkey, and protect the future health of Turkish adults and young people.

## **2. THE ROLE OF TOBACCO AND CIGARETTES IN THE TURKISH ECONOMY**

This section provides data on the role of tobacco and cigarettes in the Turkish economy. It reviews data on cigarette consumption, and cigarette production. The role of tobacco in Turkish agriculture and foreign trade is examined. Data on cigarette taxes and their contribution to government revenues are presented. Finally, tobacco control policies in Turkey are described.

### **2.1 SMOKING PREVALENCE**

The adult smoking prevalence rate was 62.8 percent for men and 24 percent for women aged 15 or older in 1988 (Bilir, 1997). This is the only study that covers the whole country. Other (more recent) studies examine smoking prevalence rates for specific groups. For example, the most recent study by Bilir (2000) showed that the smoking prevalence rate among young people is high, despite some small apparent decline between 1998 and 1999. Among a sample of 6,715 (5,792) young people in 1999 (1998) living in 34 districts in Turkey, Bilir (2000) found that 1 (2) percent of 7th grade students and 15 (16) percent of 12<sup>th</sup> grade students were smokers in 1999 (1998), and 30 percent of 12<sup>th</sup> graders had ever smoked. Table 2.1 shows smoking prevalence rates for different groups in Bilir's surveys. Among adults, drivers have the highest prevalence rate, 74 (70) percent and religious leaders have the lowest rate, 25 percent.

**Table 2.1 - Smoking Prevalence Rates in Turkey**

Groups	Never Smoked (%)		Quit (%)		Smoker (%)	
	1998	1999	1998	1999	1998	1999
Students (7th Grade)	87.1	93.1	10.9	6.1	2.0	0.8
Students (12th Grade)	69.1	70.1	14.6	15.1	16.3	14.8
Teachers	38.6	37.0	14.1	14.5	47.2	48.5
Physicians	41.7	39.2	17.2	17.7	41.1	43.1
Police Officers	26.6	22.2	12.8	13.2	60.6	64.6
Religious Leaders	53.9	49.8	21.6	25.1	24.5	25.1
Drivers	17.4	14.8	12.5	10.9	70.1	74.3

Source: Bilir and Önder, 2000

## 2.2 CIGARETTE CONSUMPTION

There are three basic types of cigarettes sold in Turkey: a) domestic filter cigarettes, b) domestic non-filter cigarettes and c) foreign brand cigarettes. Table 2.2 shows the domestic sales of these cigarettes from 1987 to 2000. Foreign brand cigarettes include both imported and domestically produced foreign brand cigarettes, which have been produced in Turkey since 1991. The market share of foreign brands has increased dramatically and consumption of unfiltered cigarettes has declined.

Total consumption of cigarettes increased by 80 percent over the last decade (Table 2.2), an average annual increase of 5 percent.<sup>1</sup> Some of the rise is due to increasing population size, but cigarette consumption per adult also increased. The largest increase in consumption occurred in foreign brand cigarettes, consumption of which increased 46 fold from 1990 to 2000, from a negligible market share to 32 percent of the market. Total consumption of filtered domestic cigarettes increased by 31 percent but the market share fell from 92 percent to 67 percent. Total consumption of non-filtered cigarettes fell by 78 percent over this period, and the market share fell from 6 percent to less than 1 percent. The increase in the consumption of foreign brands can be explained by the several factors. First, the restrictions on imports of these products were eliminated. Second, these cigarettes started to be produced in Turkey. Third, the government allowed these companies to promote their cigarettes.

<sup>1</sup> These data on domestic cigarette sales in Turkey from the Annual Reports of TEKEL show a larger increase than the USDA aggregate data reported in Section 1. The USDA data use aggregate leaf production, net of imports and exports, and convert leaf volume to cigarette equivalents.

**Table 2.2 - Cigarette Consumption by Type, 1987 to 2000**

Year	Total Consumption (Million Pieces)			Consumption per Adult (Packs with 20 pieces)			
	Foreign	Filter	Non-filter	Foreign	Filter	Non-filter	Total
1987	859	66,184	7,083	1.27	97.90	10.48	109.65
1988	853	65,708	7,032	1.23	95.02	10.17	106.42
1989	546	42,068	4,502	0.77	59.47	6.36	66.61
1990	793	58,964	4,091	1.08	80.27	5.57	86.92
1991	690	67,619	3,810	0.92	90.59	5.10	96.62
1992	7,003	63,068	5,324	9.23	83.15	7.02	99.40
1993	10,180	67,479	4,853	13.21	87.55	6.30	107.05
1994	15,228	72,345	7,054	19.44	92.37	9.01	120.82
1995	17,812	73,627	5,061	22.38	92.51	6.36	121.25
1996	22,974	72,112	3,423	28.41	89.16	4.23	121.80
1997	28,634	68,613	2,783	35.02	83.91	3.40	122.33
1998	34,410	72,825	2,065	41.41	87.64	2.49	131.54
1999	35,108	78,952	1,440	41.58	93.50	1.71	136.79
2000	37,535	77,097	903	43.75	89.85	1.05	134.65

Source : State Institute of Statistics and TEKEL Annual Reports.

## 2.3 CIGARETTE PRODUCERS

Cigarette production in Turkey started in the 19<sup>th</sup> century in small shops called *atalye*. The first cigarette factory was established in 1939, and produced hand-made non-filter cigarettes and packed tobaccos. In 1958 Tekel started to produce filter cigarettes, the demand for which increased steadily. The factory for the first machine made cigarettes started to operate in 1969.

At the end of the 1970s, cigarette factories had problems importing some raw materials and spare parts because of a shortage of foreign exchange in Turkey. This caused a decline in cigarette production and factories operated below capacity. In order to satisfy domestic demand, tobacco was sent to factories in Yugoslavia and Bulgaria, and the cigarettes imported into Turkey. In 1983, Tekel started to import cigarettes with foreign brand names. As foreign brands became popular, Tekel started to produce new cigarettes that use blends of American tobaccos.

Until the early 1980s, Tekel, a government owned company, had a monopoly over manufacturing and sale of tobacco products in Turkey. Its factories produced poor quality cigarettes, and Tekel's inadequate distribution system made it necessary for store owners to visit Tekel's warehouses to pick up their inventories. Tekel rarely advertised and never promoted its products to women or young people (Dagli, 1999).

In 1984, the Turkish government allowed foreign tobacco companies to export their products to Turkey, while Tekel maintained the exclusive right to import, price and distribute domestic and foreign tobacco products. Later, the Turkish government eased the control on foreign tobacco products, and in 1991 other tobacco companies were allowed to price and distribute their own cigarettes in Turkey. One of the immediate effects of this new regulation was the establishment of Philsa in 1991, a joint venture of Philip Morris with one of the largest holding companies in

Turkey, Sabanci Holding. Philip Morris owns 75 percent and Sabanci Holding has a 25 percent ownership stake. Their factory started to operate in 1992.

With the entrance of foreign companies into the Turkish tobacco market, Tekel's power and market share started to decline. Although Tekel's domestic sales volume and value increased (Table 2.3), Tekel's market share fell from 82 percent to 70 percent between 1995 and 1997. Philsa increased its market share from 15 percent to 23 percent in this period, to become the dominant foreign cigarette company operating in Turkey. The second foreign tobacco company, R.J. Reynolds, increased its share from 3 percent to 7 percent (IMF, 1999). (In 1999, Japan Tobacco International (JTI) bought the international operations of R.J. Reynolds.)

All three major producers of cigarettes in Turkey -- Tekel, Philsa and JTI—are among the largest companies in Turkey. In 2000, Tekel was the 6<sup>th</sup> largest company, Philsa ranked 20<sup>th</sup>, and JTI was 53<sup>rd</sup>. Three other companies operating in the tobacco industry usually make the list of the largest 500 companies: Salatab Tobacco Company, Dimon Turkish Tobacco Company and Sunel Tobacco Trading Company. In 2000, a new tobacco company, TTL Tobacco was also included in the list.

**Table 2.3 – Tekel Domestic Sales Volumes, 1992-2000 (million pieces or thousand kilograms)**

	1992	1993	1994	1995	1996	1997	1998	1999	2000
Domestic Sales Volume (Million pieces, Thousand kg)									
Filter Cigarettes of Tekel	63,068	67,479	72,345	73,627	72,112	68,613	72,825	78,952	77,097
Filter Cigarettes Outside of Tekel	567	4,013	4,825	36	22	0	-	-	-
Nonfilter Cigarettes	5,324	4,853	7,054	5,061	3,423	2,783	2,065	1,440	903
Imported Tobacco Products	9,979	8,663	982	131	73	81	62	54	51
Other Tobacco Products	462	399	419	350	293	259	157	127	125
Domestic Sales Value (Billion TL)									
Filter Cigarettes of Tekel	12,936	23,081	51,386	80,538	143,620	288,481	480,200	820,223	1,621
Filter Cigarettes Outside of Tekel	194	3,068	7,268	82	45	-	-	-	-
Nonfilter Cigarettes	171	251	989	1,018	1,488	2,853	3,806	5,157	9,137
Imported Tobacco Products	4,845	5,566	1,190	333	303	286	169	101	218
Other Tobacco Products	25	30	66	92	173	368	513	911	1,422
<b>Total</b>	<b>18,171</b>	<b>31,996</b>	<b>60,899</b>	<b>82,064</b>	<b>145,630</b>	<b>291,989</b>	<b>484,688</b>	<b>826,392</b>	<b>1,631,916</b>

Source: Tekel, Annual Reports, 1994-2000.

**Table 2.4 – Sales of Some Private Companies in Turkey, 1998-2000 (million TL)**

	1998	1999	2000
Philsa	96,880,998	426,070,651	233,500,223
RJ Reynolds/JTI Tobacco Products	n.a.	66,433,985	116,714,923
Dimon Turkish Tobacco Corp.	16,417,426	26,764,370	35,751,246
Sunel Trading Company	7,683,631	10,054,006	n.a.
TTL Tobacco Industry Corp	n.a.	n.a.	24,874,965
Salatab Tobacco Corp	36,445,178	n.a.	n.a.

n.a. means not available.

Source: Capital, 500 Largest Companies in Turkey.

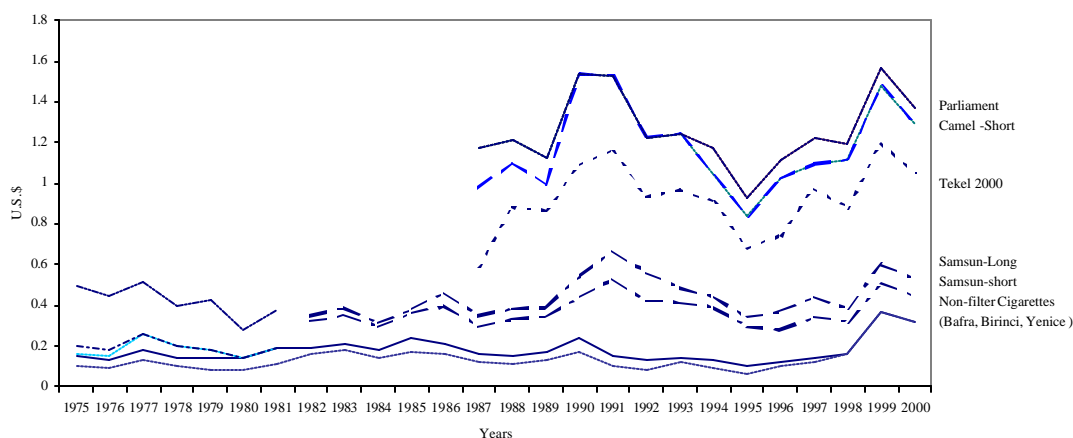
To compete with Philip Morris brands, Tekel introduced a new American blend cigarette, Tekel 2000. About two-thirds of Tekel's production are oriental blend cigarettes, the rest are American blends. Tekel produces the following cigarettes: Tekel 2000, Tekel 2001, Samsun, Maltepe. Yeni Harman, Meltem, Ballica, Bafra, Bitlis, and Birinci.

The second company, Philsa, has a factory in the western part of Turkey, Torbali, Izmir, with a total investment of more than \$200 million and capacity to produce 35 billion cigarettes per year. It produces American blend products, including Marlboro, Parliament, L&M and Chesterfield. The third cigarette producer, Japan Tobacco International, has a plant in the same part of Turkey that produces 13 million sticks of blended cigarettes per year including Camel, Winston, Salem, Magna, Monte Carlo and Aspen brands.

#### Price trends

Figure 2.1 shows the price of different cigarette brands sold in Turkey between 1975 and 2000. Prices are expressed in US dollars for comparisons over time. Prices of domestic cigarettes fluctuated less than prices of American blend cigarettes. The government adjusted Tekel's prices periodically in response to the high inflation rate, and private companies adjusted their prices to maintain more-or-less constant differentials.

**Figure 2.1 Price of Different Brands of Cigarettes (Packs of 20 sticks)**



Source: State Institute of Statistics

## Exports

Table 2.5 shows cigarette and tobacco exports. Panel A shows Tekel's exports and Panel B shows exports of private companies that were among the largest 500 companies in Turkey in 1998, 1999 and 2000. The combined exports of all tobacco companies amount to only 1.4 percent of total exports in Turkey in 1998, and this declined to 1.1 percent in 2000. In recent years, Tekel has accounted for approximately one-third of all tobacco exports. Tekel's exports rose in the first half of the 1990s and declined after 1996.

**Table 2.5 – Exports of Companies in Cigarette/Tobacco Industry**

### Panel A - Exports of Tekel

	1992	1993	1994	1995	1996	1997	1998	1999	2000
Exports Volume (million pieces, Thousand Kg)									
Supported Leaf Tobacco	34,115	26,989	88,791	92,205	140,474	82,485	51,665	35,858	45,443
Blended Leaf Tobacco	68	17	51	17	-	-	-	-	-
Cigarette	2,407	4,176	1,889	1,423	2,426	3,460	494	218	33
Exports Value (Thousand \$)									
Supported Leaf Tobacco	98,985	64,320	144,510	173,148	367,518	198,111	131,493	94,275	98,121
Blended Leaf Tobacco	303	76	226	76					
Cigarette	19,568	40,046	4,487	16,355	31,351	44,809	3,638	1,483	329
Total	118,856	104,442	149,223	189,579	398,869	242,920	135,131	95,758	98,450

Source: TEKEL Annual Reports

### Panel B - Exports of Private Companies (Thousand \$)

	1998	1999	2000
Philsa	82,172	n.a.	19,785
RJ Reynolds / JTI	n.a.	85,960	114,473
Salatab Tobacco Corp.	86,351	n.a.	n.a.
Dimon Turkish Tobacco Corp.	51,030	54,721	43,680
Sunel Trading Company	32,000	27,342	n.a.
TTL Tobacco Corp.	n.a.	n.a.	35,789
Total	251,553	168,023	213,727

Source: Capital, Largest 500 Companies of Turkey

## Profits

Table 2.6 shows total profits of companies in the tobacco industry. Profits fell in 1999 and rose dramatically in 2000. Tekel's profit decline in 1999 was caused primarily by purchases of tobacco to support growers, which accounted for three fourths of Tekel's purchases; only one-fourth of total tobacco purchases were for production (Table 2.7).

**Table 2.6 – Before Tax Profits, Cigarette/Tobacco Industry Companies (million TL)**

## Panel A - Private Tobacco Companies

	1998	1999	2000
Philsa	2,085,475	1,897,723	12,097,173
JTI Tobacco Products Corp.	n.a.	11,904,125	32,376,385
Solotab Tobacco Corp.	672,213	n.a.	n.a.
Dimon Turkish Tobacco Corp.	248,996	5,002,142	8,149,265
Sunel Trading Company	678,363	398,145	n.a.
TTL Tobacco Industry Corp.	n.a.	n.a.	7,013,440

## Panel B - Tekel

	1995	1996	1997	1998	1999	2000
Net Profit (Billion TL)	7,310	4,085	24,027	15,173	-58,720	68,934

Source: Panel A: Capital, 500 Largest Companies in Turkey; B: TEKEL Annual Report

**Table 2.7 – Tobacco Purchasing and Cigarette Production at Tekel in 1992-2000**

	1992	1993	1994	1995	1996	1997	1998	1999	2000
Volume ('000 kg)									
Leaf Tobacco	151,801	232,872	271,664	110,930	107,933	124,104	199,915	185,583	177,551
Need of Tekel	50,000	35,000	41,000	48,442	61,996	60,952	39,330	48,601	28,885
Supported	101,801	197,872	230,664	62,488	45,937	63,152	160,585	136,982	148,666
Value (Billion TL)									
Leaf Tobacco	3,903	7,603	14,943	14,324	24,066	59,303	139,217	205,698	237,263
Need of Tekel	1,304	1,161	1,518	4,949	11,776	24,014	27,657	55,530	37,752
Supported	2,599	6,441	13,425	9,376	12,290	35,289	111,560	150,167	199,511

Source: TEKEL Annual Reports

Tekel has many factories: in 2000, there were 108 establishments for leaf tobacco processing and trading and 7 cigarette manufacturing plants. The total number of Tekel employees in 2000 was 26,334, most (73 percent) employed in tobacco processing and trading establishments, about half of whom are seasonal workers. Table 2.8 shows employment in all Tekel establishments.

**Table 2.8 – Employment at Tekel**

	1995	1996	1997	1998	1999	2000
<b>Leaf Tobacco Processing and Trading Establishment</b>						
Officials	104	107	132	125	124	122
Contractual Employees	1,090	1,230	1,353	1,987	1,953	1,956
Permanent Workers	10,336	9,252	8,935	8,724	8,253	7,875
Seasonal Workers	8,326	9,587	8,028	9,891	8,489	9,348
<b>Total</b>	<b>19,856</b>	<b>20,176</b>	<b>18,448</b>	<b>20,727</b>	<b>18,819</b>	<b>19,301</b>
<b>Cigarette Industry Establishments</b>						
Officials	64	58	54	38	52	49
Contractual Employees	329	319	377	629	612	554
Permanent Workers	7,695	7,138	6,636	6,146	6,020	5,913
Seasonal Workers		120	332	465	451	517
<b>Total</b>	<b>8,088</b>	<b>7,635</b>	<b>7,399</b>	<b>7,278</b>	<b>7,135</b>	<b>7,033</b>
<b>Total Number of Employees</b>	<b>27,944</b>	<b>27,811</b>	<b>25,847</b>	<b>28,005</b>	<b>25,954</b>	<b>26,334</b>

Source: TEKEL Annual Reports

Table 2.9 shows the number of workers employed in the private tobacco companies that were on the largest 500 companies list. Together they provided 0.13 percent of total employment in Turkey, and 0.74 percent of industrial sector employment in Turkey in 2000.

**Table 2.9 - Employment in Private Tobacco/Cigarette Companies**

	1998	1999	2000
Tekel	28,005	25,954	26,334
Philsa	715	710	713
JTI Tobacco Products Corp.	na	306	314
Salatab Tobacco Corp	784	na	na
Dimon Turkish Tobacco Corp.	590	413	423
Sunel Trading Company	310	325	na
TTL Tobacco Corp.	na	na	339
<b>Total</b>	<b>30,404</b>	<b>27,708</b>	<b>28,123</b>

Source: Capital, 500 Largest Companies in Turkey

## 2.4 TOBACCO GROWING

Turkey is the fifth largest tobacco producer in the world (Table 2.10). In 1998, world production was 7,066,875 tons and Turkey produced 258,811 tons, 3.7 percent of the total. Turkey is the world's leader in oriental tobacco production (Table 2.11). In 1998 total oriental production was 702,733 tons, of which Turkey produced 35.7 percent

**Table 2.10 – World Tobacco Production, and Twelve Biggest Producers, 1995-1998**

	1995		1996		1997		1998	
	Tons	%	tons	%	Tons	%	tons	%
China	2,317,700	36.47	3,076,000	42.08	3,390,000	42.10	2,524,500	35.72
India	587,100	9.24	562,750	7.70	623,700	7.75	635,000	8.99
U.S.A.	575,380	9.05	688,258	9.42	810,154	10.06	696,116	9.85
Brazil	398,000	6.26	439,000	6.01	576,600	7.16	442,500	6.26
<b>Turkey</b>	<b>204,440</b>	<b>3.22</b>	<b>230,949</b>	<b>3.16</b>	<b>302,008</b>	<b>3.75</b>	<b>258,811</b>	<b>3.66</b>
Indonesia	171,400	2.70	177,000	2.42	184,300	2.29	175,631	2.49
Zimbabwe	209,042	3.29	207,767	2.84	192,107	2.39	212,050	3.00
Italy	124,492	1.96	130,590	1.79	131,410	1.63	132,000	1.87
Greece	131,875	2.08	131,000	1.79	132,450	1.64	132,000	1.87
Malawi	130,686	2.06	142,262	1.95	158,615	1.97	142,300	2.01
Argentina	79,010	1.24	98,200	1.34	123,200	1.53	117,300	1.66
Pakistan	80,917	1.27	80,760	1.10	86,279	1.07	90,450	1.28
Others	1,344,945	21.16	1,345,269	18.40	1,342,005	16.67	1,508,217	21.34
<b>Total</b>	<b>6,354,987</b>	<b>100.00</b>	<b>7,309,805</b>	<b>100.00</b>	<b>8,052,828</b>	<b>100.00</b>	<b>7,066,875</b>	<b>100.00</b>

Source: State Planning Organization, The 8<sup>th</sup> Five-Year Planning Report, 1998

**Table 2.11 – World Oriental Tobacco Production, and Twelve Largest Producers, 1995-1998**

	1995		1996		1997		1998	
	Tons	%	tons	%	tons	%	Tons	%
<b>Turkey</b>	<b>199,434</b>	<b>40.18</b>	<b>224,962</b>	<b>38.40</b>	<b>295,506</b>	<b>44.96</b>	<b>251,109</b>	<b>35.73</b>
Greece	85,000	17.12	83,500	14.25	83,500	12.70	82,800	11.78
Bulgaria	16,339	3.29	33,392	5.70	33,392	5.08	65,359	9.30
Moldova	24,366	4.91	23,913	4.08	23,913	3.64	32,608	4.64
Macedonia		0.00	30,000	5.12	30,000	4.56	30,000	4.27
Kyzgistan	19,000	3.83	30,000	5.12	30,000	4.56	30,000	4.27
China	15,000	3.02	20,000	3.41	20,000	3.04	25,000	3.56
Uzbekistán	22,000	4.43	24,700	4.22	24,700	3.76	23,300	3.32
Pakistan	10,553	2.13	14,101	2.41	14,101	2.15	17,030	2.42
Thailand	9,000	1.81	12,500	2.13	12,500	1.90	15,500	2.21
Iran	12,500	2.52	12,500	2.13	12,500	1.90	12,500	1.78
Italy	11,083	2.23	11,271	1.92	11,271	1.71	12,343	1.76
Others	72,117	14.53	64,946	11.09	65,910	10.03	105,184	14.97
<b>Total</b>	<b>496,392</b>	<b>100.00</b>	<b>585,785</b>	<b>100.00</b>	<b>657,293</b>	<b>100.00</b>	<b>702,733</b>	<b>100.00</b>

Source: State Planning Organization, The 8<sup>th</sup> Five-Year Planning Report, 1998

Tobacco growing in Turkey is usually carried out as a family business. There were around half a million tobacco growing families during the last decade, gradually increasing to over 600,000 in 1998 (Table 2.12). Most of the tobacco growers are in the Aegean region in western Turkey. On average each tobacco growing family plants 0.45 hectare (4,500 square meters) with tobacco

(Table 2.13). The average area allocated for tobacco production increased in 1998 compared to the average area in 1995.

**Table 2.12 – Tobacco Growers in Turkey, 1990-1998**

Year	Number of Tobacco Growers
1990	521,952
1991	468,361
1992	526,385
1993	543,923
1994	494,298
1995	550,016
1996	546,671
1997	560,380
1998	622,063

Source: State Planning Organization, The 8<sup>th</sup> Five-Year Planning Report, 1998

**Table 2.13 – Tobacco Area per Grower by Year and Region (square meters)**

Year	Aegian	Marmara	Black sea	Eastern	Southeastern	Average
1995	4,110	3,350	3,592	2,477	3,452	3,810
1996	4,871	4,208	4,000	3,461	3,472	4,355
1997	6,699	4,471	4,450	3,087	5,135	5,751
1998	4,731	4,510	4,197	2,417	4,474	4,475

Source: State Planning Organization, The 8<sup>th</sup> Five-Year Planning Report, 1998

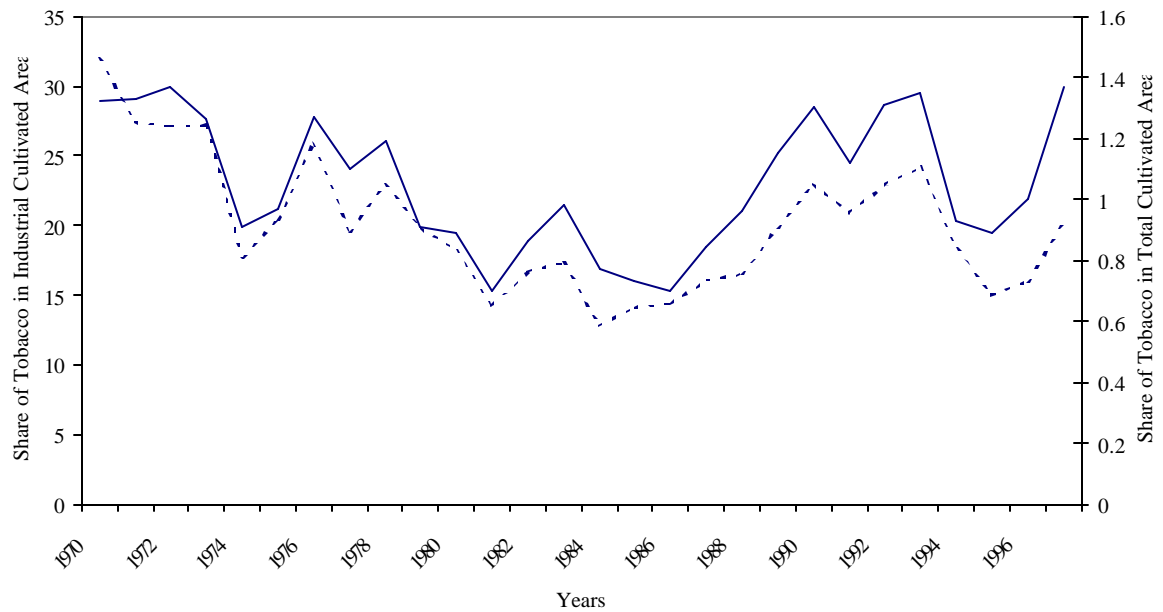
The total area cultivated with tobacco fluctuates from 1970 to 2000 (Table 2.14, Figure 2.2). It declines until the mid 1980s, and then tobacco increases as a proportion of the total cultivated land area. The yield per hectare increased from a very low level in the early 1970s, to 915.45 kg tobacco per hectare in 1999.

**Table 2.14 – Tobacco Production, Tobacco Area and Yield, 1970-1999**

Year	Area (ha)	Production (ton)	Yield (kg/ha)
1970	328,498	149,861	456.20
1971	335,627	173,861	518.02
1972	352,383	179,799	510.24
1973	322,840	149,120	461.90
1974	230,149	203,487	884.15
1975	241,508	199,935	827.86
1976	315,315	323,963	1027.43
1977	276,550	247,952	896.59
1978	299,299	292,563	977.49
1979	232,505	216,585	931.53
1980	222,997	228,349	1024.00
1981	177,166	168,024	948.40
1982	206,113	207,735	1007.87
1983	229,544	233,843	1018.73
1984	188,494	177,529	941.83
1985	176,848	170,491	964.05
1986	169,919	158,480	932.68
1987	206,247	184,712	895.59
1988	237,068	219,063	924.05
1989	284,768	269,888	947.75
1990	320,236	296,008	924.34
1991	281,701	240,881	855.09
1992	331,158	334,321	1009.55
1993	339,860	338,800	996.88
1994	226,928	187,733	827.28
1995	209,919	204,440	973.90
1996	237,992	230,949	970.41
1997	322,500	302,008	936.46
1998	278,350	258,811	929.80
1999	283,444	259,478	915.45

Source: State Institute of Statistics

**Figure 2.2 - Share of Tobacco in Cultivated Areas**



Source: State Institute of Statistics

The major tobacco purchaser is Tekel, which buys tobacco for producing cigarettes and other tobacco products and also to implement the government's policy of support for tobacco farmers. As Table 2.7 shows, Tekel purchased far more tobacco for support purposes than for production, with tobacco bought for support reaching nearly 84 percent of total tobacco purchases in 2000. In addition to Tekel, 15 private tobacco companies and merchants purchased tobacco in 1998. The total amount of tobacco produced in 1998 and purchased in 1999 was 252 thousand tons. Tekel purchased 186 thousand tons (74 percent), and private companies bought the other 26 percent.

Until 1994, the government followed a support price policy for tobacco that was implemented by Tekel. Each year, Tekel experts estimated the amount of tobacco production based on the cultivated area declared by farmers. Then the government set prices for three different quality grades of tobacco (Grade A, Grade B, and Kappa, the lowest grade) by region. Tekel was required to purchase all tobacco not purchased by private companies at these prices in order to support farmers.

In December 1993, the government announced a new support program for tobacco in which quotas were set, which took effect from the 1994 crop year. Tobacco production declined from 340 thousands tons to 227 thousands tons. As part of this new program, an extra premium and compensation were paid to farmers. Table 2.15 shows average prices paid by Tekel and private tobacco merchants from 1995 to 1998. Private companies paid higher price per kilogram than Tekel. Historically, government has increased average prices by more than the inflation rate, but in recent years, government increased prices by less than the inflation rate.

**Table 2.15 – Average Tobacco Prices, 1995-1998**

Crop Year	Tekel		Private		Total		Inflation Rate
	Purchases (TL)	Change %	Purchases (TL)	Change %	Average (TL)	Change %	
1995	189,171	71.2	234,746	91.5	210,930	82.9	93.63
1996	410,619	117.0	447,017	103.2	440,752	108.9	79.41
1997	696,387	69.6	798,928	67.4	729,197	65.6	84.99
1998	1,108,385	59.1	1,198,210	49.9	1,131,843	55.0	83.61

Source: Source: State Planning Organization, The 8<sup>th</sup> Five-Year Planning Report, 1998

## 2.5 TOBACCO TRADE (EXPORTS AND IMPORTS)

Turkey is a net exporter of tobacco. According to the USDA, Turkey ranked the 4<sup>th</sup> among tobacco exporting countries in terms of volume in the 1990s and the 12<sup>th</sup> among tobacco importing countries. During the last decade, an average of 139,000 tons of tobacco were exported each year. Imports averaged 24,000 tons during the first half of the decade, and around 53,000 tons during the second part of the last decade. Unprocessed tobacco constituted 92 percent of all tobacco exported and 75 percent of total tobacco imported. Table 2.16 shows tobacco imports and exports of unprocessed and processed tobacco over the last thirty years. Tobacco constituted 1.8 percent of exports and 0.6 percent of imports in 2000. Turkey's major trading partner was the U.S.A. both in exports and imports (Table 2.17).

Figures 2.3 and 2.4 present the trends in tobacco imports and exports over the last 20 years. The quantity exported fluctuated a lot, increasing in recent years. The quantity imported grew fairly rapidly after ban on tobacco imports was removed. As with quantity, the monetary value of tobacco imports and exports fluctuated over the last 30 years.

The composition of tobacco imports and exports has changed over the years. In the 1970s, Turkey was not exporting processed tobacco but only unprocessed tobacco. The share of processed tobacco has increased over time, although unprocessed tobacco is still the major part of tobacco exports. Processed tobacco constituted 25 percent of all tobacco imported in 1999.

**Table 2.16 – Tobacco Exports and Imports of Turkey**

Year	EXPORTS						IMPORT					
	Unprocessed (thousand tons)	Processed (thousand tons)	Total (thousand tons)	Unprocessed (Thousand US\$)	Processed (Thousand US\$)	Total (Thousand US\$)	Unprocessed (thousand tons)	Processed (thousand tons)	Total (thousand tons)	Unprocessed (Thousand US\$)	Processed (Thousand US\$)	Total (Thousand US\$)
1970			74,027	71,819	0	71,819	0	0	0	0	0	0
1971			84,412	79,251	0	79,251	0	0	0	0	0	0
1972			124,485	126,797	0	126,797	0	0	0	0	0	0
1973			108,443	129,759	0	129,759	0	0	0	0	0	0
1974			112,374	205,671	0	205,671	0	0	0	0	0	0
1975			65,640	183,222	0	183,222	0	0	0	0	0	0
1976			75,174	251,299	0	251,299	0	0	0	0	0	0
1977			61,836	175,827	0	175,827	0	0	0	0	0	0
1978			77,335	225,261	0	225,261	0	0	0	0	0	0
1979			69,554	176,971	0	176,971	0	5	5	0	40	40
1980	83,727	0	83,727	233,742	1	233,743	6	0	6	46	0	46
1981	130,969	22	130,991	395,013	135	395,148	0	0	0	0	0	0
1982	104,906	8	104,914	348,320	47	348,367	0	0	0	0	0	0
1983	69,529	14	69,543	237,758	70	237,828	0	0	0	0	0	0
1984	69,718	144	69,862	216,357	611	216,968	0	2,768	2,768	0	26,585	26,585
1985	102,726	64	102,790	330,144	310	330,454	0	5,978	5,978	0	55,870	55,870
1986	81,951	229	82,180	270,226	1,595	271,821	2	11,056	11,058	59	116,225	116,284
1987	106,322	580	106,902	313,954	1,854	315,808	4	15,678	15,682	145	177,955	178,100
1988	77,683	777	78,460	266,001	3,246	269,247	610	13,693	14,303	3,602	169,680	173,282
1989	116,868	196	117,064	479,083	729	479,812	4,081	9,366	13,447	23,561	197,459	221,020
1990	94,770	47,233	142,003	418,491	23,868	442,359	3,279	14,021	17,300	21,429	315,766	337,195
1991	136,572	895	137,467	563,463	8,412	571,875	10,984	14,432	25,416	68,634	298,011	366,645
1992	76,452	18,734	95,186	309,425	23,192	332,617	20,936	9,079	30,015	134,255	184,719	318,974
1993	96,354	6,361	102,715	395,563	45,467	441,030	12,497	12,191	24,688	93,667	233,618	327,285
1994	103,711	11,443	115,154	395,165	28,469	423,634	16,692	6,307	22,999	86,442	53,102	139,544
1995	82,590	59,514	142,104	244,545	136,660	381,205	21,639	4,693	26,332	134,397	25,214	159,611
1996	162,843	10,957	173,800	542,479	95,111	637,590	44,245	7,550	51,795	243,388	34,093	277,481
1997	162,527	14,506	177,033	564,514	118,231	682,745	54,396	10,350	64,746	341,158	41,837	382,995
1998	155,284	7,494	162,778	521,472	68,389	589,861	42,173	14,943	57,116	255,498	51,882	307,380
1999	129,053	11,460	140,513	477,459	83,330	560,789	48,846	16,347	65,193	247,591	45,795	293,386

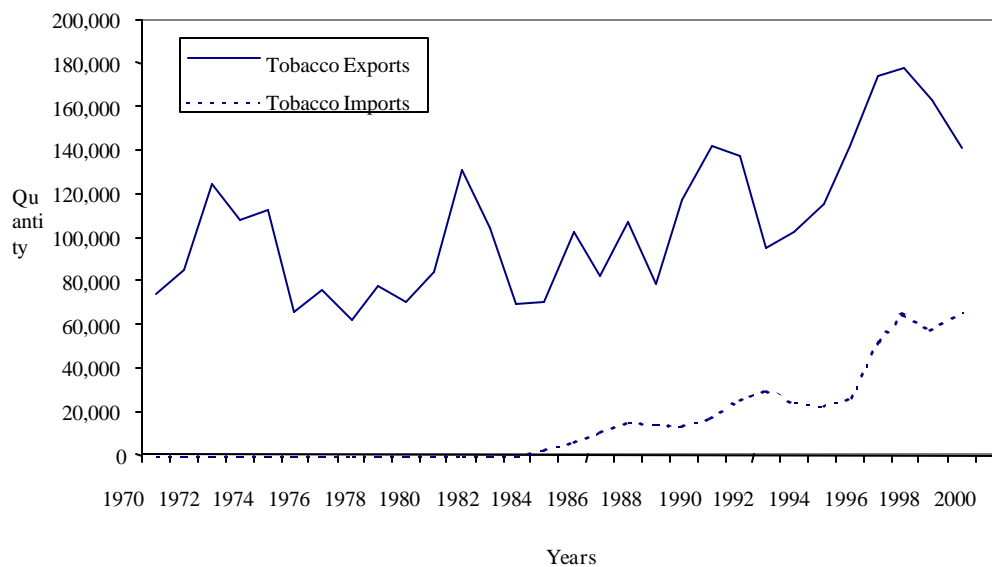
Source: State Institute of Statistics

**Table 2.17 – Major Tobacco Trading Partners of Turkey in 2000**

Country	Exports (U.S. \$)	Imports (U.S. \$)
U.S.A.	102,488,230	225,125,133
Germany	70,282,948	5,502,239
United Arab Emirates	46,844,893	
Lebanon	39,260,618	
Netherlands	28,497,230	4,722
Russia	26,047,942	
Japan	19,397,261	
Switzerland	16,024,214	17,396,243
Tunisia	14,066,861	861,411
South Korea	11,232,005	22,381,403
Brazil	719,327	10,688,791
Zimbabwe		27,902,569
Malawi		10,364,331
<b>Total</b>	<b>491,418,606</b>	<b>350,726,549</b>

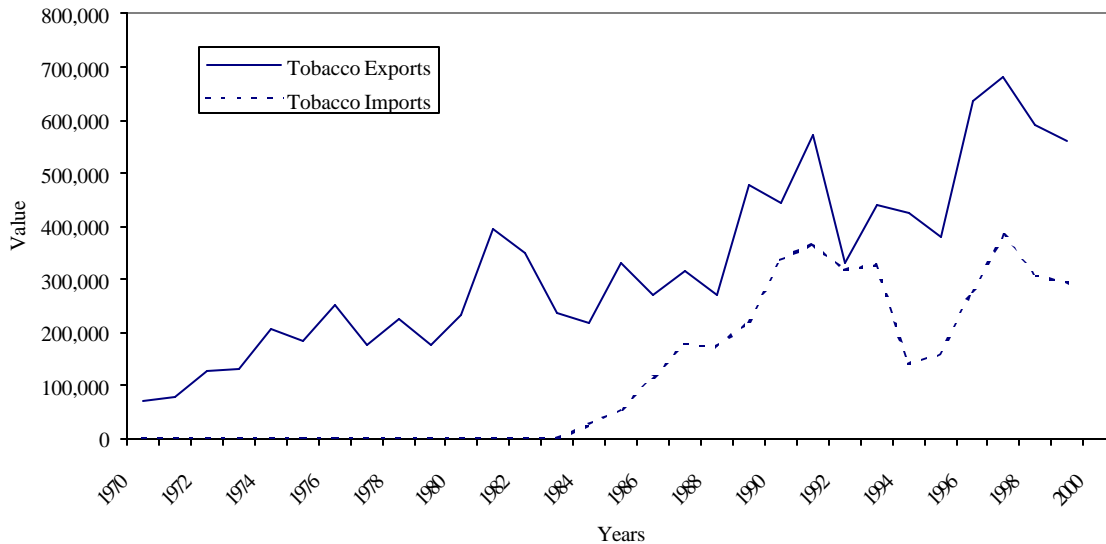
Source: State Institute of Statistics, Foreign Trade Statistics

**Figure 2.3 Tobacco Exports and Imports**



Source: State Institute of Statistics

**Figure 2.4 - Tobacco Exports and Imports (Thousand U.S.\$)**



Source: State Institute of Statistics

Before 1984 only Tekel was allowed to import tobacco, and private companies needed special permission to export tobacco. Although private companies have been allowed to import since 1984, they did not do so until 1991 because of high import duties.

Tekel's share in total tobacco exports has changed over time, from 15 percent in 1990 to 30 percent in 1999. In monetary terms, Tekel's share was much lower; 12 and 20 percent of the total value of tobacco exports in 1991 and 1999, respectively.

## 2.6 TAXES ON CIGARETTES

There are different types of taxes on cigarettes in Turkey. Table 2.18 shows the average taxes in 2000. Taxes constituted approximately 77 percent of the retail cigarette price in 2000, a considerable increase from 44 percent in 1994.

**Table 2.18 – Taxes on Cigarettes in 2000**

Type of Tax	Amount of Tax
Tobacco Fund: Domestic Cigarettes	US\$ 3 / kg
Tobacco Fund: Imported Cigarettes	US \$ 0.4 / package
Defense Industry Fund	10 % on Factory Price
Additional Tax	120 % on Factory Price
Education Fund	15 % on Retail Price
Grazing Ground Fund	2 % on Retail Price
Veterans Fund	2 % on Retail Price
Value Added Tax	17 % on Retail Price

Source: TEKEL

**Table 2.19 – Separation of Different Components of Cigarette Prices**

	1994			2000			2001		
	Factory	Retail		Factory	Retail		Factory	Retail	
	Values	Price	Price	Values	Price	Price	Values	Price	Price
	TL	%	%	TL	%	%	TL	%	%
<b>Panel A - Samsun (85 mm)</b>									
Factory Price	3,500	100.0	23.3	92,000	100.0	30.67	122,000	100.0	27.1
Additional Tax	2,846	81.3	19.0	113,174	123.0	37.72	150,078	123.0	33.4
Federation Tax	17	0.5	0.1	472	0.51	0.16	625	0.5	0.1
Veterans Fund	299	8.6	2.0	5,200	5.65	1.73	7,800	6.4	1.7
Defense Industry Fund	200	5.7	1.3	20,749	22.55	6.92	27,514	22.6	6.1
Education Fund	40	1.1	0.3	40,000	43.48	13.33	60,000	49.2	13.3
Grazing Ground Fund				1,840	2.00	0.61	2,440	2.0	0.5
Value Added Tax	1,607	45.9	10.7	43,590	47.38	14.53	68,644	56.3	15.3
Commissions	1,800	51.4	12.0	36,000	39.13	12.00	54,000	44.3	12.0
Marketing & Distribution	615	17.6	4.1	12,300	13.37	4.10	18,450	15.1	4.1
Treasury Share				6,724	7.31	2.24			
Total Cost	10,925	312.2	72.8	365,324	397.09	121.77	511,552	419.3	113.7
Profit Margin	4,075	116.4	27.2	-65,324	-71.00	-21.77	-61,552	-50.5	-13.7
Retailer Price	15,000	428.6	100.0	300,000	326.09	100.00	450,000	368.9	100.0
Total Tax	5,010	143.2	33.4	231,747	251.90	77.25	317,102	259.9	70.5
<b>Panel B - TEKEL 2000 (100 mm)</b>									
Tobacco processing cost	4,660	42.7	13.3	28,410	21.9	3.9	69,402	27.8	6.3
Imported Tobacco (CIF)	3,181	29.2	9.1	66,286	51.0	9.1	142,905	57.2	13.0
Import Duty	795	7.3	2.3	16,572	12.7	2.3	35,726	14.3	3.2
Tobacco Fund	2,272	20.8	6.5	28,408	21.9	3.9	61,245	24.5	5.6
Factory Profit/Loss				9,676	7.4	1.3	-59,279	-23.7	-5.4
Factory Price	10,909	100.0	31.2	130,000	100.0	17.9	250,000	100.0	22.7
Additional Tax	8,072	74.0	23.1	159,920	123.0	22.1	307,538	123.0	28.0
Federation Tax	55	0.5	0.2	66	0.1	0.0	1,281	0.5	0.1
Veterans Fund	700	6.4	2.0	12,600	9.7	1.7	19,200	7.7	1.7
Defence Industry Fund	200	1.8	0.6	29,319	22.6	4.0	56,382	22.6	5.1
Education Fund	40	0.4	0.1	95,000	73.1	13.1	140,000	56.0	12.7
Grazing Ground Fund				2,600	2.0	0.4	5,000	2.0	0.5
Value Added Tax	3,750	34.4	10.7	105,342	81.0	14.5	167,797	67.1	15.3
Commission	2,450	22.5	7.0	50,750	39.0	7.0	77,000	30.8	7.0
Marketing & Distribution	1,435	13.2	4.1	29,725	22.9	4.1	45,100	18.0	4.1
Treasury Share				31,399	24.2	4.3			
Total Cost	27,611	253.1	78.9	647,320	497.9	89.3	1,069,298	427.7	97.2
Profit Margin	7,389	67.7	21.1	77,680	59.8	10.7	30,702	12.3	2.8
Retailer Price	35,000	320.8	100.0	725,000	557.7	100.0	1,100,000	440.0	100.0
Total Tax	15,885	145.6	45.4	481,825	370.6	66.5	794,169	317.7	72.2

Source: TEKEL

The tax structure differs slightly depending on whether cigarettes are produced using imported or domestic tobacco (Table 2.19). In Panel A, the pricing schedule for cigarettes with domestic tobacco (Samsun) is shown for years 1994, 2000, and 2001. Panel B summarizes the tax structure for a cigarette brand with imported tobacco (Tekel 2000) that Tekel introduced to compete with American brand cigarettes. Tax rates on cigarettes have increased over time, especially the value added components. Most of the specific tax rates did not change in 2000 and 2001 but the tobacco fund rate increased. The defense fund tax as a percent of the price of Samsun (Tekel 2000) increased from 5.7 (1.8) percent in 1994 to 22.6 percent in 2001. Similarly, the rate for the Education fund increased from 0.3 (0.1) to 13 percent. The tax rate on Samsun was highest in 2000 and declined to 70.5 percent of the retail price in 2001 because of the removal of the Treasury share in the taxation of cigarettes in that year. This was an earmarked tax to offset Tekel's debt with the Treasury, incurred as a result of tobacco support purchases from farmers, which Treasury had financed through external borrowing.

## 2.7 GOVERNMENT REVENUES

Table 2.20 shows some of the tax revenues collected from Tekel's cigarette sales. Only revenues from Tekel cigarette sales for the grazing ground fund, federation fund, additional tax, defense industry fund, and education fund are available. These funds correspond to 3.14 percent of total government revenues. Since the taxes for the Veterans Fund and the Value Added Tax are 1.7 and 15.3 percent of the retail price of the cigarettes, it is possible to calculate total taxes collected from Tekel cigarette sales approximately. They amount to 4.04 percent of total government revenues in 2000. Since the market share of Tekel in 2000 was 67.5 percent, this suggests that approximately 6 percent of total government revenues were obtained from cigarette sales. This had been much higher fifty years earlier; Tekel contributed 11.13 percent of government revenues in 1948 (Dogruel and Dogruel, 2000).

**Table 2.20 - Taxes Obtained from Tekel Cigarette Sales, 1996-2000 (billion TL)**

	1996	1997	1998	1999	2000
Grazing Ground Fund			2,336	4,469	7,037
Federations Fund	236	370	677	1,145	3,861
Additional Tax	47,223	74,510	135,383	234,301	432,765
Defense Industry Fund	6,568	14,902	27,077	46,321	174,208
Education Fund	686	17,563	56,957	110,253	214,705
Total	54,712	107,344	222,430	396,488	832,575
Total Government Tax Revenues	2,244,094	4,745,484	9,228,596	14,802,280	26,514,127
Percent of Total Tax Revenues	2.44%	2.26%	2.41%	2.68%	3.14%

Source: Department of Finance

## 2.8 TOBACCO CONTROL POLICIES AND THEIR IMPLICATIONS

Before the 1980s, when new brands were introduced, there was limited advertisement, in print only. In September 1981, the warning: "Harmful to Your Health" was printed on cigarette packages of some brands. After cigarette imports were permitted in 1984, advertisement of cigarettes was allowed in print but not on radio or television. There was a short-lived anti-smoking campaign in 1988 initiated by the Ministry of Health, with some posters in public places.

A new law (Law No. 4207) on cigarette smoking was enacted in November 1996. The law regulates smoking in public places and the sale and advertising of tobacco products, in order to discourage smoking, reduce cigarette consumption among young people and reduce the damage that results from smoking.

According to this law, smoking is banned in health and education related places, at in-door sports and cultural activities, in all types of transportation vehicles, waiting rooms, and in work places where at least five people work. There is a penalty for individuals and companies that do not obey this regulation. In addition, it is forbidden to advertise, or to make advertisements using tobacco or tobacco products, their brand names, and to campaign to promote and motivate the use of tobacco or tobacco products. There is an age restriction on buying cigarettes: the minimum age to buy tobacco or tobacco products is eighteen. Furthermore, according to this law, tobacco products that are produced in Turkey or that are imported have to carry the warning “Legal Precaution: Harmful to Health.” Products without this warning may not be sold or imported. Lastly, both public and private radio and television channels have to broadcast information about the harmful effects of the use of tobacco and its products for at least 90 minutes every month. Even though this regulation is comprehensive, there are problems in its implementation. For example, the law does not state explicitly who will be responsible for punishment or collecting penalties. A study by Bilir and Önder (2000) shows that the 1996 Law has affected significantly the number of cigarettes smoked but not the smoking prevalence rate and that enforcement declined in 1999 relative to 1998.

### 3. AGGREGATE DATA ANALYSIS

Cigarette demand in Turkey is analyzed using annual data for 1960 to 2000, using the standard models in the literature to estimate price, tax and income elasticities. The substitution elasticity of international brands produced in Turkey is also estimated, to understand the extent to which smokers shift to a different type of cigarette as the price of one type of cigarette increases relative to other types. Furthermore, the impact of a recent regulation that bans smoking in public places is examined.

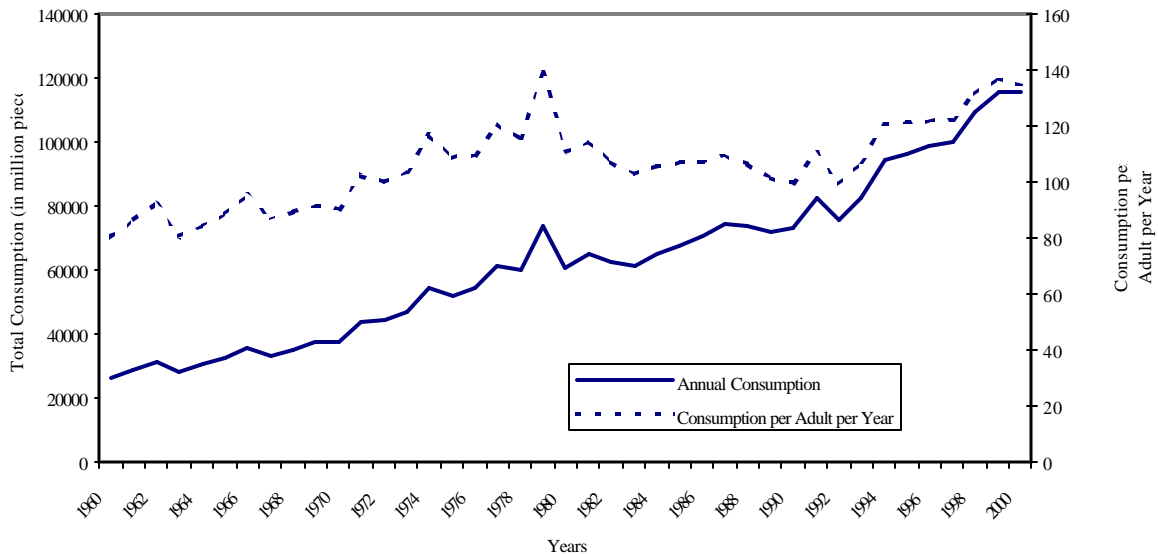
#### 3.1. DATA

The variables used in the estimation are based on the economic theory of demand for cigarettes and on previous empirical studies: the quantity of cigarettes smoked is a function of the real price, per capita income, regulations that ban smoking in public places, and a time trend variable.

##### **Quantity**

The quantity consumed is defined as the number of packages of cigarettes consumed per adult per year in Turkey. Total consumption in Turkey is taken from the database of the U.S. Department of Agriculture. Total packs consumed are divided by the population 15 years of age or older in order to get consumption of cigarettes per adult. The adult population is calculated by interpolating the population in the eight census estimates that span the 41-year period under analysis.

**Figure 3.1 - Cigarette Consumption in Turkey, Period: 1960-2000**



Source: Author's estimates using data from US Department of Agriculture

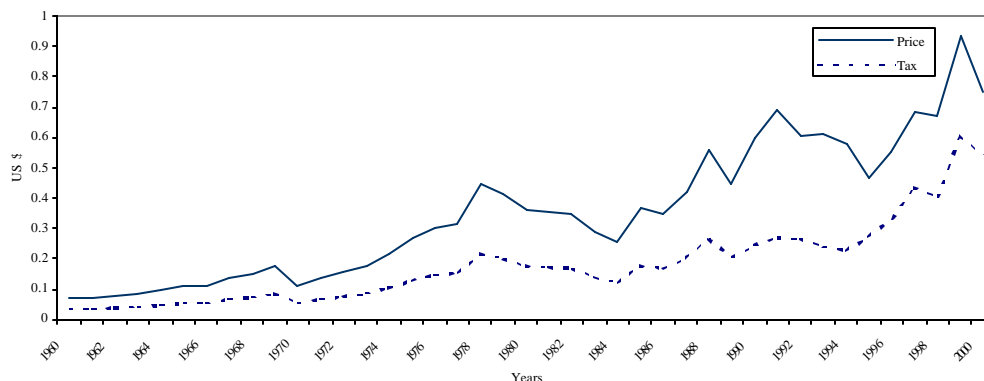
Figure 3.1 shows aggregate consumption and packages smoked per adult per year. Total consumption has increased over the sample period. Per adult consumption increased from 1960 to 1979, declined in 1980 and stayed stable until 1993, but then started to increase again after 1993, which is when private companies started to produce American brand cigarettes in Turkey. In 2000, 134.65 packs of cigarettes were smoked per adult per year, or 11.22 packs per adult per month. Given that 64 percent of adults smoke, this corresponds to an average smoking intensity of 12 cigarettes per day per adult smoker.

### Price

The price variable used in the estimation is the weighted average price of a pack of cigarettes. Data for the period 1960-1988 are taken from Tansel (1993). Prices for the rest of the period are calculated using the prices of individual brands weighted by their market shares. Prices and market shares are obtained from the State Institute of Statistics and TEKEL records.

All prices are presented in terms of prices in Turkish Lira in December 2000, using the Consumer Price Index (CPI) as the deflator. Figure 3.2 shows the weighted average price of a pack of cigarettes and the average taxes paid per pack. Inflation is very high in Turkey, and over the sample period, the price of cigarettes has increased as the government adjusted prices periodically in response to inflation. When private companies started to operate, they also adjusted their prices from time to time, usually just after the government increased the prices of cigarettes produced by Tekel. Tax rates have risen over the years from 39 percent in 1993 to 72 percent in 2000, and the average tax paid per pack of cigarettes has increased. Trends in cigarette prices and taxes are similar, whether prices and taxes are expressed in Turkish Lira or in US \$ (Figure 3.3).

**Figure 3.2 - Average Price and Tax on One Cigarette Pack (US \$)**



Source: State Institute of Statistics and Tekel

The average price of cigarettes was \$0.75 in 2000. This price is low compared to average cigarette prices in upper-middle-income countries (\$0.81) and very low compared to average prices in high-income countries (\$3.23), but higher than most of the lower-middle income countries (\$0.34).<sup>2</sup> Although Turkey's tax rate as a percent of price is similar to high-income countries, because the price is low in Turkey, the average amount of tax per pack of cigarettes was only \$0.54 in 2000. Moreover, over the whole period analyzed in this study, the average price of cigarettes was only \$0.35 with an average tax of \$0.18 and average tax rate of 49 percent of retail cigarette prices.

### **Income**

Income is calculated from the Gross Domestic Product (GDP) in Turkey, obtained from the State Institute of Statistics. Income per adult is calculated by dividing GDP by the population aged 15 years or older. Income per adult is adjusted for inflation using the CPI.

### **Regulations**

In order to examine the impact of smoking regulations, a variable is created which takes different values depending on the smoking regulations that were in force in Turkey. Since 1992, the warning message on cigarettes packs: "Harmful to Your Health" has been required. In 1997, a new regulation was enacted to ban smoking in public places and end all advertising of cigarettes. The regulation variable is set to 0 before 1992, has a value of 0.25 from 1992 to 1996, and a value of 1 from 1997 onwards.

### **Trend**

In the literature, a trend variable is included in cigarette demand models in order to control for other changes that could affect consumption over the time period analyzed.

<sup>2</sup> The average cigarette price in lower-middle income countries is \$0.34, but the range is huge: from \$0.0004 in Indonesia to \$0.67 in El Salvador (Chaloupka, et al., 2000).

## 3.2. MODEL

Following the current literature, the following double-log model is estimated:

$$\ln Q_t = \beta_0 + \beta_1 \ln P_t + \beta_2 \ln Y_t + \beta_3 \text{Regulation}_t + \beta_4 \text{Trend} + e_t$$

where  $Q_t$  is the quantity (in packs) of cigarettes consumed per adult in year  $t$ .  $P_t$  is the weighted average price of a pack of cigarettes in year  $t$ .  $Y_t$  is per capita income in year  $t$ .  $\text{Regulation}_t$  is the regulation variable that takes a value of 0, 0.25 or 1 depending on year  $t$ .  $\text{Trend}_t$  is the trend variable and  $e_t$  is the error term.  $\beta$ 's are the coefficients estimated. The model was also estimated without the trend variable.

In addition to this basic model, myopic addiction and rational addiction models are also estimated, in which the quantity of cigarettes demanded in year  $t$  is also affected by consumption in the previous year (myopic addiction) and in the following year (rational addition).

$$\text{Myopic addiction model: } \ln Q_t = \beta_0 + \beta_1 \ln P_t + \beta_2 \ln Y_t + \beta_3 \text{Regulation}_t + \beta_4 \text{Trend} + \beta_5 \ln Q_{t-1} + e_t$$

$$\text{Rational Addiction model: } \ln Q_t = \beta_0 + \beta_1 \ln P_t + \beta_2 \ln Y_t + \beta_3 \text{Regulation}_t + \beta_4 \text{Trend} + \beta_5 \ln Q_{t-1} + \beta_6 \ln Q_{t+1} + e_t$$

All of the models were first estimated using Ordinary Least Squares. However, since Durbin-Watson test statistics indicated autocorrelation, Generalized Least Squared (GLS) Estimations were obtained.

Before estimating the models, endogeneity of cigarette prices was tested. The results indicate that prices are endogeneous, so two stage estimation was used. (This is the standard procedure used when a variable is endogenous.) In the first step, the price of cigarettes was predicted using tax rate data. The predicted cigarette prices are used in the demand estimation in the second step.

In addition to the basic demand model, in order to examine substitution elasticities, cigarettes are grouped into three categories: domestic filter cigarettes, domestic non-filter cigarettes and cigarettes with foreign brand names like Marlboro, Parliament, Camel, that are either imported or produced in Turkey. The availability of data restricts the analysis to the period between 1987 and 2000. Since the degrees of freedom is low, only the major model is estimated separately for each type of cigarette. Additionally, the price of the type of cigarettes that can be considered as a substitute is included in the model in order to calculate cross-price elasticity.

Descriptive statistics for the variables in the analysis are shown in Table 3.1. On average, 62,533 million cigarettes were consumed per year over the period analyzed. This corresponds to 106.38 cigarettes per adult. The average price is \$0.35 per pack and average tax paid per package is \$0.18. Expressed in 2000 prices, these correspond to 414,849 TL and 206,215 TL respectively. The average price and tax in 2000 were 505,089 TL and 363,664 TL, much higher than prices and taxes in the earlier years of the analysis period. Consumption was lower in earlier years.

**Table 3.1 - Descriptive Statistics of Variables Used in the Estimations for 1960-2000**

	Mean	Standard Deviation	Minimum	Maximum
Total Consumption (Million pieces)	62,533	25,295	26,284	115,535
Tax rate (%)	49.23	6.63	39	72
Consumption of Packs per Adult per Year	106.38	15.05	80.49	139.44
Price of Pack in terms of 2000 Prices (TL)	414,849	147,883	207,332	779,155
Price of Pack (in US\$)	0.35	0.22	0.07	0.93
Tax per Pack in terms of 2000 Prices (TL)	206,215	88,968	99,520	502,555
Tax per Pack (in US\$)	0.18	0.13	0.04	0.60
Income per Adult in terms of 2000 Prices (million TL)	2,298	727	904	3,261
Regulation index	0.10	0.30	0	1

Source: Author's estimates

### 3.3. RESULTS

Because of the endogeneity of cigarette prices, price is first estimated as a function of the tax per pack. The following estimate is obtained:

$$\ln P_t = 2.4176^{***} + 0.8601^{***} \ln Tax_t \text{ with Adjusted } R^2 = 0.8993 \text{ and } F = 358.369$$

(0.5526)    (0.0454)

The standard errors of the estimates are shown in parentheses. This model explains almost 90 percent of variation in prices. It shows that if taxes increase by 100 percent, prices will increase by 86 percent. This result is used to estimate the tax elasticity of demand for cigarettes (the extent to which tax revenues will change when cigarette demand changes as a result of a price change).

The coefficient estimates for the basic model with and without a time trend variable and the regulation variable are shown in Table 3.2. Since a double log model is used, the coefficients on the price and income variables measure the elasticity, that is, the change in quantity demanded in response to changes in these variables.

The OLS estimations indicate a substantial and significant effect of price on the demand for cigarettes. The results are robust across specifications with and without the trend variable. However, the Durbin-Watson test statistic indicates that there is autocorrelation in the error terms. Therefore, the discussion that follows focuses on the GLS results.

The GLS estimations of the basic models indicate a surprisingly low effect of prices on the demand for cigarettes, and the coefficient is not statistically significant. The results show that if prices increase by 100 percent, cigarette consumption will decline by approximately 19 percent, controlling for income, the time trend and the effect of changing regulations. This is quite similar to the -0.21 price elasticity of demand estimated by Tansel (1993) for the period 1960 to 1988.

The trend variable is not statistically significant, and excluding it does not change the price elasticity estimate.

Turkey's price elasticity of demand for cigarettes is low compared to other countries. For example, price elasticity of demand for cigarettes in high-income countries typically falls into a range of -0.25 to -0.50. For low- and middle-income countries, estimates usually range between -0.50 and -1.00, suggesting much greater price sensitivity in lower income countries. For example, price elasticity was estimated to be -0.70 in Papua New Guinea (Chapman and Richardson, 1990) and -0.59 in South Africa (van der Merwe, 1998).

Nor does the regulation variable appear to have a significant impact. Several hypotheses may explain this. First, the strong regulations were only in effect for the last three years of the sample period, perhaps not long enough to see a significant impact. Second, enforcement of this regulation is weak in many places, and Bilir and Önder (2000) show that the impact of this regulation depends on the degree of enforcement. Third, there are other factors that have an opposite effect on consumption. In particular, foreign brand cigarettes have been produced in Turkey since the mid 1990s, and their availability has

**Table 3.2 - Results of Demand for Cigarettes**

	OLS						GLS					
	With Time Trend		Without Time Trend		Without Regulation		With Time Trend		Without Time Trend		Without Regulation	
	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic	Parameter Estimate	t-statistic
Intercept	-0.7920	-0.471	-0.8196	-1.195	-0.0731	-0.048	0.0911	0.431	0.1280	0.615	0.0747	0.335
Ln P <sub>t</sub>	-0.3129*	-2.033	-0.3123*	-2.094	-0.4110***	-3.518	-0.1924	-1.248	-0.1895	-1.229	-0.2836*	-2.176
Ln Y <sub>t</sub>	0.2928***	3.658	0.2940***	7.763	0.2704***	3.526	0.2328***	9.452	0.2315***	9.409	0.2451***	11.029
Trend	0.0001	0.018			0.0017	0.701	0.0017	1.013			0.0024	1.644
Regulation	0.0678	0.979	0.0685	1.221			0.0686	1.025	0.0984	1.638		
F-statistic	25.3030		34.6740		33.454		56.805		75.345		69.866	
Prob>F	0.0001		0.0001		0.0001		0.0001		0.0001		0.0001	
Adjusted R-squared	0.7085		0.7164		0.7088		0.8513		0.8512		0.8412	
Number of Observations	41		41		41		40		40		40	
Durbin-Watson Statistic	1.3470		1.3480		1.377		1.907		1.888		1.875	

\* \*\* and \*\*\* show significance at 10, 5 and 1 percent levels respectively

Source: Author's estimates

increased consumption in recent years, counteracting the impact of the regulations.<sup>3</sup>

The only statistically significant factor in the cigarette consumption equation is income. Cigarettes are a normal good; that is, people consume more cigarettes when income increases. The income elasticity of demand for cigarettes is 0.23, indicating that if income increases by 100 percent, cigarette consumption will increase by 23 percent. This is similar to income elasticity in the U.S. 30 years ago, but lower than many other countries (Townsend, 1998, Chapter 8, Page 88).

The model was re-estimated without the regulation variable, since its coefficient was not significant. In this specification, the impact of price is significant and much greater: a 100 percent increase in the price of cigarettes would decrease consumption by 28 percent.

The price and tax elasticities allow estimates to be made of the impact of changes in taxes on the demand for cigarettes and on government revenues (holding income constant). (See Table 3.3.) The base case is for the average cigarette price, average consumption per adult per year and average tax rate in 2000. The total tax rate comprises the value added tax (VAT) and excise tax, calculated as a percentage of the retail price of a pack of cigarettes. Government revenues are calculated as the sum of VAT and excise taxes on cigarettes. The simulation analysis shows that if the government were to increase the excise tax rate on cigarettes by 10 percent, the price of cigarettes would increase by 5.5 percent. This price increase would reduce cigarette consumption by 1.50 percent. The higher tax rate would increase government revenue by 7.08 percent.

**Table 3.3 - Impact of Tax Changes on Consumption and Government Revenues**

	Base Case	Percentage Changes in Excise Tax Rate				
		-25	-10	10	25	50
Price (TL)	505,089					
Consumption	134.65	139.90	136.75	132.55	129.40	124.15
Total Tax Rate (%)	72	58.25	66.5	77.5	85.75	99.5
VAT (%)	17	17	17	17	17	17
Excise Tax Rate (%)	55	41.25	49.5	60.5	68.75	82.5
Change in Price (%)		-13.75	-5.50	5.50	13.75	27.50
New Price (TL)	505,089	435,639	477,309	532,869	574,539	643,988
Change in Consumption (%)		3.90	1.50	-1.50	-3.90	-7.80
Government Revenues (in Thousand TL)						
from VAT	11,562	10,334	11,097	12,008	12,639	13,592
from Excise Tax	31,048	24,194	28,377	33,620	37,296	42,939
Total	42,610	34,555	39,474	45,628	49,935	56,531
Change in Government Revenues (%)		-18.90	-7.36	7.08	17.19	32.67

Source: Author's estimates

<sup>3</sup> A dummy variable with the value =1 for years when foreign cigarettes were available was statistically insignificant, so the more standard time variable was used in the model.

In this estimation it is assumed that there is no smuggling. However, a tax increase that increases cigarette prices makes smuggling more profitable, and may induce an increase in smuggling, which will moderate the increase in tax revenue.

Since smuggling is illegal, no data on smuggling in Turkey are available. In order to take into consideration the effect of smuggling, the potential supply of cigarettes through smuggling is calculated by assuming that any difference between the sum of domestic consumption and exports, and the sum of production and imports, is accounted for by smuggling. This difference (assumed to be the smuggled volume) is regressed against the tax rate on cigarettes for the sample period, making the (over) simplifying assumption that the volume of smuggled cigarettes is a function of the tax rate. Then, this estimated model is used in the simulation analysis to calculate smuggling at different tax rates. Incorporating an increase in smuggling in response to an increase in taxes and prices does not change the results much. For example, a 10 percent increase in the excise tax rate would increase government revenues by 5.5 percent with smuggling (Table 3.4), not much lower than the 7.1 percent revenue increase without smuggling.

**Table 3.4 - Impact of Tax Changes on Government Revenues with Smuggling**

	Base Case	Percentage Changes in Excise Tax Rate				
		-25	-10	10	25	50
New Tax Rate (%)	72	58.25	66.50	77.50	85.75	99.50
Consumption ( million packs)	124,035	128,534	125,835	122,235	119,536	115,037
Predicted Smuggling	8,500.04	4,256.42	6,802.59	10,197.50	12,743.67	16,987.30
Government Revenues After Adjusting for Smuggling (in Billion TL)						
from VAT	9,920	9,204	9,659	10,149	10,431	10,734
from Excise Tax	26,639	21,491	24,701	28,416	30,779	33,911
Total	36,560	30,695	34,360	38,565	41,210	44,646
% Change in Government Revenues		-16.04	-6.02	5.49	12.72	22.12

The regression model for estimating increases in smuggling in response to tax increases:

$$\text{Smuggling} = -1,372.10^{**} + 308.63^{***} (\text{Tax Rate})$$

(4948.95)      (101.31)

Adjusted R-squared = 0.3151 and F-statistic = 9.28 with significance = 0.007

### **Incorporating Addiction into the Model**

The addiction models assume that past and future consumption affect current consumption (Becker et al. 1991). In the case of myopic addiction, only past consumption affects current consumption, whereas with rational addiction, both past and future consumption affect current consumption.

Table 3.5 shows the results of the estimation that assumes myopic addition. In this model, consumption in the previous period explains about 43 percent of consumption in the current year. The estimated short-run price elasticity is -0.107 (-0.118) with (without) trend variable. Past consumption and income are the only significant variables in the model. The estimated long-run price elasticity of demand for cigarettes is -0.190 (-0.207) when the trend variable is included (excluded) in the model.

In the rational addiction model, both past and future consumption determine current consumption, almost equally. The estimated price elasticity of demand for cigarettes is fairly similar to the myopic addiction model (Table 3.6). The short-run elasticity is found to be -0.095 with a trend variable and -0.100 without a trend variable. The long-run elasticity decreases to -0.139 and -0.146 with and without trend variable respectively.

**Table 3.5 - Results of Myopic Addiction (N=40)**

	With Time Trend		Without Time Trend	
	Parameter		Parameter	
	Estimate	t-statistic	Estimate	t-statistic
Intercept	-0.7919	-0.492	-0.3545	-0.513
Ln P <sub>t</sub>	-0.1071	-0.671	-0.1178	-0.766
Ln Y <sub>t</sub>	0.1733*	2.014	0.1549**	2.586
Trend	-0.0008	-0.302		
Regulation Index	0.0721	1.127	0.0612	1.174
Ln Q <sub>t-1</sub>	0.4365***	2.816	0.4303***	2.838
F-statistic	22.3410		28.6470	
Adjusted R-squared	0.7323		0.7393	
Durbin-Watson Statistic	2.191		2.182	

Source: Author's estimates

**Table 3.6 - Results of Rational Addition Model (N=39)**

	With Time Trend		Without Time Trend	
	Parameter		Parameter	
	Estimate	t-statistic	Estimate	t-statistic
Intercept	-0.4369	-0.274	-0.2456	-0.364
Ln P <sub>t</sub>	-0.0947	-0.591	-0.0999	-0.653
Ln Y <sub>t</sub>	0.1125	1.253	0.1042	1.636
Trend	-0.0004	-0.133		
Regulation	0.0352	0.537	0.0305	0.560
Ln Q <sub>t-1</sub>	0.3167*	1.935	0.3136*	1.966
Ln Q <sub>t+1</sub>	0.3146*	1.938	0.3162*	1.984
F-statistic	18.1560		22.4520	
Adjusted R-squared	0.7304		0.7384	
DW	2.7360		2.7380	

Source: Author's estimates

### Substitution Elasticity

In this section, estimates of the substitution elasticities for different types of cigarettes are reported. The availability of data restricts the analysis to the period between 1987 and 2000. Table 3.7 shows the descriptive statistics for price and consumption of different types of cigarettes. Domestic filter cigarettes are the most popular type, with consumption at over 87 packs per adult per year, corresponding to 7.3 packs per month per adult. The next most popular type is foreign brand name cigarettes, which are becoming increasingly popular, despite selling for higher prices than domestic filter cigarettes. Domestic non-filter cigarettes are the least

popular and least expensive, and their consumption has declined recently. Figures 3.4, 3.5 and 3.6 show consumption and price trends of the different cigarettes types over the sample period, showing the strong increase in consumption of foreign brands. It is notable that the real price of foreign brand cigarettes has a declining trend, whereas the real price of domestic brands is fairly stable over the period between 1987 and 2000.

**Table 3.7 - Prices and Consumption of Cigarettes by Type, 1987-2000**

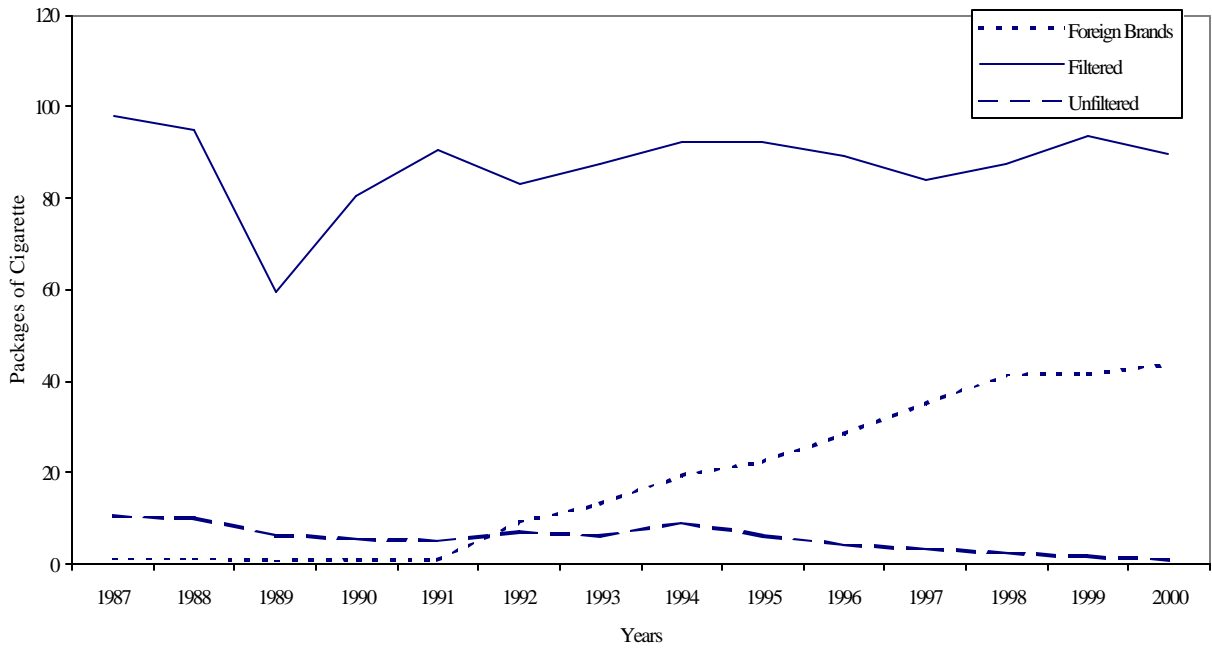
	Mean	Standard Deviation	Minimum	Maximum
<b>Filter Cigarettes</b>				
Packs Consumed per Adult per Year	87.35	9.35	59.47	97.90
Price (TL in terms of 2000 prices)	491,520	90,409	362,900	627,755
<b>Non-filter Cigarettes</b>				
Packs Consumed per Adult per Year	5.66	2.94	1.05	10.48
Price (TL in terms of 2000 prices)	148,842	58,599	79,734	307,853
<b>Cigarettes with Foreign Brand Names</b>				
Packs Consumed per Adult per Year	18.55	16.91	0.77	43.75
Price (TL in terms of 2000 prices)	1,155,557	240,223	759,089	1,606,755

Source: Author's estimates

Some smokers switch to lower priced cigarettes when the price of the cigarette they usually buy increases. In estimating cross-price elasticities, it is assumed that when prices of domestic filter cigarettes increase, people might switch to non-filter cigarettes, so the demand model for non-filter cigarettes includes the price of filter cigarettes. Similarly, when prices of foreign cigarettes increase, people might switch to domestic filter cigarettes, so the price of foreign cigarettes is included in the model that explains the demand for filter cigarettes.

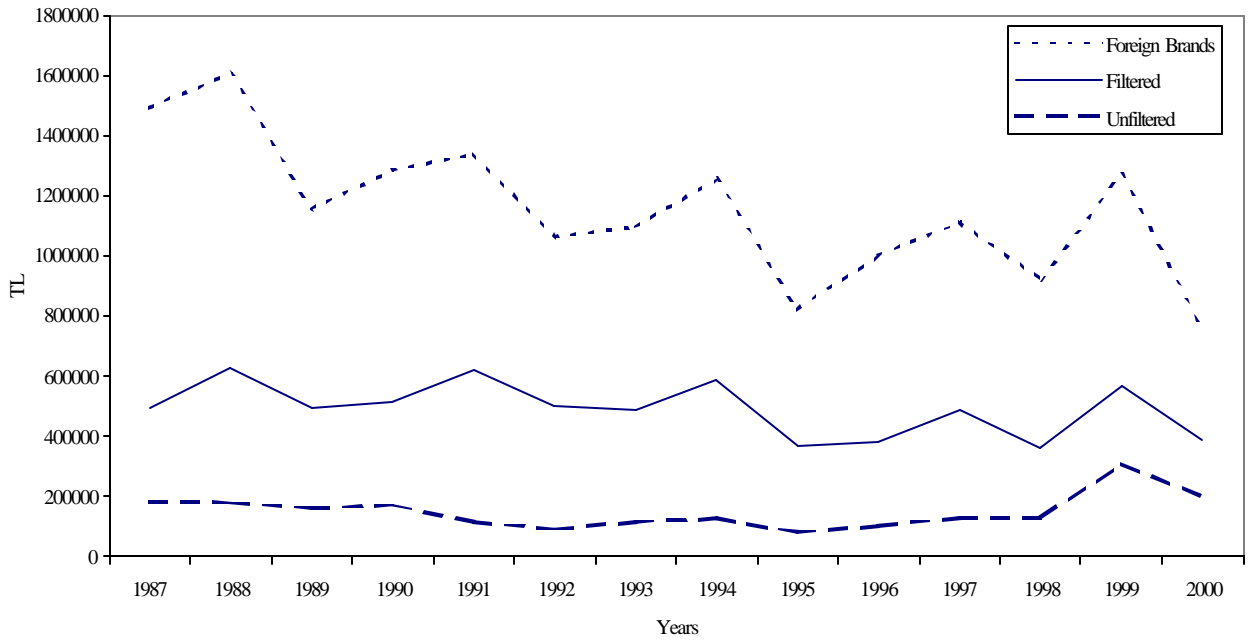
Four models are estimated, separately for each of the three types of cigarettes. In the simplest model, only price and income are included. When a trend variable is included, it picks up the increase in the consumption of cigarettes with foreign brand names over time, and the decline in consumption of unfiltered cigarettes (panels B and D of Table 3.8).

**Figure 3.3 - Consumption of Cigarettes per Adult per Year by Type**



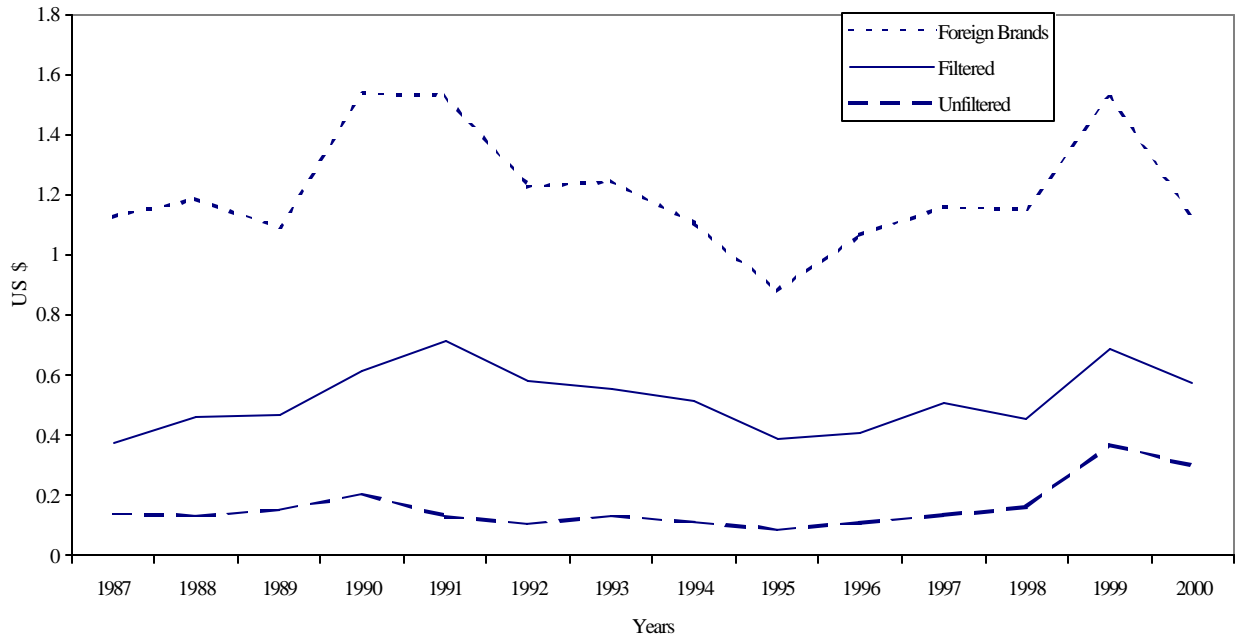
Source: State Institute of Statistics and Tekel

**Figure 3.4 - Prices of Cigarettes by Type (TL in terms of 2000 prices)**



Source: State Institute of Statistics

**Figure 3.5 - Prices of Cigarettes by Type in US \$**



Source: State Institute of Statistics

The equations that include the prices of substitute cigarettes (whether with or without a trend variable) have much greater explanatory power (panels C and D compared with A and B in Table 3.8). The middle column in panel C shows a strong substitution effect between domestic filtered and unfiltered cigarettes: if the price of filtered cigarettes increases by 1 percent, the demand for unfiltered cigarettes increases by 1.35 percent. When the trend variable is included, there appears to be no significant impact of changes in the prices of substitute cigarettes. This suggests that the changing market shares of the different types of cigarettes is due to changing tastes or other variables that are not included in the models, rather than to changes in relative prices of different types of cigarettes.

### Summary

In summary, the price elasticity of demand for cigarettes appears to be low in Turkey compared to other countries for which empirical results are available. Moreover, real prices of cigarettes have fallen in Turkey, especially for foreign brand cigarettes, whose consumption has increased the most. Poorly-enforced, new regulations to ban smoking in public places have done little to curb the increasing trend in cigarette consumption in Turkey.

**Table 3.8 - Regression Results for Different Types of Cigarettes**

	Filtered Cigarettes		Unfiltered Cigarettes		Foreign Brands	
	Parameter		Parameter		Parameter	
	Estimate	t-statistic	Estimate	t-statistic	Estimate	t-statistic
Panel A - Demand for Cigarettes without Trend.						
Intercept	-2.6765	-1.032	-2.3245**	-2.716	3.8220	1.353
Ln P <sub>t</sub>	0.0267	0.141	-0.6989	-1.906	-1.7658	-1.883
Ln Y <sub>t</sub>	0.3172	1.851	0.6034**	2.726	0.9882	1.492
Adjusted R-squared	0.3006		0.5143		0.1911	
F-statistic	3.5790		7.8830		2.5350	
Prob (F)	0.0673		0.0075		0.1243	
Panel B - Demand for Cigarettes with Trend.						
Intercept	14.2994	2.222	-2.1902	-0.954	0.3039	0.212
Ln P <sub>t</sub>	0.0616	0.344	-0.6659*	-2.581	0.7634	0.928
Ln Y <sub>t</sub>	-0.4855	-1.628	0.5839**	2.841	-0.5152	-0.976
Trend	0.0213	2.224	-0.1091***	-4.393	0.3099**	3.287
Adjusted R-squared	0.1652		0.7522		0.5465	
F-statistic	1.7910		14.1520		6.2200	
Prob (F)	0.2188		0.0006		0.0118	
Panel C - Demand for Cigarettes with Cross-Substitution without Trend.						
Intercept	-2.4775	-1.096	-2.5515**	-3.463	-88.4967	-0.413
Ln P <sub>t</sub>	0.3300	0.617	-1.1610**	-3.398	-6.2797	-1.829
Ln Y <sub>t</sub>	0.3440	1.665	0.0556	0.197	6.7523	0.756
Ln CP <sub>t</sub>	-0.3340	-0.591	1.3546*	2.615	2.3515	0.562
Adjusted R-squared	0.4992		0.6790		0.3418	
F-statistic	4.9880		10.1670		3.2510	
Prob(F)	0.0262		0.0022		0.0683	
Panel D - Demand for Cigarettes with Cross-Substitution with Trend.						
Intercept	-3.3337	-1.681	-2.3245*	-2.393	0.1588	0.103
Ln P <sub>t</sub>	0.2154	0.466	-1.0800*	-2.603	2.5220	1.830
Ln Y <sub>t</sub>	0.2415	1.311	0.0822	0.272	-0.1388	-0.251
Ln CP <sub>t</sub>	-0.0126	-0.025	1.2193	1.887	-2.5249	-1.570
Trend	0.0253	2.056	-0.0145	-0.384	0.3708***	4.085
Adjusted R-squared	0.6314		0.6491		0.6405	
F-statistic	6.1390		7.0120		6.7920	
Prob (F)	0.0146		0.0076		0.0084	

Source: Author's estimates

## 4. HOUSEHOLD LEVEL ANALYSIS

Data from the 1994 Household Expenditure Survey are used in order to analyze the links between poverty and tobacco consumption, investigate the impact of changes in tobacco taxes on poor households and examine smoking prevalence and tobacco consumption trends among households in different income groups.

### 4.1. DATA

The Household Expenditure Survey, the most comprehensive survey of household expenditures, is administered by the State Institute of Statistics every seven years. The most recent available data are from the 1994 survey. The sample covers seven regions in Turkey, and includes households from different income groups. Household expenditures are recorded over one month. Surveyed households are replaced every month by another household with similar characteristics. Characteristics of the head of the households are recorded, including age, gender, education, and occupation, as well as the size of the household and the number of children below 12. The reported income includes salaries, wages and other income obtained from non-working activities, such as interest and rent.

There were 26,186 households surveyed in 1994. However, 20 households reported zero income, and are excluded from the sample, leaving a sample size of 26,166. Since households were interviewed in different months of the year 1994 and Turkey was in an economic crisis in 1994 with an inflation rate of over 100 percent, all monetary figures are expressed in terms of December 1994 values using the Consumer Price Index (CPI) to adjust current values. The sample is divided into quintiles based on household income in December 1994.

In the survey, total cigarette expenditures are reported for each household, by cigarette brand. The 29 different brand names in the survey differ by length and strength; and include 22 filtered, 6 unfiltered and 15 foreign brand cigarettes. Table 4.1 shows the number of households that smoke each brand of cigarettes. Maltepe and Marlboro are the most popular Turkish filtered and foreign brand names, respectively. In general, households prefer Turkish cigarettes.

**Table 4.1 - Brands and Shares of Cigarettes Used by Households**

Brand names	Number of Households	Share (%)	Brand names	Number of Households	Share (%)
Domestic Brands			Foreign Brands		
Filtered			Malboro	1,405	5.99
Maltepe	9,261	39.47	Parliament	391	1.67
Tekel 2000	4,863	20.73	Camel	96	0.41
Samsun	4,766	20.31	Salem	31	0.13
Yeni Harman	1,074	4.58	Winston	16	0.07
Bafra	87	0.37	Kent	7	0.03
Silahli Kuvvetler	24	0.10	Cartier	4	0.02
Bitlis	18	0.08	Dunhill	3	0.01
Tokat	14	0.06	Eva	3	0.01
Lux Harman	9	0.04	Pall Mall	3	0.01
Meltem	6	0.03	Rothmans	3	0.01
T.B.M.M.	4	0.02	Others	229	0.98
Hanimeli	3	0.01	Total Foreign	2,191	9.34
Others	63	0.26			
Total Filtered Cigarettes	20,192	86.07			
Unfiltered					
Birinci	848	3.61			
Bafra	172	0.73			
Bitlis	43	0.18			
Bahar	2	0.01			
Others	13	0.05			
Total Unfiltered Cigarettes	1,078	4.59			
Total Domestic Brands	21,270	90.66			
Total				23,461	100.00

Source: 1994 Household Consumption and Income Survey

Smoking prevalence rates for households in the sample are reported in Table 4.2. For 64 percent of households, cigarette expenditures are greater than zero (we will call these “smoker households”). Filtered Turkish cigarettes are preferred by 53 percent of the sample. Smoking prevalence rates differ across income quintiles. The lowest smoking rate is found in the lowest income quintile (52 percent) and the highest income quintile has the highest smoking rate (70 percent). There are also differences in the types of cigarettes smoked across quintiles. Use of unfiltered cigarettes decreases monotonically as income increases whereas use of foreign-brand cigarettes increases with income. Although 7 percent of the lowest income quintile households buy unfiltered cigarettes, this declines to 1 percent in the highest income group. Foreign brands that have very high prices compared to unfiltered cigarettes are smoked more by households in the highest income quintile: 18 percent of the highest income quintile households buy foreign brands compared to only 1.5 percent of households in the lowest income quintile.

**Table 4.2 - Smoking Prevalence, Number of Smoker Households by Type of Cigarette and Income Group, 1994**

Description	Income Quintiles					
	Overall	Lowest	2	3	4	Highest
Smoking Prevalence (%)						
Filtered	52.55	47.98	59.80	62.42	64.35	63.05
Unfiltered	3.73	7.25	4.97	3.71	2.29	1.22
Foreign Brand	7.42	1.47	3.15	4.93	9.14	18.43
All	63.70	52.04	62.59	65.14	68.15	70.34
Number of Smoker Households						
Filtered	13,749	2,514	3,128	3,266	3,366	3,299
Unfiltered	977	380	260	194	120	64
Foreign Brand	1,942	77	165	258	478	964
All	16,668	2,727	3,274	3,408	3,565	3,680
Total Number of Households in the Sample	26,166	5,240	5,231	5,232	5,231	5,232

Source: Computed from the National Household Consumption Survey, 1994

Table 4.3 shows the preferences of smoker households in different income quintiles. Members of a household may collectively smoke more than one kind of cigarette, so percentages add to more than 100. About 82 percent of 16,668 smoker households buy filtered cigarettes. Unfiltered cigarettes are least preferred by all households regardless of income level. Many Turkish people think that a filter makes cigarettes healthier. These preferences are similar to cigarette market shares at the aggregate level in 1994.

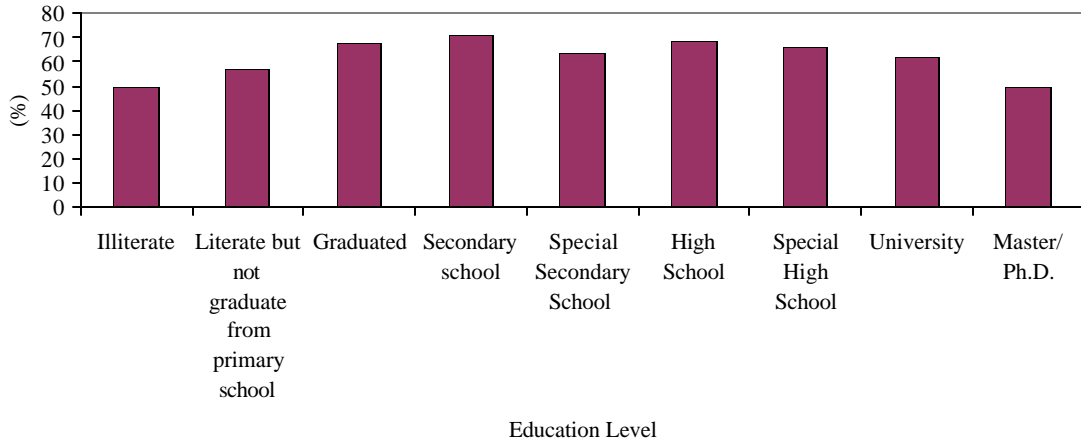
**Table 4.3 - Household Preference by Income Group**

	Income Quintiles					
	Overall	Lowest	2	3	4	Highest
Filtered	82.49%	92.19%	95.54%	95.83%	94.42%	89.65%
Unfiltered	5.86%	13.93%	7.94%	5.69%	3.37%	1.74%
Foreign Brand	11.65%	2.82%	5.04%	7.57%	13.41%	26.20%

Source: Computed from the National Household Consumption Survey, 1994

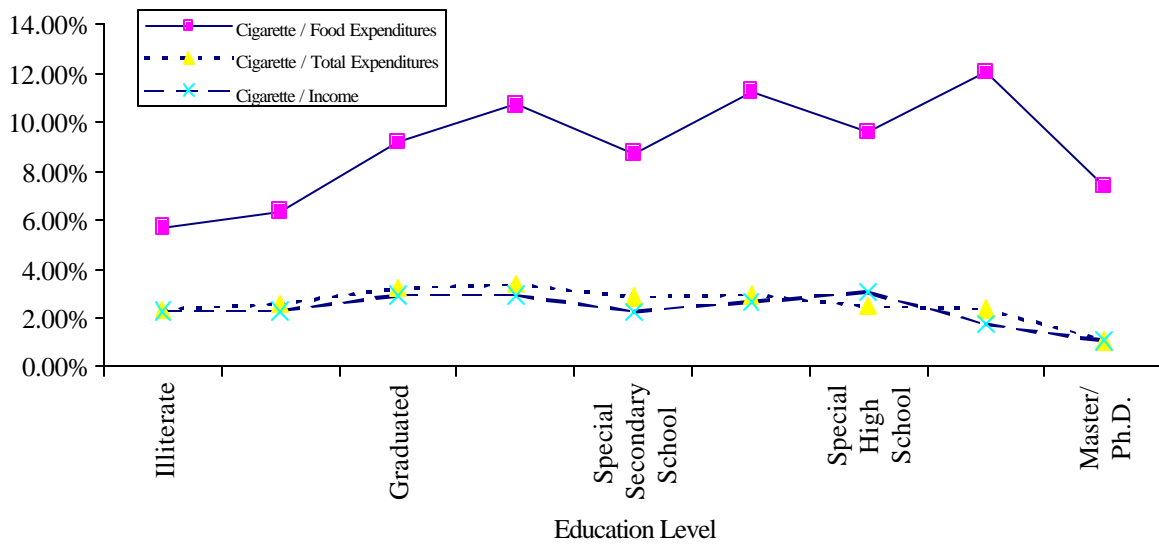
Smoking prevalence rates of households by education level of the household head seem to show a quadratic relationship (Figure 4.1). As education level increases, the smoking prevalence rate first increases and then declines. Education and cigarette expenditures also vary with income level. As might be expected, households whose heads is illiterate have less income and spend more of it on food (Figure 4.2). The ratio of cigarette expenditures to food expenditures is lowest for this group. This ratio increases as education level increases, reflecting both an increase in cigarette expenditures and a decline in food consumption as a percentage of total expenditure. Households whose head graduated from secondary school have the highest smoking rate. Cigarette expenditures and the cigarette/food expenditure ratio declines for households headed by a university graduate. The low ratio of cigarette to food expenditures for households whose head attended a special (religious) school is consistent with lower smoking rates among religious leaders.

**Figure 4.1 - Smoking Prevalence Rate by Education Level**



Source: Computed from the National Household Consumption Survey

**Figure 4.2 - Share of Cigarette Expenditures by Education Level**



Source: Computed from the National Household Consumption Survey

Table 4.4 shows monthly consumption of cigarettes, prices and taxes paid by households, and cigarette expenditures relative to other household expenditure categories and relative to income. The number of packs of cigarettes bought per adult and packs of filtered cigarettes are similar across all quintiles. Unfiltered cigarettes decline and foreign brands increase as income increases.

**Table 4.4 - Average Packages of Cigarettes Consumed per adult per household, Price and Tax Paid by Smoker Households by Type of Cigarette and Income Group**

	Overall	Income Quintiles				
		Lowest	2	3	4	Highest
Consumption per month per adult (number of packs)						
Filtered	7.89	7.94	7.82	7.84	7.86	8.02
Unfiltered	7.61	9.76	6.90	6.73	5.48	4.42
Foreign Brand	4.67	3.75	2.91	3.47	4.51	5.45
All types of cigarettes	8.39	8.78	8.17	8.16	8.21	8.69
Price per pack (20 pieces)						
Filtered	19,181	15,676	16,621	18,707	20,013	23,919
Unfiltered	4,476	4,373	4,733	4,079	4,296	5,606
Foreign Brand	44,467	41,898	43,167	42,452	44,243	45,544
All types of cigarettes	20,154	14,820	16,628	18,984	21,420	27,125
Tax value per pack						
Filtered	7,828	6,167	6,589	7,584	8,207	10,133
Unfiltered	3,077	3,006	3,253	2,817	2,939	3,842
Foreign Brand	19,654	18,519	19,080	18,764	19,555	20,131
All types of cigarettes	8,365	5,993	6,711	7,792	8,899	11,617
Tax Rate to Price						
Filtered	40.81%	39.34%	39.64%	40.54%	41.01%	42.36%
Unfiltered	68.74%	68.74%	68.73%	69.05%	68.42%	68.53%
Foreign Brand	44.20%	44.20%	44.20%	44.20%	44.20%	44.20%
All types of cigarettes	41.50%	40.44%	40.36%	41.04%	41.54%	42.83%
Cigarette/Food Expenditures	9.12%	7.70%	7.85%	8.84%	9.64%	11.56%
Cigarette/Food Group Expenditures	6.82%	5.83%	6.16%	6.70%	7.18%	8.24%
Cigarette/Total Expenditures	2.96%	3.08%	3.05%	2.98%	2.90%	2.80%
Cigarette/Income	2.69%	4.25%	2.87%	2.52%	2.17%	1.65%
Cigarette Expenditure (TL)	314,860	167,640	229,763	289,177	361,295	526,644
Total Expenditure (TL)	12,483,521	5,616,231	8,238,041	10,723,999	14,147,907	23,701,433
HHD Income (TL)	15,826,162	4,635,739	8,050,421	11,529,988	16,770,513	38,159,956

All monetary figures are expressed in TL in terms of the end of December of 1994 prices.

Source: Computed from the National Household Consumption Survey, 1994

Households pay on average \$0.52 per pack of cigarettes. The average price paid for cigarettes increases as income increases because higher income households are more likely to smoke more expensive foreign brands. Households pay on average \$0.22 in cigarette taxes per pack. As income levels increase, the tax paid per pack increases. The tax rates on filtered, unfiltered and foreign brands are reported in the Appendix. If the tax rate on the particular brand is not known, the average tax rate on that group is used. For example, the tax rate on Marlboro is used as the tax rate for all foreign cigarettes.

On average, smoker households spent 314,860 TL per month on cigarettes (December 1994 prices); equivalent to 2.7 percent of household income, and almost 3 percent of total household expenditures. Interestingly, the State Institute of Statistics includes cigarettes and alcohol within food group expenditures; cigarettes are 6.8 percent of food group expenditures and over 9 percent of food expenditures.

Total cigarette expenditures increase with income, but decrease as a share of total expenditures. On average households in the lowest income quintile spend 4.3 percent of their income on cigarettes compared to 1.7 percent for households in the highest income quintile. Although richer households pay more cigarette taxes in absolute amounts, they pay less as a percentage of their income. The differences in tax rate among the income quintiles are small; there is a relatively high tax rate on unfiltered cigarettes that are consumed most by the lowest income households.

Table 4.5 shows the estimated total cigarette taxes paid by households in each income quintile using their expenditure on cigarettes and the total tax revenue of government in 1994. Cigarettes taxes accounted for approximately 3.5 percent of all government revenue in 1994.<sup>4</sup> In terms of equality, the picture does not look bad. Households in the highest income quintile paid the highest share (35 percent) and households in the lowest income quintile paid the lowest share (10 percent) of total cigarette taxes.

**Table 4.5 - Taxes Paid on Cigarettes**

Income Quintiles	Taxes Paid (in million TL)	Taxes Paid (in million US\$)	Share (%)
Lowest	2,128,300	56.82	10.25
2	2,692,000	71.87	14.03
3	3,625,900	96.80	18.10
4	4,483,900	119.70	22.91
Highest	7,597,300	202.82	34.66
Total	20,527,000	547.99	100.00
Total Tax Revenue in 1994	587,760,248	15,690.76	3.49

Source: Computed from the National Household Consumption Survey, 1994

An interesting question is what households could buy instead with the money they spend on cigarettes each month (Table 4.6). The 314,860 TL spent on average each monthly on cigarettes could instead buy 16.5 kilograms of bread, 11.9 liters of milk, or 127 kilograms of wood. The amount spent each year on cigarettes could instead pay the rent for two months, or buy 1.1 tons of coal (just more than the average household monthly coal consumption).

<sup>4</sup> Tax rates increased considerably in later years, and by 2000, tobacco taxes accounted for 6% of government revenues.

**Table 4.6 - Alternative Ways of Spending Cigarettes Money**

Total Cigarette Expenditure per Month = 314,860 TL					
<b>Food Items</b>		Spinach (kg)	13.32	<b>Household Goods</b>	
Bread (kg)	16.47	Fresh Onion (kg)	9.93	Vacuum Cleaner	0.64
Rice (kg)	6.82	Sugar (kg)	13.54	Washing Machine	0.18
Macaroni (packages)	9.85	Tea (kg)	2.58	Refrigerator	0.23
Meat (kg)	2.25	Coffee (kg)	0.70	Sewing Machine	0.36
Chicken (kg)	4.34	Black Olive (kg)	2.87	Color TV	0.17
Milk (liter)	11.92	Pure Honey (kg)	2.03	<b>Transportation</b>	
White Cheese (kg)	2.79	Canned Food (kg)	6.39	Minibus Fare	34.98
Yogurt (kg)	9.15	Fruit Juice(bottle)	36.52	City Bus Fare	39.36
		<b>Children's Clothes</b>			
Eggs (number)	106.24	(# items)		Gasoline (lt)	14.42
Beans (kg)	4.83	Coats	1.43	<b>Rent, Utilities</b>	
Potatoes (kg)	29.57	Jackets	2.92	Rent per month*	2.14
Walnut (kg)	1.12	Trousers	7.01	Water (m3)	20.71
Orange (kg)	20.14	School Uniforms	8.76	LPG (12 kg)	1.66
Banana (kg)	5.78	Shirt	9.10	Fuel oil (lt)	36.69
Apple (kg)	15.99	Socks (pairs)	73.54	Electricity (kwh)	110.13
Tomatoes (kg)	7.94	School Bag	10.16	Wood (monthly)	1.27
Cabbage (kg)	30.02	Pair of Shoes	6.28	Lignite Coal (ton)*	1.10

Source: Author's calculations, using National Household Consumption Survey. For example, households could pay 2.14 months' rent or buy 1.10 tons of lignite coal with their annual cigarette expenditures.

## 4.2. METHODOLOGY

In order to estimate the price and income elasticity of cigarettes, a two-step model is used as in Hu et al. (1995). The first step involves estimating the price elasticity of smoking participation. The conditional price elasticity of demand for cigarettes is estimated in the second step. The underlying assumption of the model is that households first decide whether or not to smoke, and then they decide how much to smoke.

As before, a household is defined to be a smoker household if they spent any money on cigarettes during the month. The average price of cigarettes for each smoker household is calculated by dividing total cigarette expenditures by the total number of cigarettes purchased in that month. Obviously, this calculation cannot be done for non-smokers. So in order to calculate the price of cigarettes facing non-smoker households, it is assumed that smoker and non-smoker households with similar household characteristics face the same cigarette prices.

The following model is used in estimating prices for non-smoker households:

$$\text{Log (Price}_i) = f (\text{Tax}_i, \text{Income}_i, \text{Region}_i, \text{Urban}_i, \text{Education}_i, \text{Unemployed}_i, \text{White-Collar}_i)$$

where

Price is cigarette price per pack of 20 (in log TL).

Tax is cigarette excise tax in TL per pack of 20.

Income is per capita household income per month in TL.

Region represents six dummy variables for Western, Southern, Northern, Middle, Eastern and Southeastern regions of Turkey; each takes a value of 1 if a

	household lives in the corresponding region; the Northwest region is taken as a base group.
Urban	represents three dummy variables; urban-developed, urban-undeveloped and slum or ghetto areas; rural area is taken as a base group.
Education	represents two dummy variables related to the education of the head of the household; head of household had attended secondary or high school; and head of household had university or higher degree; base group includes those that had at most an elementary school diploma.
Unemployed	is a dummy variable that gets a value of 1 if the head of the household is unemployed and 0 otherwise.

Hypothetical price and tax variables for non-smoking households are estimated using an ordinary least squared model, and expressed as a function of per capita household income:

$$\text{Log}(\text{tax}_i) = a + b_1 * \text{Log}(\text{Household Income}_i) + \epsilon_i$$

where  $\epsilon_i$  is the disturbance term in the regression equation. The regression result for tax is used to estimate the tax that non-smoker households would pay if they bought cigarettes. Similarly, the predicted tax paid by non-smoker households is used to generate a cigarette price for non-smoking households. The models are estimated for the full sample as well as for the five income quintiles separately.

Guided by the availability of data and by previous similar studies, several household characteristics are included as determinants of a household's decision to smoke. The following logit model is used to estimate the probability, P, that a household includes a smoker (the smoking participation decision):

$$P(\text{Smoke}_i) = f(\text{Price}_i, \text{Income}_i, \text{Education}_i, \text{Unemployed}_i, \text{White-collar}_i, \text{Gender}_i, \text{Age}_i, \text{Number of adults}_i, \text{Location}_i, \text{Region}_i)$$

where Smoke is a dummy variable that takes a value of 1 if the household includes a smoker. Income is per capita total household income in the survey month, including wages, salaries and other non-work income. Education is the education level of the household head, represented by dummy variables for secondary school and university that take a value of 1 if the household head has some secondary school education or some university education, respectively. Unemployed is a dummy variable showing whether the head of household is employed or not. White-collar takes a value of 1 if the head of household is a white-collar worker. The Gender dummy variable takes a value of 1 if the head of household is male. Age is captured by four dummy variables for age intervals of less than 20, 20 to 29, 30 to 44, and 45 to 59. Those age 60 or older are the base group. In calculating the variable for the number of adults in the household, "adult" is defined as older than 12 because this was the only definition possible using this dataset. Two variables are included to control for the characteristics of the location: one for the region and the other for the level of urbanization. There are six regional dummy variables: Aegean, Anatolian, Black Sea, Mediterranean, Eastern and Southeastern. Marmara region is taken as the base. Three dummy variables are created to capture urban development: developed, semi-developed and ghetto, with rural areas taken as a base group.

Before estimating this logit model, the Durbin, Wu and Hausman endogeneity test was applied to the cigarette price variable. First the equation is estimated for all households in the sample, and this estimation is used to calculate price residuals. Next, these estimated residuals are included in the model in order to test whether prices are determined endogeneously. The results of this test are reported in the Appendix (Table A2). If the coefficient on the residuals is significantly

different from zero, then price is endogeneous and the estimated price is used instead of observed price in the model. Price is found to be endogeneously determined in the second income quintile. Therefore, the logit model is estimated for this quintile using the predicted price.

The second estimation in the two-step procedure is the conditional demand for cigarettes for smoker households only. The dependent variable in this model is the number of cigarettes smoked per adult in household. Variables are included to capture the key characteristic of cigarettes (price), household characteristics and location characteristics, in the following model:

$$\begin{aligned} \text{Log (Consumption}_i) = & a_0 + b_1 \log (\text{Price}_i) + b_2 \log(\text{Income}_i) + b_3 \text{Education}_i + \\ & b_4 \text{Unemployed}_i + b_5 \text{White-collar}_i + b_6 \text{Gender}_i + b_7 \text{Age}_i + \\ & b_8 \text{Number of adults}_i + b_9 \text{Location}_i + b_{10} \text{Region}_i + e_i \end{aligned}$$

This equation is estimated only for smoker households. Similar to the logit estimates, the endogeneity of cigarette price is tested using the Durbin, Wu and Hausman endogeneity test. The results are presented in the Appendix (Table A3). Since prices are found to be endogeneously determined for the overall sample, the model is re-estimated using predicted price, rather than price calculated directly from the expenditure and quantity data in the survey.

### 4.3. RESULTS

As mentioned in the previous section, the tax and price equations are estimated first, and then used to estimate the cigarette tax and prices faced by non-smoker households. Third, these estimated values are used in examining the probability of smoking in a two-step procedure. Lastly, the demand for cigarettes (conditional on smoking participation) is estimated in order to calculate the price elasticity. All of these analyses are done for the full sample as well as for each of the five income quintiles.

#### **Estimation of Tax Equation**

The results of the Ordinary Least Squares Model to predict taxes that would be paid by non-smoking households if they smoked, using the 16,653 smoker households in the sample, are presented in Table 4.7. Per capita household income has a significant and positive effect for all households except the lowest quintile. A ten percent increase in income increases the predicted tax by 3.1 percent for the full sample. A ten percent increase in household income would increase the predicted tax paid by 0.9 percent for households in the second income quintile and by 2.6 percent for the top quintile.

**Table 4.7 - Estimated Coefficients of Tax Equation**

	Income Quintiles					
	Overall	Lowest	2	3	4	Highest
Intercept	-29753*** (-43.867)	4948.479*** (3.581)	-1602.48 (-0.79)	-11608*** (-4.561)	-22851*** (-7.657)	-35531*** (-14.405)
Log(per capita income)	2563.475*** (56.282)	74.75591 (0.756)	575.9025*** (4.103)	1313.392*** (7.626)	2101.274*** (10.643)	2986.707*** (19.129)
Number of Observations	16653	2726	3273	3407	3564	3679
R-squared	0.1598	0.0002	0.0051	0.0168	0.0308	0.0905
Mean of tax per pack	8366.9	5992.7	6711.2	7791.9	8898.7	11616.6
Income Elasticity	0.31	0.01	0.09	0.17	0.24	0.26

t-values are presented in parentheses. \*\*\* shows significance at 1 percent.

Income elasticity with respect to tax was evaluated at mean tax values.

Source: Author's estimates

### Estimation of Price Equation

Non-smoking households have no price information. Their prices they face are estimated assuming they are the same as for similar smoker households. Table 4.8 shows the estimated coefficients of the price equation for smoker households. Almost all of the coefficients affect prices significantly, with significant price variations among regions and development levels. Interestingly, income is not significant for all income quintiles.

A positive impact of taxes on prices is found, as expected. A tax increase of 10 percent would increase cigarette prices by 7.32 percent for the full sample (Table 4.8). The impact of a change in taxes on prices is different for households in different income quintiles. For example, a 10 percent tax increase leads to an increase in price of 6.6 percent for households in the second quintile and 8.7 percent for the fifth income quintile.

**Table 4.8 - Estimated Coefficients on Price Equation, by Income Quintile**

	Overall	Lowest	2	3	4	Highest
Intercept	8.629*** (230.244)	8.720*** (60.823)	8.860*** (63.502)	8.896*** (68.614)	9.068*** (90.442)	9.111*** (154.002)
Log (Income)	0.024*** (9.336)	-0.008 (-0.802)	0.001 (0.095)	0.005 (0.555)	0.000 (0.025)	0.004 (1.123)
Taxes	0.000*** (235.998)	0.000*** (65.712)	0.000*** (87.815)	0.000*** (113.447)	0.000*** (159.394)	0.000*** (207.001)
Aegean	0.037*** (5.856)	0.056** (2.337)	0.080*** (5.156)	0.036*** (2.829)	0.044*** (4.643)	0.030*** (3.992)
Mediterranean	0.030*** (4.857)	0.103*** (4.726)	0.052*** (3.44)	0.035** (2.735)	0.010 (1.101)	0.004 (0.486)
Central Part	0.004 (0.693)	0.055** (2.713)	0.006 (0.413)	-0.006 (-0.519)	-0.003 (-0.331)	0.019** (2.697)
Black Sea	0.052*** (8.66)	0.108*** (4.866)	0.070*** (4.618)	0.058*** (4.682)	0.019* (2.132)	0.040*** (5.868)
Eastern	0.036*** (5.72)	0.113*** (4.733)	0.056*** (3.577)	0.025 (1.928)	0.006 (0.658)	-0.002 (-0.287)
Southeastern	0.049*** (7.389)	0.142*** (6.784)	0.074*** (4.937)	0.034** (2.453)	0.002 (0.161)	0.018 (1.774)
Developed -urban	0.057*** (12.009)	0.097*** (5.361)	0.054*** (4.666)	0.055*** (5.653)	0.054*** (7.594)	0.027*** (4.504)
Semi-Developed	0.058*** (13.53)	0.081*** (6.202)	0.058*** (6.114)	0.044*** (5.054)	0.036*** (5.313)	0.024*** (3.898)
Ghettos	0.065*** (6.93)	0.095** (3.434)	0.037 (1.819)	0.066*** (3.508)	0.052*** (3.445)	0.030 (1.877)
Secondary School	0.020*** (4.622)	0.012 (0.687)	0.041*** (3.894)	0.010 (1.13)	0.021*** (3.403)	0.010* (2.005)
University	0.005 (0.701)	0.101 (0.9)	0.068 (1.706)	0.016 (0.861)	0.007 (0.653)	0.020*** (3.086)
Unemployed	-0.009 (-1.71)	-0.046*** (-2.988)	-0.004 (-0.306)	0.007 (0.692)	0.002 (0.22)	0.007 (0.991)
White-collar	0.011** (2.866)	0.011 (0.741)	0.014 (1.492)	0.019** (2.339)	0.008 (1.425)	0.014** (2.749)
Number of Obs	16653	2726	3273	3407	3564	3679
R-squared	0.8175	0.6302	0.7210	0.8061	0.8891	0.9326
Tax Elasticity	0.7318	0.7611	0.6626	0.7096	0.7383	0.8663

Source: Author's estimates

**Table 4.9 - Estimated Logit Coefficients for Smoking Prevalence Rates**

	Overall	Income Quintiles				
		Lowest	2	3	4	Highest
Intercept	-2.3424*** (35.918)	4.2696*** (13.359)	9.4972*** (28.183)	7.9304*** (18.882)	2.6769 (1.944)	-4.4688*** (13.549)
Log (Price)	-0.0748*** (8.761)	-0.2560*** (66.391)	-0.8628*** (39.542)	-0.3114 (3.261)	-0.0752 (3.146)	0.4920*** (69.850)
Log (Income)	-0.1398*** (45.094)	0.0122 (1.111)	-0.2945*** (9.287)	-0.4108*** (16.320)	-0.2400** (5.879)	-0.1241** (7.115)
Urban-Developed	0.2632*** (46.264)	0.2373** (5.988)	0.3765*** (17.828)	0.2177** (6.617)	0.1370 (2.599)	0.0954 (1.059)
Semi-developed	0.2227*** (41.476)	0.3231*** (20.135)	0.4105*** (30.860)	0.1307 (2.958)	0.1123 (1.853)	0.0502 (0.274)
Ghettos	0.2871*** (13.094)	0.5756*** (12.136)	0.4900*** (8.512)	0.2018 (1.439)	0.2239 (1.391)	-0.4088 (3.528)
Secondary School	0.0681 (3.397)	0.2229* (4.179)	0.0218 (0.067)	0.0874 (1.225)	-0.0225 (0.088)	0.0812 (1.015)
University	-0.2848*** (23.154)	0.0311 (0.003)	-0.3556 (1.704)	-0.1185 (0.604)	-0.3812*** (11.065)	-0.3245*** (11.859)
Unemployed	-0.3192*** (57.430)	-0.4003*** (23.682)	-0.3432*** (13.874)	-0.1650 (2.824)	-0.1637 (2.279)	-0.3775*** (11.333)
White-collar	-0.1123** (11.089)	0.0944 (1.191)	-0.0781 (1.047)	-0.2606*** (12.895)	-0.1113 (2.410)	-0.1375 (3.036)
Male	0.8902*** (283.978)	1.3182*** (155.495)	0.7563*** (41.034)	0.6643*** (30.290)	0.5203*** (13.982)	0.3065* (4.191)
Age <=20	0.4321** (6.343)	0.5366* (4.472)	0.6645 (2.890)	0.0247 (0.003)	1.3208 (2.994)	-0.3743 (0.471)
Age 20-29	0.8189*** (251.052)	0.9474*** (84.467)	0.7147*** (40.079)	0.6192*** (25.348)	0.4430*** (11.448)	0.4836*** (11.747)
Age 30-44	0.6643*** (277.071)	0.7544*** (75.725)	0.6021*** (42.966)	0.3561*** (13.436)	0.3300*** (10.602)	0.4446*** (17.831)
Age 45-59	0.3464*** (69.695)	0.3978*** (17.667)	0.4594*** (24.277)	0.1961* (4.376)	0.1214 (1.487)	0.1700 (2.761)
Number of Adults	0.1646*** (275.402)	0.1480*** (26.650)	0.0560 (2.961)	-0.0004 (0.000)	0.0328 (1.150)	0.1255*** (25.577)
Aegean	-0.0106 (0.042)	-0.2021 (2.395)	0.1820 (2.310)	-0.1575 (1.961)	0.0960 (0.689)	0.0423 (0.140)
Mediterranean	-0.2112*** (18.327)	-0.3234** (7.162)	-0.0536 (0.221)	-0.3401*** (9.498)	-0.2928** (7.688)	-0.1297 (1.430)
Black Sea	-0.0856 (3.034)	-0.0842 (0.448)	0.0665 (0.339)	-0.3420*** (9.987)	-0.0718 (0.464)	-0.0417 (0.159)
Central Part	-0.0941* (3.846)	-0.2860** (6.400)	0.0228 (0.043)	-0.1830 (2.716)	-0.0378 (0.124)	0.0557 (0.280)
Eastern	-0.1746*** (11.373)	-0.4662*** (13.092)	0.0894 (0.537)	-0.2732** (5.461)	-0.1894 (3.072)	-0.0802 (0.486)
Southeastern	-0.1930*** (12.533)	-0.4375*** (13.926)	-0.1337 (1.318)	-0.2903** (5.280)	0.1028 (0.538)	-0.2517 (2.727)

Source: Author's estimates

## **Probability of Smoking**

Price is not endogeneous for the full sample, or for any subsample except the second quintile. Therefore, the model is re-estimated using predicted price only for the second income quintile. The results are reported in Table 4.9. Almost all of the variables significantly affect the smoking participation rate. As the price of cigarettes increases, the probability of smoking decreases for all households. However, the impact of price is found to be insignificant for households in the third and fourth income quintiles and is positive for households in the highest income quintile.

Income is another important factor affecting the probability of smoking. As income increases, households are less likely to smoke. Although the impact is not found to be significant for the first income quintile, the results suggest that as income increases, households in this income quintile are more likely to smoke. However, households in all other income quintiles are less likely to smoke as their income increases.

Households in rural areas are less likely to smoke than urban households. Those in Marmara region are more likely to smoke, but regional differences disappear as income levels increase.

As expected, males in all income quintiles are more likely to smoke. The smoking probability is lower among white-collar workers than others. Household heads with University degrees are less likely to smoke than others, as are households with an unemployed head. Households whose head is older than 60 are less likely to smoke. As the number of adults in the household increases, the probability of someone in the household smoking increases, as would be expected.

## **Conditional Demand for Cigarettes**

For households that decide to smoke, the next decision is how much to smoke. Since price is endogeneous for the full sample and for all income quintiles, the conditional demand for cigarette is estimated using two-stage least squares. (see Appendix Table A3 for the results of the test for endogeneity).

Table 4.10 shows two-stage least squares estimation of the number of packs smoked by smoker households. Cigarette prices affect the conditional demand for cigarettes significantly and negatively for all households and within each income quintile. The results suggest that households are more sensitive to price when deciding how much to smoke than in deciding whether or not to smoke. For the whole sample, if price increases by 10 percent, total consumption declines by 3.9 percent.

As income increases, households smoke more cigarettes. For each 10 percent increase in total household income per adult, the total number of packs consumed increases by 1.5 percent.

**Table 4.10 - Estimated Coefficients for Total Packs Smoked**

	Overall	Income Quintiles				
		Lowest	2	3	4	Highest
Intercept	4.0478*** (20.11)	4.5240*** (6.92)	8.6672*** (9.67)	4.4084*** (4.70)	5.9567*** (6.08)	4.5923*** (7.48)
Log(Price)	-0.3855*** (-21.92)	-0.3437*** (-8.02)	-0.5751*** (-13.12)	-0.4494*** (-11.66)	-0.4078*** (-10.95)	-0.3035*** (-8.11)
Log(Income)	0.1455*** (13.23)	0.0845** (2.48)	-0.0391 (-0.75)	0.1618*** (2.91)	0.0478 (0.83)	0.0681* (2.04)
Secondary School	-0.0024 (-0.13)	0.0315 (0.61)	0.0721 (1.76)	-0.0348 (-0.90)	-0.0070 (-0.19)	-0.0342 (-0.86)
University	-0.0662* (-2.09)	0.4820 (1.51)	-0.0732 (-0.48)	-0.0362 (-0.44)	-0.0318 (-0.50)	-0.1241** (-2.46)
Unemployed	-0.0119 (-0.51)	0.0326 (0.69)	-0.0302 (-0.62)	-0.0245 (-0.47)	-0.0382 (-0.68)	0.0224 (0.37)
White-collar	0.0009 (0.06)	-0.0236 (-0.58)	0.0039 (0.11)	-0.0190 (-0.54)	-0.0152 (-0.44)	0.0492 (1.28)
Male	0.3041*** (8.53)	0.3887*** (5.23)	0.2567*** (3.42)	0.2945*** (3.89)	0.2225** (2.65)	0.2521** (2.81)
Age <=20	-0.0799 (-0.87)	-0.1541 (-1.15)	0.1299 (0.72)	-0.4212 (-1.56)	-0.0325 (-0.13)	0.3728 (1.07)
Age 20-29	0.0749** (2.72)	0.0790 (1.46)	0.0972 (1.69)	0.0671 (1.09)	0.0504 (0.76)	-0.0176 (-0.24)
Age 30-44	0.0801*** (3.56)	0.0819 (1.71)	0.1022* (2.12)	0.1015* (1.98)	0.0080 (0.15)	0.0231 (0.40)
Age 45-59	0.0700*** (2.96)	0.1040 (1.91)	0.1054* (2.06)	0.1430** (2.78)	0.0467 (0.87)	-0.0412 (-0.72)
Adult Size	0.0532*** (11.07)	0.0076 (0.52)	-0.0015 (-0.10)	0.0504*** (3.30)	0.0333* (2.23)	0.0624*** (5.48)
Aegean	0.0356 (1.35)	0.0646 (0.95)	0.0822 (1.37)	0.0110 (0.20)	0.0426 (0.75)	0.0312 (0.54)
Mediterranean	-0.0074 (-0.29)	-0.0036 (-0.06)	0.0075 (0.13)	0.0222 (0.40)	-0.0182 (-0.33)	-0.0137 (-0.24)
Black Sea	-0.0280 (-1.12)	-0.0851 (-1.34)	0.0509 (0.87)	0.0006 (0.01)	-0.0327 (-0.62)	-0.0428 (-0.81)
Central	-0.0943*** (-3.86)	-0.0256 (-0.44)	-0.0869 (-1.57)	-0.0475 (-0.88)	-0.0688 (-1.30)	-0.2000*** (-3.72)
Eastern	-0.1120*** (-4.24)	-0.1218 (-1.79)	-0.1235* (-2.03)	-0.0491 (-0.86)	-0.1004 (-1.85)	-0.1717*** (-2.95)
Southeastern	-0.3464*** (-12.39)	-0.3507*** (-5.91)	-0.2963*** (-5.08)	-0.2960*** (-4.78)	-0.3910*** (-5.89)	-0.3467*** (-4.36)

Source: Author's estimates

Households headed by a University graduate smoke fewer cigarettes than those with less than secondary school education. As the number of adults in the household increases, total cigarette consumption increases. Male-headed households smoke 0.3 packs more than female-headed households. Younger households smoke more.

No significant differences are found among urban, rural and slum areas in the number of packs smoked. Households in the central, eastern and southeastern regions smoke fewer cigarettes than those living in Marmara region.

### Price and Income Elasticity

Two-step estimation enables price and income elasticity of demand for cigarettes to be estimated for the overall sample as well as for each income quintile. Two elasticities are calculated: first, the impact of changes in price or income on the probability of smoking, and second, the impact of price and income changes on the total number of cigarettes smoked. Table 4.11 shows the calculated price elasticities for whole sample and for households in different income quintiles. If the price of cigarettes increases by 10 percent, there will be a 0.3 percent decline in the smoking participation, and smokers will reduce the number of packs consumed by 3.9 percent. The combined effect would be a 4.1 percent decline in the demand for cigarettes. Total price elasticity is highest in the second income quintile: a ten-percent increase in cigarette prices decreases the demand for cigarettes by almost 9 percent. At higher income levels, the impact of the increase in cigarette prices declines. Households in the lower income quintiles are more sensitive to changes in the price of cigarettes. For example, although a ten percent increase in cigarette prices decreases demand for cigarettes by 4.7 percent in the lowest income quintile, the decline is only 1.6 percent for the highest income quintile.

**Table 4.11 - Price Elasticity**

	Overall	Lowest	2	3	4	Highest
Logit Coefficient on Price	-0.0748	-0.2560	-0.8628	-0.3114	-0.0752	0.4920
Elasticity of Smoking Participation	-0.0272	-0.1228	-0.3228	-0.1086	-0.0240	0.1459
Conditional Price Elasticity of Demand	-0.3855	-0.3437	-0.5751	-0.4494	-0.4078	-0.3035
Total Price Elasticity	-0.4127	-0.4665	-0.8979	-0.5580	-0.4318	-0.1576

Source: Author's estimates

Table 4.12 shows the income elasticity of the demand for cigarettes. Cigarette are a normal good for the full sample: as income increases, the total demand for cigarettes increases, even though there is a decline in the probability of smoking. If household income per adult increases by 10 percent, smoking participation declines by 5.1 percent, but smokers buy 14.6 percent more cigarettes, resulting in an increase in total demand for cigarettes of 9.5 percent. The picture is mixed when each income quintile is examined separately; in some quintiles, an income increase causes a decline in total consumption, whereas total consumption increases in other quintiles.

**Table 4.12 - Income Elasticity**

	Overall	Lowest	2	3	4	Highest
Logit Coefficient on Income	-0.1398	0.0122	-0.2945	-0.4108	-0.2400	-0.1241
Elasticity of Smoking Participation	-0.0507	0.0059	-0.1102	-0.1432	-0.0764	-0.0368
Conditional Income Elasticity of Demand	0.1455	0.0845	-0.0391	0.1618	0.0478	0.0681
Household Smoking Prevalence Rate (%)	63.7	52.04	62.59	65.14	68.15	70.34
Total Price Elasticity	0.0948	0.0904	-0.1493	0.0186	-0.0286	0.0313

Source: Author's estimates

#### 4.4. SIMULATION ANALYSIS

Price is a powerful policy tool to influence cigarette consumption. This part of the paper uses the analysis reported above to explore the impact that tax and price changes could have on cigarette consumption and on government revenues from cigarette taxes in Turkey. Simulation analysis is done of the likely effect of cigarette price increases of 10 percent, 25 percent, 50 percent and 100 percent, assuming that there is no increase in smuggling.

Table 4.13 shows that if all of the variables are evaluated at their mean values, the predicted smoking participation rate is 68.5 percent. Increases in cigarettes prices of 10 percent, 25 percent, 50 percent and 100 percent will reduce the smoking rate of households by 0.16 percent, 0.36 percent, 0.66 percent and 1.13 percent respectively. In other words, the percentage decline in the number of smoker households is 0.23 percent, 0.53 percent, 0.96 percent and 1.65 percent, respectively. (The predicted smoking prevalence rate is used to calculate the number of smoking households: 17,910. For hypothetical price rises, the number of households that quit smoking is estimated, and then expressed as a percentage.)

**Table 4.13 - Impact of Price Increase on Household Smoking Prevalence Rate**

	Original	Price Increase			
		10 %	25%	50%	100%
Predicted Smoking Prevalence Rate	0.6845	0.6829	0.6809	0.6779	0.6732
Predicted Number of Smoker Households	17,910	17,870	17,816	17,738	17,615
Number of Households Quitted Smoking		40	95	172	296
Decline in Number of Smoker Households		-0.23%	-0.53%	-0.96%	-1.65%

Source: Author's estimates

These relatively small declines in the probability of smoking suggest that cigarette prices are not as powerful a policy tool in Turkey as in many other countries. However, this small decline in smoking prevalence rate may be explained by the level of analysis. Since households are examined, all of the smokers in the households need to quit smoking for the household to become a non-smoking household. The decline in the smoking prevalence rate of individuals would be much higher if there are more than one smokers in one household.

The next issue is the impact of a tax increase on cigarettes on government revenues. From the price estimation we know that the tax elasticity of price is 73.2 percent. This means that if taxes on cigarettes increase by 10 percent, the price of cigarette will increase by 7.32 percent. A 100 percent increase in taxes on cigarettes will increase the price of cigarettes by 73.2 percent. The price increase would cause smoking households to reduce their consumption from 15.62 packs to 10.90 packs. This would increase household cigarette expenditures to 380,528 TL. The government would then be collecting taxes of 182,400 TL from smoking households. The 100 percent increase in taxes would increase government revenues by 41.2 percent. Government could increase total tax revenues by increasing taxes (Table 4.14).

An important factor in identifying the impact of increase in taxes on cigarettes is the change in the share of cigarette expenditures in total income of households. If this share increases, it suggests that households shift some of their non-cigarette expenditures to cigarettes. The simulation analysis found that the share of cigarette expenditures in income would increase from 1.99 percent to 2.40 percent.

**Table 4.14 - Impact of Tax Increase on Government Revenues**

	Original	Tax Increase			
		10 %	25%	50%	100%
Increase in Price		0.0732	0.1830	0.3659	0.7318
Increase in Price Excluding Taxes		0.0541	0.1354	0.2707	0.5415
Price per Pack (TL)	20,154	21,629	23,841	27,528	34,903
Tax per Pack (TL)	8365	9202	10456	12548	16730
Consumption in pack per household	15.62	15.15	14.44	13.26	10.90
Expenditure per Household (TL)	314,805	327,640	344,282	365,061	380,528
Expenditure to Income (%)	1.99	2.07	2.18	2.31	2.40
Tax Revenue by Government (TL)	130,661	139,387	150,995	166,396	182,400
Number of Smoker Households	17910	17870	17816	17738	17615
Revenue Change (%)		6.66	15.57	27.60	41.21
Income (TL)	15,826,162				
Tax elasticity with respect to price	0.7318				
Total Price Elasticity	-0.4127				

Source: Author's estimates

An important question with tax increases is to know which households pay the increased taxes. In Turkey, the analysis shows that most of the tax increase would be paid by households in the highest income group. For example, if taxes increased by 100 percent, 13.9 percent of increase in taxes would be paid by households in the lowest income quintile, and 38.3 percent by households in the highest income quintile (Table 4.15).

**Table 4.15 - Collection of Tax From Different Income Groups**

Income Quintiles	Increase in Tax Rate			
	10%	25%	50%	100%
1	13.64%	13.65%	13.70%	13.91%
2	13.13%	12.44%	11.37%	9.42%
3	18.57%	18.35%	17.98%	17.25%
4	21.24%	21.24%	21.22%	21.14%
5	33.41%	34.33%	35.72%	38.28%

#### **4.5. SUMMARY AND CONCLUSION**

The 1994 Household Consumption Survey in Turkey shows that 63.7 percent of households spend something on smoking each month. The percentage is lowest among the lowest income quintile (52 percent) and highest among the highest income quintile (70 percent). Domestic filtered cigarettes are the most popular cigarettes in Turkey; and are smoked by 82 percent of smoker households. Domestic unfiltered cigarettes smoked mostly by households in the lowest income quintile, and foreign brands are bought by households in the highest income quintile.

On average 8.3 packs are consumed per month per adult. The number of packs of cigarettes consumed is similar across income quintiles. Higher income households pay higher prices for cigarettes than lower income households. Similarly, taxes paid increase as income level increases. However, lower income households spend a larger share of their income on cigarettes than higher income households.

Excise taxes on cigarettes are a significant source of government revenue, that also can be used to reduce tobacco use. The results suggest that tax increases will have only a modest effect on smoking prevalence, but will have a significant effect on the number of packs smoked. Government could increase its cigarette tax revenue by 41 percent by increasing cigarette taxes by 100 percent.

The results should be interpreted with care. First, in the analysis it is assumed that there is no smuggling. However, tax and price increases might lead to an increase in smuggling that would dampen the beneficial effects on government revenues and consumption. Second, the analysis is done with household level data. Individual level data would allow a more accurate analysis of the likely impact of price increase on the probability of smoking. Third, the situation in 1994 may not represent the current situation. Unfortunately, this is the latest country-wide dataset available with information on cigarette expenditures. Table 4.16 compares household cigarette expenditures in 1987 and in 1994, the first year after foreign cigarette companies began operating in Turkey. The aggregate analysis in earlier sections of this paper showed clearly the increase in cigarette consumption during the second part of the 1990s. Therefore, the analysis should be repeated when more recent data on household expenditures becomes available. Lastly, the household level of analysis does not enable smoking behavior of young people to be studied well. However, most people begin smoking as teenagers or young adults, which makes this a very important group to track.

**Table 4.16 - Comparison of 1987 and 1994 Household Expenditures**

	Turkey		Urban		Rural	
	1987	1994	1987	1994	1987	1994
Total Expenditures	100	105	100	107	100	102
Food	100	117	100	121	100	112
Bread and Cereals	100	129	100	145	100	115
Cigarettes	100	107	100	119	100	89
Health	100	107	100	119	100	87
Share in Total (%)						
Food	32.02	35.62	27.22	30.70	40.97	45.28
Bread and Cereals	5.89	7.24	4.50	6.07	8.47	9.54
Cigarettes	2.42	2.42	2.15	2.39	2.93	2.57
Health	2.57	2.57	2.38	2.65	2.91	2.50

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## STATISTICAL APPENDIX

**Table A1 - Ratio of Tax Rates to the Retail Price of Cigarettes in 1994**

Brand Name	Tax Rate (%)
Filtered	
Samsun 85 mm	33.4
Tekel 2000 100 mm	45.4
Maltepe 100 mm	33.4
Maltepe 85 mm	41.1
Bafra 85 mm(Filtreli)	46.1
Unfiltered	
Birinci 68 mm	91.3
Birinci 85 mm	50.6
Bafra 68 mm	61.3
Foreign	
Marlboro 100 mm	44.2

Source: Tekel

**Table A2 - Test for Endogeneity of Price in the Logit Estimation**

	Overall	Income Quintiles				
		Lowest	2	3	4	5
Intercept	-2.4153** (32.330)	1.2658 (1.102)	11.4082*** (39.357)	9.4894*** (26.200)	4.4429** (5.254)	-3.5307*** (8.001)
Log(Price)	-0.0905* (4.570)	-0.3463*** (11.377)	-0.8683*** (67.806)	-0.3578*** (15.299)	-0.0834 (0.886)	0.5535*** (36.745)
Residual	0.0690 (0.621)	0.2575 (2.234)	0.8520*** (17.591)	0.2659 (1.620)	0.0720 (0.078)	-0.6322 (3.523)
Log(Income)	0.1419*** (40.803)	0.0229 (0.126)	-0.2757** (6.781)	-0.4069*** (14.070)	-0.2393* (4.529)	-0.1327* (4.218)
Urban - Developed	0.2617*** (45.46)	0.2159* (4.969)	0.4070*** (20.581)	0.2402*** (8.009)	0.1643 (3.734)	0.1170 (1.604)
Semi-developed	0.2215*** (40.939)	0.2943*** (16.681)	0.4365*** (34.452)	0.1452 (3.633)	0.1246 (2.282)	0.0620 (0.421)
Slum areas	0.2854*** (12.933)	0.5444** (10.880)	0.5097*** (9.135)	0.2236 (1.760)	0.2523 (1.766)	-0.3974 (3.366)
Secondary School	0.0677 (3.351)	0.2136* (3.869)	0.0485 (0.326)	0.0982 (1.540)	-0.0102 (0.018)	0.0891 (1.230)
University	-0.2843*** (23.024)	0.0245 (0.002)	-0.3306 (1.460)	-0.1087 (0.506)	-0.3675*** (10.290)	-0.3184*** (11.477)
Unemployed	-0.3203*** (57.804)	-0.4195*** (26.351)	-0.3392*** (13.481)	-0.1632 (2.754)	-0.1598 (2.175)	-0.3709*** (11.020)
White-collar	-0.1131*** (11.216)	0.0865 (1.011)	-0.0676 (0.777)	-0.2520*** (12.029)	-0.0957 (1.783)	-0.1228 (2.439)
Male	0.8915*** (284.816)	1.3433*** (162.680)	0.7505*** (40.119)	0.6515*** (29.021)	0.5125*** (13.562)	0.2995* (4.024)
Age <=20	0.4268** (6.1882)	0.4912 (3.758)	0.6555 (2.772)	0.0159 (0.001)	1.3259 (3.010)	-0.3602 (0.442)
Age 20-29	0.8140*** (247.931)	0.9071*** (78.247)	0.7075*** (38.968)	0.6261*** (25.740)	0.4605*** (12.374)	0.4864*** (11.957)
Age 30-44	0.6602*** (273.388)	0.7234*** (70.361)	0.5961*** (41.898)	0.3572*** (13.376)	0.3368*** (11.031)	0.4535*** (18.683)
Age 45-59	0.3453*** (69.194)	0.3962*** (17.803)	0.4574*** (23.977)	0.1927* (4.189)	0.1193 (1.436)	0.1715 (2.830)
Adult Size	0.1634*** (271.735)	0.1408*** (24.325)	0.0561 (2.956)	-0.0016 (0.003)	0.0320 (1.090)	0.1251*** (25.634)
Aegean	-0.0110 (0.045)	-0.1935 (2.236)	0.2034 (2.865)	-0.1627 (2.089)	0.1028 (0.791)	0.0467 (0.172)
Mediterranean	-0.2126*** (18.568)	-0.3269** (7.399)	-0.0347 (0.092)	-0.3338*** (9.132)	-0.2863** (7.358)	-0.1196 (1.225)
Black Sea	-0.0883 (3.222)	-0.1080 (0.744)	0.1071 (0.870)	-0.3227*** (8.867)	-0.0511 (0.235)	-0.0224 (0.046)
Central	-0.0943* (3.866)	-0.2784** (6.166)	0.0193 (0.031)	-0.1920 (2.983)	-0.0450 (0.177)	0.0509 (0.235)
Eastern	-0.1760*** (11.556)	-0.4736*** (13.633)	0.1125 (0.844)	-0.2684** (5.261)	-0.1909 (3.122)	-0.0700 (0.372)
Southeastern	-0.1957*** (12.887)	-0.4380*** (14.063)	-0.1033 (0.780)	-0.2807* (4.925)	-0.1045 (0.556)	-0.2341 (2.379)

Source: Author's estimates

**Table A3 - Test for Endogeneity of Price in the Model for Number of Cigarettes Smoked**

	Overall	Income Quintiles				
		Lowest	2	3	4	Highest
Intercept	3.9899*** (19.79)	4.4293*** (6.78)	8.6647*** (9.66)	4.3881*** (4.68)	5.9438*** (6.07)	4.5955*** (7.49)
Log(Price)	-0.3875*** (-22.04)	-0.3451*** (-8.06)	-0.5754*** (-13.13)	-0.4499*** (-11.67)	-0.4080*** (-10.96)	-0.3033*** (-8.11)
Residual	0.2446*** (6.66)	0.1649** (2.38)	0.5298*** (6.57)	0.3775*** (4.44)	0.2770** (2.59)	0.3872*** (2.89)
Log(Income)	0.1502*** (13.60)	0.0911** (2.67)	-0.0387 (-0.74)	0.1631*** (2.94)	0.0487 (0.85)	0.0678* (2.02)
Secondary School	-0.0039 (-0.21)	0.0296 (0.57)	0.0719 (1.75)	-0.0357 (-0.92)	-0.0075 (-0.20)	-0.0341 (-0.86)
University	-0.0693* (-2.19)	0.4783 (1.50)	-0.0735 (-0.48)	-0.0375 (-0.45)	-0.0325 (-0.52)	-0.1238** (-2.45)
Unemployed	-0.0094 (-0.40)	0.0377 (0.80)	-0.0297 (-0.60)	-0.0221 (-0.43)	-0.0374 (-0.67)	0.0224 (0.37)
White-collar	0.0002 (0.01)	-0.0251 (-0.61)	0.0038 (0.11)	-0.0191 (-0.54)	-0.0152 (-0.44)	0.0493 (1.28)
Male	0.3011*** (8.45)	0.3851*** (5.19)	0.2550*** (3.40)	0.2944*** (3.89)	0.2202** (2.63)	0.2528*** (2.81)
Age <=20	-0.0674 (-0.73)	-0.1375 (-1.03)	0.1322 (0.73)	-0.4097 (-1.51)	-0.0271 (-0.11)	0.3707 (1.07)
Age 20-29	0.0846*** (3.06)	0.0948 (1.75)	0.0988 (1.72)	0.0744 (1.20)	0.0538 (0.81)	-0.0169 (-0.23)
Age 30-44	0.0888*** (3.94)	0.0967* (2.01)	0.1031* (2.14)	0.1085* (2.09)	0.0117 (0.22)	0.0224 (0.39)
Age 45-59	0.0740*** (3.13)	0.1073* (1.97)	0.1041* (2.03)	0.1483*** (2.87)	0.0489 (0.91)	-0.0417 (-0.73)
Adult Size	0.0548*** (11.38)	0.0105 (0.72)	-0.0013 (-0.09)	0.0504*** (3.31)	0.0334* (2.24)	0.0625*** (5.48)
Aegean	0.0361 (1.36)	0.0649 (0.96)	0.0823 (1.37)	0.0113 (0.20)	0.0425 (0.75)	0.0313 (0.54)
Mediterranean	-0.0068 (-0.27)	-0.0037 (-0.06)	0.0075 (0.13)	0.0226 (0.41)	-0.0182 (-0.33)	-0.0138 (-0.24)
Black Sea	-0.0275 (-1.10)	-0.0856 (-1.35)	0.0509 (0.87)	0.0010 (0.02)	-0.0327 (-0.62)	-0.0428 (-0.81)
Central	-0.0936*** (-3.83)	-0.0250 (-0.44)	-0.0869 (-1.57)	-0.0473 (-0.88)	-0.0688 (-1.30)	-0.2000*** (-3.72)
Eastern	-0.1112*** (-4.22)	-0.1214 (-1.79)	-0.1233* (-2.03)	-0.0485 (-0.85)	-0.1001 (-1.85)	-0.1719*** (-2.95)
Southeastern	-0.3446*** (-12.33)	-0.3512*** (-5.93)	-0.2963*** (-5.08)	-0.2951*** (-4.77)	-0.3907*** (-5.89)	-0.3470*** (-4.36)

Source: Author's estimates





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