

The impact of tobacco expenditures on spending within Turkish households

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ABSTRACT

Purpose The aim of this study is to determine whether tobacco spending has a 'crowding out' effect on food and utility spending within Turkish households. It also examines whether tobacco control policies have caused the spending patterns of smoking households to become similar to those of non-smoking households.

Methods Using 2007 and 2011 Turkish Household Budget Surveys, we estimated the Quadratic Conditional Engel Curve (QCEC) to determine household spending patterns. The QCEC was estimated using the Three-Stage Least Square (3SLS) method with instrumental variables.

Results In Turkey, smoking households spend nearly 8% of their monthly budgets on smoking, while the expenditures of non-smoking households on food, utilities and housing average 9% more than those of smoking households. For both years studied, a crowding out effect was demonstrated whereby smoking expenditure results in decreased household expenditure on food, housing, durable/non-durable goods and education.

Conclusions In Turkey, households including at least one smoker spend nearly 8% of their monthly budget on tobacco, with a converse reduction in spending on food and utilities. While tobacco control policies (eg, increasing taxes on tobacco products and extending smoking bans) have decreased tobacco consumption, these policies have had limited impact on the spending patterns of smoking households.

INTRODUCTION

Since the 1980s, the process of economic liberalisation has affected the tobacco market in Turkey, as well as markets for most other products. While cigarettes have been freely imported since 1984, private firms have been allowed to produce cigarettes in Turkey since 1986, provided they were in partnership with the state tobacco monopoly TEKEL¹. In 1992, the first private tobacco manufacturing plant was established as a domestic-foreign joint venture.¹ Average tobacco consumption in Turkey increased from 1258 g per capita in 1985, to 2329 g per capita in 1995.²

In 1996, in response to an increase in tobacco consumption, the Turkish government enacted the Prevention of Hazards of Tobacco Products (Number 4207), which banned smoking in certain indoor areas (eg, public transportation) and banned all forms of tobacco advertising or promotion. Following implementation of this law, tobacco

consumption trended slightly downwards from 2365 g per capita in 1996, to 2044 g per capita in 2008.²

In 2008, Turkey implemented more severe restrictions on tobacco use in public settings. Smoking was prohibited in all public buildings as well as in hospitals and places for social/cultural activities (eg, restaurants, cafes and gyms). In addition, total taxes on cigarettes rose from 39% of retail price in 1994 to nearly 79% of retail price in 2009.³ The extension of the smoking ban and an increase in cigarette price were associated with a further 15% reduction in tobacco consumption from 2008 to 2010 (to 1700 g per capita in 2010).²

While the last two decades have seen a number of developments in Turkey's tobacco control policies, the effect of these on tobacco and other household expenditures has not been analysed. The first aim of this study was to examine if there is a difference in spending patterns between smoking and non-smoking households arising from the crowding out effect of tobacco expenditure in the former. A secondary aim was to determine whether tobacco control policies (eg, smoking bans and increasing tobacco taxes and prices) have been associated with a change in household spending patterns and the magnitude of the crowding out effect. Such evidence is useful in evaluating the economic consequences of tobacco control policies. Moreover, Turkey is one of the few countriesⁱⁱ to adopt comprehensive measures to decrease smoking.⁴ Evidence on the economic consequences of these policies may be useful for other countries considering similar policies.

Tobacco expenditures have two different effects on household budgets. The first is called the 'crowding out' effect, where tobacco expenditures directly reduce the share of other goods (eg, food, education, utilities and housing) in household budgets. This decrease strongly affects household members who do not consume tobacco products. Therefore, tobacco consumption will lead to deviations in household budgets in favour of the household members who consume tobacco products.⁵

Increases in health spending are regarded as the second (indirect) effect of tobacco expenditures on household budgets. It is recognised that tobacco use is not the only influence on health spending. Other variables such as age, income, gender,

ⁱTEKEL is the name of the public company that had been operating as a monopoly in the tobacco and alcohol markets up to the 2000s.

ⁱⁱIn 2013, according to the tobacco control scale report that is conducted by the Association of European Cancer Leagues, Turkey ranked fifth in fighting against smoking, among 34 European countries.

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Table 1 Summary statistics for averages and budget shares of tobacco expenditure

	2007			2011		
	Mean expenditure (Turkish Lira/month)	Budget share of tobacco expenditure (%)	Sample size	Mean expenditure (Turkish Lira/month)	Mean budget share of tobacco expenditure (%)	Sample size
All incomes	91.10	8.09	5004	106.26	8.17	5388
Low income (first 25th centile)	66.30	10.33	1056	80.14	10.70	1128
Middle income (between 25th and 75th centiles)	87.49	8.15	2594	103.74	8.19	2781
High income (last 25th centile)	117.35	6.22	1354	130.92	6.21	1479

US\$1=2.75 Turkish Lira.

education or insurance also affect health spending. However, smoking causes diseases and lowers the resistance of the body's immune system to fight other diseases, increasing health expenditures. Moreover, smoking not only has a negative effect on personal health, but also causes a negative externality on household budgets (by reducing the income of smoking households due to smoking-related illness) and on society (through increased cancer risk, higher health expenditures, and productivity loss due to smoking-related diseases and deaths).⁶

There are many studies in the literature that analyse the determinants of tobacco consumption,^{7–8} the price elasticity of tobacco demand, the effect of taxes on tobacco consumption^{9–13} and smoking bans in workplaces.^{14–15} In recent years, there have been many studies examining the crowding out effect of tobacco consumption. Efrogmson *et al*,¹⁶ using data from Bangladesh, showed that tobacco consumption caused a decrease in living standards, especially among the poor. Other studies^{17–22} found that expenditures on tobacco had a crowding out effect on expenditures for education, household, health and insurance.

Studies on tobacco consumption and tobacco control policies in Turkey can be grouped under two main headings. Some studies^{23–26} analysed the effect of smoking and tobacco control policies on health, the others have focused on the economic effects of smoking. Smoking-related diseases were the third leading cause of death, according to the National Burden of Disease Report.²⁷ Cardiovascular ailments, chronic obstructive pulmonary diseases and lung cancer were the main diseases caused by smoking.

The number of economic studies on tobacco expenditures and tobacco control policies is very limited in Turkey. The main conclusion of studies^{28–30} on tobacco demand is that males, the less educated and younger consumers are more likely to smoke. A negative relationship between price (also tobacco tax) and tobacco demand is found in studies^{31–32} on tobacco price elasticity.

This study focuses on the direct (crowding out) effect of smoking expenditure on household budgets using the Turkish Household Budget Surveys³³ conducted by the Turkish Statistical Institute (TSI). Although likely, the indirect effect of tobacco spending on health expenditures could not be analysed in this paper. First, there were no subcategories of health spending in these surveys, making it impossible to assess whether expenditures on health were related to smoking or not. Second, an important part of health expenditures is derived from gross income in Turkey. Thus, the share of health expenditures in total expenditures derived from net income is very low.ⁱⁱⁱ

ⁱⁱⁱA significant portion of health expenditures and insurance premiums are taken by the government before the net salary or wages paid. In Turkey, the out-of-pocket share in total health expenditures is very low.

DATA AND THE STATISTICAL RESULTS

Data from the 2007 and 2011 cross sectional Turkish Household Budget Survey were used to assess the impact of the 2008 smoking ban, and 2009 increases in cigarette taxes and prices, on the spending patterns of smoking households. The presence of the crowding out effect was also investigated. If a crowding out effect was detected, changes in the magnitude of the crowding out effect following these tobacco control policies were also analysed.

Surveys included information about consumption for over 150 goods (in four digits) from 8543 households in 2007, and 9918 households in 2011. These data consisted of each household's monthly expenditure information. Expenditures were separated into 11 subgroups (tobacco; food; housing; utilities; transportation; entertainment; durable and nondurable goods; clothing; health; education; alcohol) for the analysis.^{iv}

A dummy variable was created for tobacco expenditure in order to make a comparative analysis between the expenditures of smoking and non-smoking households. This variable took a value of '1' if any household had a positive amount of tobacco expenditure; otherwise, the variable had a value of '0'. In 2007, 5004 households (58% of the sample) indicated tobacco spending while 5388 households (54% of the sample) indicated tobacco spending in 2011. As shown in [table 1](#), the average tobacco spending of smoking households was 91 Turkish Lira (TL)/month and 106 TL/month in 2007 and 2011, respectively. In other words, the average share of tobacco expenditure in the smoking household budget was 8.09% in 2007 and 8.17% in 2011.

[Table 2](#) provides the monthly average share of spending on goods in each category for non-smoking and smoking households. [Table 2](#) also presents results of student's t test for the differences in average expenditures between non-smoking and smoking households.

There are positive and significant differences in the budget shares for food, housing, utilities, durable and non-durable goods, health and education, in favour of non-smoking households in both years. The average budget shares for transportation, entertainment and alcohol are higher among smoking households than non-smoking households. There is no significant difference in the budget share for clothing in each year.

The data presented in [table 2](#) suggest that tobacco expenditure may have an effect on the budget shares for many goods. In other words, smoking households spend less for other goods

^{iv}In the household budget surveys, eleven major commodity groups have been identified by the TSI. Commodity groups used in this paper are based on this definition.

Table 2 Average shares of commodities and t statistics of the differences between non-smoking and smoking households

Commodities	2007				2011			
	\bar{X}_n^*	\bar{X}_s^\dagger	$\bar{X}_n - \bar{X}_s$	t—stat‡	\bar{X}_n	\bar{X}_s	$\bar{X}_n - \bar{X}_s$	t—stat
Food	0.3194	0.2749	0.0445	15.01§	0.2786	0.2397	0.0389	14.97§
Cereal	0.0670	0.0619	0.0051	5.23§	0.0554	0.0531	0.0023	2.77§
Meat	0.0498	0.0417	0.0081	6.41§	0.0483	0.0385	0.0098	7.31§
Dairy	0.0447	0.0388	0.0059	8.42§	0.0377	0.0312	0.0065	11.23§
Fruit	0.0331	0.0257	0.0074	15.68§	0.0292	0.0217	0.0075	16.80§
Vegetables	0.0577	0.0478	0.0099	12.36§	0.0468	0.0390	0.0078	11.38§
Beverages	0.0219	0.0210	0.0009	2.69§	0.0190	0.0189	0.0001	0.36
Edible oil	0.0187	0.0155	0.0032	6.69§	0.0157	0.0132	0.0025	5.95§
Housing	0.2355	0.2019	0.0336	12.85§	0.2299	0.1914	0.0385	16.68§
Utilities	0.1498	0.1369	0.0129	6.76§	0.1420	0.1274	0.0146	9.91§
Transportation	0.0853	0.0897	-0.0044	-2.51§	0.1121	0.1228	-0.0107	-3.76§
Entertainment	0.0638	0.0772	-0.0134	-8.63§	0.0802	0.0968	-0.0166	-10.49§
Durable and Nondurable Goods	0.0558	0.0517	0.0041	2.50§	0.0637	0.0553	0.0084	5.85§
Clothing	0.0515	0.0529	-0.0014	-1.01	0.0471	0.0465	0.0006	0.54
Health	0.0201	0.0154	0.0047	4.02§	0.0208	0.0167	0.0041	5.05§
Education	0.0181	0.0166	0.0015	1.26	0.0246	0.0192	0.0054	5.63§
Alcohol	0.0007	0.0028	-0.0021	-7.74§	0.0010	0.0036	-0.0026	-9.37§
Sample size	3539	5004			4530	5388		

*The average shares of goods in non-smoking household monthly budgets.

†The average shares of goods in smoking household monthly budgets.

‡Null hypothesis of the Student t statistics for each goods is $H_0: \bar{X}_n - \bar{X}_s = 0$.

§These statistics are significant at the 5% level.

because of the budget constraint, or spend more on items such as healthcare. Nonetheless, it should be determined whether or not tobacco expenditures affect the spending patterns of households for other goods. If tobacco spending affects other expenditures, it will reflect that smoking and non-smoking households have different spending patterns.

ECONOMETRIC METHODOLOGY AND RESULTS

There are two possible reasons for households to report zero tobacco expenditures: (1) households do not smoke, even if they have adequate income; and (2) households cannot afford tobacco products at the current prices, given their income.³⁴

The first explanation is important, since it implies that there is a difference between the spending patterns of smoking and non-smoking households. Statistically significant differences in the income dedicated to other commodities in the budgets of smoking and non-smoking households might indicate the crowding out effect of smoking.

Because of the lack of price information for all commodities, the Engel curve was estimated for 10 subgroup commodities in order to determine whether or not there was a difference between the spending patterns of smoking and non-smoking households. Since the quadratic form of total expenditures has been used, the Quadratic Almost Ideal Demand System³⁵ (QUAIDS) was used to estimate the Engel curve.

$$w_i = (\alpha_{1i} + \alpha_{2i}d + \alpha_{3i}q + \alpha_{4i}a) + (\beta_{1i} + \beta_{2i}d)(\ln M) + (\delta_{1i} + \delta_{2i}d)(\ln M)^2 \quad (1)$$

In equation (1), w_i stands for the budget shares of i commodity group; d is the dummy variable that takes '1' for smoking households and is otherwise '0'. q is the total spending on tobacco; a is the vector of household characteristics (age of heads of households; education level of heads of households;

Table 3 Wald test* results for the equation (2)

Commodities	2007 χ^2 Statistics	2011 χ^2 Statistics
Food	23.76†	13.38†
Housing	23.81†	34.01†
Utilities	4.83	11.58†
Transportation	16.97†	29.86†
Entertainment	13.03†	27.37†
Durable and non-durable goods	10.67†	17.79†
Clothing	18.50†	15.06†
Health	2.79	5.27
Education	20.99†	14.06†
Alcohol	10.69†	29.71†
Sample size	8543	9918

*A parametric statistical test for the joint significance of parameters.

†These results are significant at the 5% level.

and the logarithm of family size) and M is total expenditures minus tobacco spending.

Earlier studies^{34 36 37} using this method emphasised the potential endogeneity of M and q . If there is a relationship between two endogenous variables, OLS estimators will be inconsistent. After carrying out the Durbin-Wu-Hausmann test for exogeneity, M and q were found to be endogenous. Results for the exogeneity test can be found in an online supplementary table A1. The instrumental variable (IV) method was used in order to obtain consistent and unbiased estimators. While total expenditures were used as an IV for M , the women ratio^v was

^vWomen ratio is the ratio of adult females to the number of family (adult) members.

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Table 4 Results for the quadratic conditional Engel curve in 2007

Independent variables	Food	Housing	Utilities	Transportation	Entertainment	Durable and non-durable	Clothing	Health	Education	Alcohol
Dummy variable for tobacco spending (d)	-0.7589* (0.2703)	-0.8582* (0.2572)	-0.9612* (0.1121)	1.139* (0.1502)	0.3462* (0.1082)	-0.3380* (0.1097)	-0.1688* (0.0836)	-0.0909 (0.0697)	0.1974* (0.0855)	-0.0355 (0.0204)
Total amount of tobacco spending (q)	-0.0015* (0.0004)	-0.0022* (0.0007)	-0.0007* (0.0002)	0.0023* (0.0005)	0.0015* (0.0003)	-0.0009* (0.0003)	-0.0006* (0.0002)	-0.0002 (0.0002)	-0.0002 (0.0002)	0.0003* (0.0001)
Log of total expenditure (lnM)	0.1027* (0.0502)	0.1148* (0.0058)	0.0465 (0.0029)	-0.0197* (0.0039)	0.0084* (0.0028)	-0.0025 (0.0029)	-0.0004 (0.0022)	0.0005 (0.0018)	-0.0219* (0.0022)	0.0006 (0.0005)
Square of (log) total expenditure-(lnM) ²	-0.0157* (0.0036)	-0.0103* (0.0007)	-0.0038* (0.0003)	-0.0053 (0.0004)	-0.0014* (0.0003)	0.0019* (0.0003)	0.0011* (0.0002)	0.0005 (0.0004)	0.0029* (0.0002)	-0.0002 (0.0006)
Interaction term (d × ln M)	-0.2703* (0.0502)	0.0749 (0.0629)	0.2790* (0.0321)	-0.3233* (0.0430)	-0.0945* (0.0310)	0.0936* (0.0314)	0.0395 (0.0239)	-0.0286 (0.0200)	-0.0579* (0.0245)	0.0100 (0.0058)
Interaction term [(d × ln M) ²]	0.0159* (0.0035)	-0.0050 (0.0040)	-0.0200* (0.0023)	0.0203* (0.0030)	0.0047* (0.0022)	-0.0046* (0.0022)	-0.0014 (0.0017)	0.0025 (0.0014)	0.0059* (0.0017)	-0.0010* (0.0004)

This study focuses on the effect of tobacco expenditure on spending for other goods, so the coefficients of household characteristics are not reported. All commodity groups are considered as a dependent variable. The values if dependent variables run from 0 to 1.

*These results are significant at the 5% level.

Table 5 Results for the quadratic conditional Engel curve in 2011

Independent Variables	Food	Housing	Utilities	Transportation	Entertainment	Durable and non-durable	Clothing	Health	Education	Alcohol
Dummy variable for tobacco spending (d)	0.7616* (0.1955)	-0.7572* (0.3650)	-1.458* (0.1274)	2.273* (0.3020)	0.7357* (0.2380)	-0.9500* (0.1628)	-0.3641* (0.0983)	-0.1670* (0.0750)	-0.0542 (0.0940)	0.0799* (0.0350)
Total amount of tobacco spending (q)	-0.0002 (0.0002)	-0.0022* (0.0004)	-0.0001 (0.0001)	0.0021* (0.0003)	0.0017* (0.0003)	-0.0008* (0.0001)	-0.0003* (0.0001)	-0.0002* (0.0001)	-0.0003* (0.0001)	0.0002* (0.0001)
Log of total expenditure (lnM)	0.1045* (0.0031)	0.1352* (0.0059)	-0.1821* (0.0067)	-0.0373* (0.0048)	0.0291* (0.0038)	-0.0031 (0.0026)	0.0041* (0.0015)	0.0024* (0.0012)	-0.0189* (0.0015)	0.0003 (0.0005)
Square of (log) total expenditure-(lnM) ²	-0.0121* (0.0003)	-0.0135* (0.0007)	0.0105* (0.0005)	0.0092* (0.0006)	-0.0013* (0.0004)	0.0018* (0.0003)	0.0005* (0.0001)	-0.0001 (0.0004)	0.0025* (0.0001)	0.0001 (0.0001)
Interaction term (d × ln M)	-0.2004* (0.0545)	0.2316* (0.1017)	0.3950* (0.0355)	-0.6456* (0.0841)	-0.2176* (0.0663)	0.2672* (0.0453)	0.0955 (0.0274)	0.0464* (0.0209)	0.0228 (0.0262)	-0.0215* (0.0097)
Interaction term [(d × ln M) ²]	0.0122* (0.0033)	-0.0105* (0.0062)	-0.0275* (0.0022)	0.0410* (0.0052)	0.0117* (0.0040)	-0.0164* (0.0028)	-0.0056 (0.0016)	-0.0027* (0.0012)	-0.0012 (0.0016)	0.0009 (0.0006)

This study focuses on the effect of tobacco expenditure on spending for other goods, so the coefficients of household characteristics are not reported. All commodity groups are considered as a dependent variable. The values if dependent variables run from 0 to 1.

*These results are significant at the 5% level.

used as an IV for tobacco spending. Given lower smoking rates among women in Turkey, it was expected that increasing the women ratio would reduce tobacco spending.^{34 37}

The budget share of one dependent variable may be affected by the share for other dependent variables (contemporaneous correlation). Because of this, the Three-Stage Least Square (3SLS) method was used in this paper. Using this method to estimate the Engel curve, whether or not spending patterns of smoking and non-smoking households were the same, could be determined.

$$H_0 : \alpha_{2i} = \beta_{2i} = \delta_{2i} = 0 \quad (2)$$

If this null hypothesis in equation (2) is not rejected, it means that there is no difference between the spending patterns of smoking and non-smoking households. If this hypothesis is rejected, it is surmised that tobacco expenditures have an effect on the consumption decisions of other goods in smoking household budgets.

As shown in table 3, the χ^2 statistics for the 10 goods in both years exceeded the critical value at the 5% significance level, with the exception of utilities in 2007 and health in both years. These results suggest the presence of the crowding out effect in

that smoking households have different spending patterns as compared to non-smoking households due to smoking expenditures.^{vi}

Tables 4 and 5 present an interpretation of the effect of tobacco spending on other goods. The statistically significant coefficient of the dummy variable for tobacco spending (d) can be interpreted as the consumption decision of commodity groups affected by tobacco expenditures, with the exception of health and alcohol in 2007 and education in 2011.

An increase in the total amount of tobacco spending (q) led to a decrease in the budget shares for food, housing, utilities, durable and non-durable goods and clothing, in 2007. In 2011, increasing tobacco expenditure caused a decrease in expenditures on housing, durable/non-durable goods, clothing, health and education.

While the budget share of transportation, entertainment and alcohol increased with increasing q in both years, the coefficient

^{vi}The crowding out effect analysis was repeated for three income levels: Low, medium and high. When income levels increase, the spending patterns of households converge, and the crowding out effect is weakened. These results are not reported here.

of q was not significant for health and education in 2007 or for food and utilities in 2011.

DISCUSSION AND CONCLUSION

This study complements existing work on the crowding out effect of tobacco expenditures in developing economies, using household micro data to analyse its impact in Turkey. This paper adds a further examination of the impact of tobacco control policies on the crowding out effect across the study period.

In this paper, 3SLS with IV variables was used as the estimation method. However, one of the most important conditions for using an IV is that the instrument should not be correlated with the error terms; it is difficult to find a variable that can fulfil this requirement. For example, the women ratio that is used as an IV in this study may be associated with other explanatory variables (eg, family size). It can be considered as a limitation of the study.

Consistent with previous studies from other countries, it was found that smoking households allocated smaller shares of their budgets to certain goods (eg, food, housing, utilities and education). It should be noted that the budget shares of tobacco expenditure across different income levels have remained almost unchanged during the period of analysis. Furthermore, the implementation of tobacco control policies did not appear to have a notable change in the spending patterns of smoking households in Turkey in this analysis. Further analysis on the change of budget shares within the same households, with longitudinal data, is needed to fully explore the statistical effect of tobacco control policies on household budgets. Unfortunately, Turkey does not have panel data including smoking expenditures for this time period.

Tobacco control policies have had positive outcomes on population-level smoking measures. The percentages of smokers who had tried to quit in the past 12 months were 40.6% in 2008 and 42.6% in 2012.³⁸ In addition, the percentage of tobacco smokers who had contemplated quitting increased 7.6 percentage points from 27.8% in 2008 to 35.4% in 2012. Furthermore, according to the Global Adult Tobacco Surveys, the number of adults smoking decreased from 31 out of every 100 adults in 2008 to 27 in 2012. As long as a household remains a smoking household, policy changes will have little impact on smoking household expenditures.

What this paper adds

- ▶ This study shows that, in Turkey, expenditures on tobacco crowd out spending on other goods.
- ▶ Smoking households allocated 8% less of their monthly budgets for certain commodities (eg, food, housing, durable/non-durable goods and utilities) than non-smoking households in each year. Tobacco expenditures have a statistically significant impact on these differences.
- ▶ Tobacco control policies were successful in many aspects across the time period studied; however, changes in the spending patterns of smoking households in response to these policies have been limited.

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Contributors SS was principally responsible for designing the study and writing the manuscript. SS and FJC were involved in the data analysis and interpretation.

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