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ORIGINAL RESEARCH

Determinants of Cigarette Consumption in Turkey: An ARDL Bounds Testing Approach

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Main Points

- As a significant tobacco producer, cigarette consumption in Turkey has increased dramatically similar to the rest of the world.
- Real GDP per capita, urbanization, and tobacco controls positively affect the cigarette consumption while the cigarette prices and level of education negatively effect smoking.
- Controlling the cigarette prices and educating people about the hazardous effects of smoking are important policies for reducing cigarette consumption.
- The tobacco control policies have a short history in Turkey and, as such, the positive effects of these policies in eliminating cigarette consumption may have not yet come through.

Abstract

The purpose of this study is to examine the determinants of cigarette consumption during 1960-2016 in Turkey by employing the Autoregressive Distributed Lag (ARDL) bounds testing approach. The variables of real Gross Domestic Product (GDP) per capita, real price of cigarettes, tertiary school enrollment (gross %), urban population (% of total), and tobacco control were adapted as the independent variables. The estimation results reveal that real GDP per capita, urbanization, and tobacco controls positively affect the cigarette consumption while the cigarette prices and level of education negatively affect smoking. Urbanization is the most impactful variable on cigarette consumption, followed respectively by tertiary school enrollment, real GDP per capita, real price of cigarettes, and tobacco control. The estimation results also suggest that controlling the cigarette prices and educating people about the hazardous effects of smoking are important policies for reducing cigarette consumption. The tobacco control policies have not yet had a reducing effect on the cigarette consumption.
Keywords: Cigarette consumption, ARDL bounds testing approach, Turkey, error correction term, tobacco controls

Introduction

Cigarette consumption is one of the most harmful and highly prevalent addictions across the world. Many people suffer from smoking-based diseases and ultimately die due to cigarette consumption. Smoking affects both regular smokers and non-smokers. Exposure of a non-smoker to cigarette smoke is called passive smoking, which leads to similar diseases that affect regular smokers. According to the World Health Organization's (WHO) data on the prevalence of tobacco smoking, 19.9% of the world's population smokes of which, 33.7% are males and 6.2% are females (WHO, 2016). Meanwhile, smoking killed more than 7.1 million people worldwide in 2016 (WHO, 2016). This data means around 0.01% of the world's total population has died due to smoking.

Cigarette consumption causes problems from several aspects, one being economic. The high levels of cigarette consumption increase countries' health expenditures , thereby causing budget imbalances, particularly in social states. Moreover, when a country's health sector highly depends on imports, cigarette consumption also jeopardizes that country's balance of payments.

As a significant tobacco producer, cigarette consumption in Turkey has increased dramatically similar to the rest of the world. According to the

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Turkish Ministry of Health (2017), between 2012 and 2016 the percentage of people who smoked regularly went up from 35.9% to 40.1% (males) and from 10.8% to 13.3% (females). The overall percentage of the smoking population went up from 23.2% to 26.5%. Furthermore, when the cigarette consumption per person over 15 years of age was investigated worldwide, Turkey ranked third in the world (Turkish Ministry of Health, 2016).

These statistics clearly demonstrate that determining the background dynamics of cigarette consumption in Turkey is an important issue. The aim of the study is to annually analyze the determinants of cigarette consumption per adult over 15 years of age in Turkey for 1960 – 2016. The variables of the real GDP per capita, real price of cigarettes, tertiary school enrollment (gross %), urban population (% of total), and tobacco control have been adapted to the model as independent variables in order to examine the determinants of cigarette consumption per adult over 15 years of age. To the best of my knowledge, no study apart from Yürekli et al. (2010), whose data ends in 2006, has been found to have taken into account the increased effects of tobacco control in Turkey on cigarette consumption. In terms of the study's contribution to the existing literature, it reinvestigates the effects of tobacco controls in Turkey over an expanded period of time.

The remainder of the study is organized as follows. The next section will review the related literature, after which the econometric model and method will be introduced, and the obtained results will be explained. Finally, the study will conclude with the discussion section.

Literature Review

Various studies have been found that address cigarette consumption from different perspectives. In this study, a review of the previous literature will only take into account the studies that have measured or investigated the determinants of cigarette consumption.

Townsend, Roderick, and Cooper (1994) investigated the effects of cigarette price and income on the cigarette consumption and found the price to be a significant factor in smoking for women of all age groups and for men only in the 25-34 years age group. The cigarette consumption also increases with increases in income for men in the 16-34 age group.

Strebel et al. (1989) investigated the determinants of cigarette consumption among the native people in Cape Town. Those results illustrated how the young boys are more inclined to smoke than the young girls and the urban people smoke more cigarettes than the rural people. These results imply that the gender factor among the youths and those living in the urban or rural areas are the significant determinants with respect to the cigarette consumption in Cape Town.

Another empirical study (Tansel, 1993) revealed that the people with tertiary levels of education have more knowledge about the harms of smoking, and therefore, quit smoking easily than less educated people.[1]

Chaloupka and Wechsler (1997) examined the impact of prices and tobacco controls on the cigarette consumption among the young adults in the USA in 1993 using the methods of probit analysis and least squares. In conclusion, the cigarette prices were found to have a significant negative effect on smoking. It is observed that an increase in the cigarette prices was observed to reduce smoking due to an increase in the taxes. The price elasticity was calculated as 0.906 and 1.309 for the full and restricted samples, respectively. In addition, the prices appeared to have a greater impact than the restriction policies.

Saffer and Chaloupka (2000) investigated the association between tobacco advertising bans and consumption using the panel data analysis for 22 Organization for Economic Co-operation and Development (OECD) countries between 1970 and 1992. Their findings suggested that advertising increases tobacco consumption and only comprehensive advertising bans had been able to reduce smoking.

The effect of educational level on cigarette consumption was analyzed by Giskes et al. (2005), who found that the tertiary-educated men and women consume less cigarettes compared to the less-educated men and women.

Dikmen (2005) analyzed the determinants of cigarette consumption in Turkey for the period 1980-2003 using the time-series analysis. His findings indicated the existence of a significant negative relationship between urbanization and cigarette consumption. The GDP level and the population over 15 years of age are the factors that enhanced the cigarette consumption.

The impact of bans on tobacco advertising over cigarette consumption in developing countries was tested by Blecher (2008) using the panel data analysis for the period 1995-2007. Those findings demonstrated both the limited and comprehensive tobacco control bans to be effective at reducing the tobacco consumption. Additionally, the effects of advertising bans are more powerful in developing countries than the developed ones.

Temiz (2010) also investigated the determinants of smoking in Turkey for the period 1980-2008. The results from the least squares estimation method suggested the existence of negative relationships between cigarette consumption and unemployed population, and cigarette prices and cigarette consumption. Urbanization plays a substantial role in reducing the tobacco consumption.

Yürekli et al. (2010) tested the impacts of cigarette prices, tobacco controls, and income on the cigarette consumption. Their results indicated that prices, tobacco controls and income have positively affect on cigarette consumption. The authors explained that the unexpected effects of tobacco controls on cigarette consumption are due to the weak implementation of the tobacco controls and other external factors such as the rising concern of multinational corporations in the Turkish tobacco industry.

Arslanhan et al. (2012) examined the costs and benefits of different-sized tobacco elimination policies for Turkey. They adapted a projection method for the period 2012-2050. The results showed that all policies had positive effects at various rates on reduc-

[1] According to Tansel (1993) education has two different adverse effects on smoking. First, higher education means higher income and higher income positively affects smoking. However, higher levels of education make people better informed about the effects of smoking on health. This result causes a decrease in cigarette consumption. According to the author, the second effect is more powerful than the first one at the tertiary educational level.

ing the expected number of tobacco-related diseases and deaths. However, a class-based 20-year intervention was found to be the most effective. Another descriptive study (Bilir et al., 2009) also confirmed the decline of tobacco consumption post tobacco control laws in Turkey.

Kilic and Ozturk (2014) examined the relationship between the cigarette consumption and gender. They used the Global Adult Tobacco Survey from the Turkish Statistical Institute (TurkSTAT) and the negative binominal and zero-inflated binominal models for estimations. Their results revealed a positive association between the educational level and smoking intensity for women and men, which was significant for women but not for men. For both genders, the presence of other smokers in the household had positive impacts on cigarette consumption. The cigarette prices inversely affected consumption for both genders. Finally, the perception of health risks for smoking negatively affects male's smoking levels, while this relation is insignificant for the females.

Cergibozan (2018) tested cigarettes and alcohol consumption for Turkey using the rational addiction model. According to the results, while the price elasticity for demand is significantly negative for both cigarettes and alcohol, the demand for alcohol is more elastic. The recommended optimal policy is to increase the price of cigarettes rather than alcohol due to the difference in demand elasticity for these substances.

Methods

Data and Model

The aim of this section is to demonstrate the short- and long-term relationship of cigarette consumption per adult over 15 years of age (Q) with real GDP per capita (2010 constant US $), real prices of cigarettes (P_C), tertiary school enrollment (gross %), urban population (% of total), and tobacco control (T) in Turkey between 1960 and 2016. The Q and P_C values were obtained from Tansel (1993), the TurkSTAT, WHO, and Yürekli et al. (2010). Y, E, and U values were obtained from the World Bank's world development indicators (WDI). Pre-1991 tobacco control was implemented too weakly without any legislation in Turkey. In 1991, the cigarette warning labels expressing "smoking is harmful to health" were required and tobacco control legislation finally was enforced in 1996. Thus, T is calculated to be 0 prior to 1991 (zero control), 0.25 (limited control) between 1991 and 1996, and 1 (comprehensive control) after 1996 (For more detail, see Table 1).[2]

The test procedure is composed of two steps. First, the long-term relationships among the variables are tested using the ARDL bounds testing approach of cointegration. Second, the causal relationships among the variables are tested using error-correction-based causality models.

The ARDL bounds testing approach of cointegration, developed by Pesaran and Shin (1999) and Pesaran, Shin, and Smith (2001), tests whether a long-term relationship exists among the variables of a model, regardless of having equal order of integration (trend- or first difference), contrary to the other cointegration methods like Engle and Granger (1987), Johansen (1988, 1995), and Johansen and Juselius (1990). At the same time, this method provides consistent results even if the samples are small (Baek & Kim, 2013; Panopoulou & Pittis, 2004) and allows variables with different optimal lags (Ozturk & Acaravci, 2013). In addition, this method simultaneously estimates the long- and short-term parameters of the model in question.

The bounds tests are based on standard F and t statistics. The asymptotic distributions for these statistics are non-standard under the null hypothesis that no level of relationships exist irrespective of whether the variables are $I(0)$ or $I(1)$. Two sets of asymptotic critical values are provided that vary according to whether all variables are $I(1)$ or $I(0)$. These two sets of obtained critical values provide a band covering all possible classifications of the variables into $I(0)$, $I(1)$, or mutually co-integrated (Pesaran, Shin, & Smith, 2001). The model that has been tested using the ARDL procedure is as follows:

$$\Delta Q_t = \alpha_0 + \sum_{i=1}^{r} \alpha_{1i}\, \Delta Q_{t-i} + \sum_{i=0}^{r} \alpha_{2i}\, \Delta Y_{t-i} + \sum_{i=0}^{r} \alpha_{3i}\, \Delta P_{C_{t-i}} + \sum_{i=0}^{r} \alpha_{4i}\, \Delta E_{t-i} + \sum_{i=0}^{p} \alpha_{5i}\, \Delta U_{t-i} + \sum_{i=0}^{p} \alpha_{6i}\, \Delta T_{t-i} + \lambda_1 Q_{t-1} + \lambda_2 Y_{t-1} + \lambda_3 P_{C_{t-1}} + \lambda_4 E_{t-1} + \lambda_5 U_{t-1} + \lambda_6 T_{t-1} + \varepsilon \quad (1)$$

where the expressions from λ_1 to λ_6 represent the long-term relationships among the variables, while the expressions from α_1 to α_6 after the summation signs represent the short-term dynamics of the variables. In addition, α_0, Δ, and ε represent a constant, the first difference operator, and the Gaussian white-noise term, respectively.

Overall test results for the short- and long-term dynamics using the ARDL bounds testing have been derived from several steps. In the first step, Equation 1 has been estimated using the ordinary least square (OLS) method with an appropriate lag-selection criterion such as Akaike information criterion and Schwarz information criterion. The F-test has been performed to test the presence

Table 1.
Descriptive Statistics for the Data

Variable	Notation	Source
Cigarette Consumption per adult over 15 years	Q	Tansel (1993) - TurkSTAT - WHO - Yürekli et al. (2010)
Real GDP per capita (2010 constant US $)	Y	World Bank WDI
Real Price of Cigarettes	P_C	Tansel (1993) - TurkSTAT - WHO - Yürekli et al. (2010)
School enrollment, tertiary (gross %)	E	World Bank WDI
Urban population (% of total)	U	World Bank WDI
Tobacco Control	T	Author's calculation

[2] Before 1991 there was not any tobacco control in Turkey. In 1991, health warning labels were required on cigarette packs and after 1996 a comprehensive tobacco control regulation accepted and all cigarette advertisements banned and smoking restricted in public places. In the light of these explanations above the tobacco control variable (T) were calculated as 0 (before 1991), 0,25 (between 1991-1996) and 1 (after 1996) respectively.

of a long-term relationship among the variables. The null hypothesis for no cointegration ($H_0: \lambda_0 = \lambda_1 = \lambda_2 = \lambda_3 = \lambda_4 = \lambda_5 = \lambda_6 = 0$) has been tested against the alternative of cointegration ($H_1: \lambda_0 \neq \lambda_1 \neq \lambda_2 \neq \lambda_3 \neq \lambda_4 \neq \lambda_5 \neq \lambda_6 \neq 0$). The calculated *F*-statistics value is then compared to the upper and lower critical values, as given by Pesaran, Shin, and Smith (2001). If the calculated F-value is greater than the upper critical value, the null hypothesis for no cointegration is rejected irrespective of whether the variables are *I*(0) or *I*(1).

The second step estimates a general error-correction model (ECM) for when the presence of a long-term relationship among the variables has been determined. Equation 1 for the ECM estimation can be rewritten as follows:

$$\Delta Q_t = \beta_0 + \sum_{i=1}^{p} \delta_i \Delta Q_{t-i} + \sum_{i=0}^{q} \phi_i \Delta Y_{t-i} + \sum_{i=0}^{r} \phi_i \Delta P_{C_{t-i}} + \sum_{i=0}^{s} \phi_i \Delta E_{t-i} + \sum_{i=0}^{t} \phi_i \Delta U_{t-i} + \sum_{i=0}^{l} \phi_i \Delta T_{t-i} + \propto ECT_{t-1} + u_t \quad (2)$$

$$ECT_t = Q_1 - \propto_1 Y_t - \propto_2 P_{ct} - \propto_3 E_t - \propto_4 U_t - \propto_5 T_t \quad (3)$$

where is the first difference operator and u_t shows the residual terms that are assumed to be identically, independently, and normally distributed; α stands for the speed of the adjustment parameter and ECT is the error-correction term (see Equation 3). A lagged error-correction term ECT_{t-1} that is statistically and negatively significant validates the long-term relationship among the variables and their coefficients, and indicates the deviations from the long-term equilibrium in the dependent variable to have been eliminated or corrected for each period (Yusoff, 2010). The presence of cointegration derived from Equation 2 does not necessarily imply that the estimated coefficients are stable. Therefore, the cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ) tests based on the recursive regression residuals may be employed to that end.

Results

In the cointegration tests, the first step is to check if the variables are stationary or not. The Augmented Dickey-Fuller unit root test (ADF; Dickey & Fuller, 1979) and the Phillips-Perron unit root test (PP; Phillips & Perron, 1988) have been used for this purpose. Table 2 demonstrates the unit root test results. Both ADF and PP unit root test results show all the variables to be stationary in their first differences at a significance of 1%, and the real price of cigarettes to also be stationary at the significance level of 5%. The ARDL method can be used regardless of whether the series of variables are stationary at that level or in the first variation. These results require to use the ARDL approach.

The lag length is critically important in the ARDL cointegration methodology. Therefore, Schwarz information criteria have been used to determine the optimal lag lengths for each variable. These results indicate Lag 3 to be appropriate for the cigarette consumption per person over 15 years of age, while Lag 4 fits for real GDP per capita, real price of cigarettes, school enrollment tertiary (gross %), and urban population (% of total).

Table 3 indicates the bounds test results. According to the results, *F*-statistics for exceed the critical values of both 1% and 5%. This result means that a long-term relationship exists for the period 1960-2016 regarding the cigarette consumption per person over 15 years of age with the real GDP per capita, real price of cigarettes, tertiary school enrollment (gross %), urban population (% of total), and tobacco control at the significance level of 1% in Turkey.

After setting the ARDL cointegration test results, the short- and long-term relationships will be examined among the variables, which are reported in Table 4. According to the estimation results, *ECT* is calculated as 20.4%. This result implies that the cigarette consumption per adult over 15 years of age converges to a long-term equilibrium status of 20.4% for each term, if exposed to a shock. Eventually, the cigarette consumption per adult over 15 years of age re-equilibrates in approximately five years. If we analyze the long-term coefficients, all the coefficients are explicitly seen to be statistically significant. According to the estimation results, the urban population (% of total) is the most powerful determinant of the cigarette consumption. The tertiary

Table 2.
Unit Root Test Results

	ADF Unit root test		PP Unit root test	
Variable	***t*-statistic (Level)**	***t*-statistic (First Difference)**	***t*-statistic (Level)**	***t*-statistic (First Difference)**
lnQ	-0.937	-7.910***	-0.937	-7.907***
lnY	-3.169	-8.966***	-3.169	-9.010***
lnP_C	-4.009**	-	-4.011**	-
lnE	-3.003	-4.082***	-1.589	-4.235***
lnU	-0.922	-4.462***	-0.297	-4.557***

Note: ***, **, and * denote significances at the level of 1%, 5%, and 10%, respectively.

Table 3.
Bounds Test Results

			Critical values 1%		Critical values 5%	
	Optimal lag length	***F*-statistics**	***I*(0)**	***I*(1)**	***I*(0)**	***I*(1)**
$F_{(Q \mid Y, P_C, E, U)}$	(3, 4, 4, 4, 4)	6.48	3.29	4.37	2.56	3.49

Note: The critical values for the lower *I*(0) and upper *I*(1) bounds are taken from Pesaran, Shin & Smith (2001).

Table 4.
Short and Long-Term Analysis

Variable	Short-term coefficient	t-statistic
ΔQ_{t-1}	0.118	0.654
ΔQ_{t-2}	0.329	1.759*
ΔY_{t}	0.309	1.666
ΔY_{t-1}	0.195	1.033
ΔY_{t-2}	-0.046	-0.958
ΔY_{t-3}	0.075	1.338
ΔPC_{t}	0.073	1.321
ΔPC_{t-1}	0.011	0.222
ΔPC_{t-2}	-3.298	-0.979
ΔPC_{t-3}	-13.170	-2.317**
ΔE_{t}	-0.295	-2.332**
ΔE_{t-1}	-0.313	-1.763*
ΔE_{t-2}	0.422	2.032**
ΔE_{t-3}	-0.119	-0.733
ΔU_{t}	10.114	1.721*
ΔU_{t-1}	-4.462	-1.350
ΔU_{t-2}	-0.252	-1.938*
ΔU_{t-3}	-0.514	-4.147***
Constant	0.511	3.270***
ECT_{t-1}	-0.204	-5.509***
Diagnostic tests		P value
χ^2*(Serial correlation)*	0.15	
χ^2 *(Heteroskedasticity)*	0.37	
χ^2 *(Normality)*	0.54	
χ^2 *(Functional form)*	0.20	
CUSUM	Stable	
CUSUMSQ	Stable	
	Long-term coefficient	*t*-statistic
Y	0.263	2.121**
PC	-0.225	3.918***
E	-0.640	-10.507***
U	3.674	15.635***
T	0.172	5.660***

Note: ***, ** and * denote significance at the 1%, 5%, and 10% levels, respectively.

school enrollment, real GDP per capita, real price of cigarettes, and tobacco control follow urbanization respectively.

The impact of real GDP per capita on cigarette consumption is positive and statistically significant at the level of 5%. A 1% increase in the real GDP per capita raises cigarette consumption by 0.263%, ceteris paribus. This implies that the level of income is a determinant of the cigarette consumption. Based on this result, an increase in the personal income also increases the cigarette consumption. This finding is also similar with previous studies (Adioetomo & Djutaharta, 2005; Laugesen & Meads, 1991; Perelman et al., 2017).

The effect of cigarette prices on the cigarette consumption is negative and statistically significant at the level of 1%. When all the other variables are held constant; a 1% increase in the cigarette prices reduces the cigarette consumption by 0.225%. According to the law of demand, an increase in the price of a good reduces its demand. Therefore, this result is also consistent with the law of demand. Similar results also can be found in the literature. According to Gallus et al. (2006), for example, a 10% increase in the real price of cigarettes decreases consumption by 5-7%. Another study has indicated an increase in the cigarette prices to decrease cigarette consumption by different levels at different time periods (Becker, Grossman, & Murphy, 1990).

The effect of tertiary school enrollment on the cigarette consumption is also negative and statistically significant at the level of 1%. A 1% increase in the tertiary school enrollment decreases the cigarette consumption by 0.640%, ceteris paribus. Although no common view has been found about the effect of the educational level on cigarette consumption, a highly educated person can be thought to be more conscious about the hazardous effects of smoking on health. Some empirical studies support this statement. For example, Becker et al. (1990) found some evidence that a lower level of education is associated with greater cigarette consumption. Giskes et al. (2005) argued that the higher-educated communities quit smoking easier than the lower-educated groups. Another empirical study has revealed that those with tertiary levels of education have more knowledge about the harms of smoking, and therefore, give up smoking more easily than the less-educated persons (Tansel, 1993).

The effect of urbanization on cigarette consumption is positive and statistically significant at the level of 1%. According to the long-term results, when urbanization increases by 1%, then the cigarette consumption also grows by 3.674%. This result shows that urbanization affects the cigarette consumption more than by itself. Several studies in the literature also support this result (Kilic & Ozturk, 2014, Strebel, Kuhn, & Yach, 1989).

Tobacco control is a practical policy for decreasing or eliminating the tobacco consumption. The tobacco controls range from limited to comprehensive controls across countries. The first legislative implementations on the tobacco controls in Turkey were started in 1996 with the tobacco controls legislation (Çobaner, 2013). After 1996, Turkey signed WHO's "Framework Convention on Tobacco Control" (FCTC) in 2004 and has sped up its efforts regarding tobacco controls. After signing the FCTC agreement, Turkey put into effect comprehensive tobacco control policies in 2009 and became a smoke-free country (Yürekli et al., 2010). According to the long-term results, the impact of tobacco controls on cigarette consumption is positive and statistically significant at the level of 1%. If all other variables remain stable, a 1% raise in tobacco controls boosts the cigarette consumption by 0.172%. This result also matches those from the study by Yürekli et al. (2010). This result indicates that contrary to expectations, the tobacco consumption has also increased despite the increase in tobacco controls. This adverse result can be explained by the weak implementations and weak inspections of the tobacco control law. Moreover, comprehensive tobacco controls have a short history in Turkey. Therefore, we will be able to feel the effects of tobacco controls more deeply in the years to come.

Discussion

Because of the highly damaging effects of smoking on human health, many studies have investigated the factors affecting cigarette consumption. Understanding the roots of smoking and producing policies to eliminate these roots is the vital mission of the policy makers. Therefore, these studies carry an enormous importance for shedding light for the policy makers.

This study has analyzed the determinants of the cigarette consumption of adults over 15 years of age in Turkey over the period 1960-2016. According to the empirical results, while the real GDP per capita, urbanization, and tobacco control affect the cigarette consumption positively, the cigarette prices and educational level affect smoking negatively.

An increase in the real GDP per capita leads to an increase in personal consumption. If people become wealthier, they smoke more than before even if they have the knowledge about the effects of smoking on health. This result is also connected to urbanization. In general, the opinion is that as compared to living in rural areas, living in urban areas brings several social, psychological, and economic problems such as the struggle to make a living, crowd, traffic jam, pollution, and so on. These problems make urban people less protected against stress than the rural people; so, the urban people smoke more to deal with stress. The most important and obvious motivations for choosing to live in the urban areas rather than the rural areas are the high probability of finding work, having a better education, getting better medical services, and the like. If policy makers abolish these motivations and eliminate the differences between the rural and urban areas through a set of regional development policies, cigarette consumption may also decrease. According to the results, another practical policy tool is controlling the cigarette prices. To do so, governments can increase cigarette prices directly or indirectly via taxes, and cigarette consumption may decrease as a result. Another finding from the estimation results is the negative relation between tertiary school enrollment and cigarette consumption. In other words, level of awareness about the effects of the cigarette consumption increases with educational level. This result implies that the education level is an important factor in eliminating cigarette consumption. An education policy that is uninterrupted, comprehensive, and accessible to a large section of society may also play a substantial role in eliminating cigarette consumption. Tobacco control legislation is another policy tool for the governments' handling of the cigarette consumption and varies from limited to comprehensive implementations. Turkey put into action comprehensive tobacco controls in 1996; however, the estimation results have shown increases in the level of tobacco controls to also lead unexpectedly to increases in cigarette consumption. This adverse result can be explained by weak implementations and weak inspections from the tobacco control law. Moreover, comprehensive tobacco controls have a short history in Turkey. A tobacco policy with strong implementation and inspection can play a critical role in eliminating tobacco consumption in Turkey.

As mentioned above, the tobacco control policies have a short history in Turkey and, as such, the positive effects of these policies in eliminating cigarette consumption may have not yet come through. This situation limits this study's ability to obtain better empirical results. On the other hand, it also creates a research area for future studies and makes re-investigating the relation between the cigarette consumption and tobacco control policies valuable.

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