

**The Effect of Advertisement on Youth Smoking Decision:
Evidence from Georgian Schools**

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A thesis submitted in partial fulfillment of
the requirements for the degree of

Master of Arts in Economics

National University “Kyiv-Mohyla Academy”
Economics Education and Research Consortium
Master’s Program in Economics

2007

Approved by _____
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Program Authorized
to Offer Degree _____ Master’s Program in Economics, NaUKMA

Date _____

National University “Kyiv-Mohyla Academy”

Abstract

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The purpose of this paper is to empirically estimate the effects of tobacco advertisement on the youth smoking behavior in Georgia. The cross sectional data from the Global Youth Tobacco Survey (GYTS) is employed for the empirical work. This data set includes tobacco advertisement data containing eight types of advertisement and seven types of anti-advertisement. The paper finds that both advertisement and anti-advertisement highly influence the amount of cigarettes consumed, but have negligible effect on the probability of becoming a smoker. In addition, I find that price is not an important determinant of demand for cigarettes by young teens. Parents, friends and classmates have highly significant influence on both, the amount of cigarettes consumed and the probability of becoming a smoker. The findings of the paper suggest that restricting tobacco advertisement will reduce total amount of cigarettes consumed, but may leave the number of smokers unchanged.

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ACKNOWLEDGMENTS

I am especially grateful to my thesis adviser Dr. Tom Coupe for his willingness to help and permanent encouragement during the working process. I also thank to Dr. Hanna Vakhitova and Dr. Serguei Maliar for their valuable and helpful comments.

GLOSSARY

Current Participation – whether a person has smoked cigarettes in the previous 30 days.

Future Participation – a potential participation. Whether a person is going to smoke or not in the future.

People Related Variables – dummy variables representing whether parents, friends, class mates and teachers are smokers or not.

Chapter 1

INTRODUCTION

Cigarette smoking and other tobacco use imposes a huge and growing public health burden globally. Tobacco products have no safe level of consumption, and are the only legal consumer products that kill when used exactly as a manufacturer offers. Yet tobacco products continue to be aggressively marketed by tobacco companies. The result is that global tobacco consumption has doubled during the past 30 years and is still increasing in many areas of the world.

Tobacco use in Georgia is an ever-increasing health and economic problem. In 2000 WHO classified Georgia as one from the 11 countries, out of 51 European countries having highest rates of smoking prevalence. “According to the Global Youth Tobacco Survey: country report” (2003) by CDC, smoking was estimated to have been the cause of about 3,200 deaths in Georgia. This represents about 7% of all deaths. Almost all of these deaths occurred among males. Tobacco caused 1 in 5 male deaths in middle age (35-69) and about 1 in 3 male deaths, caused by cancer.

The department of Statistics of Georgia provides the following data on smoking prevalence rates in Georgia: as of the end of 2005 year, 20% of boys among the 14 -16 years old population are current smokers. This number equals to 4.2% for girls of the same age. Out of the age group of 17-21 years old, 14.2% of girls and 58.6% of boys are current smokers. For adults smoking rate is much higher: 16.7% for females and 71.2% for males. The data is given in table 3, in the appendix. The figure 1 in the appendix illustrates smoking prevalence level for

our sample. In total sample 44.5% has ever tasted cigarettes. 33.8% of boys and 13% of girls were current smokers.

The high level of smoking prevalence and the number of deaths associated to it indicate the importance of taking measures to deal with the smoking problem. Since the number of these deaths is proportional to the consumption of tobacco products, measures that reduce tobacco consumption are justified. In this sense studying the tobacco industry and identifying the main factors affecting the demand for tobacco deserves attention. Carefully designed surveys can provide an insight why young people make decision to start smoking. Studying the smoking behavior of school aged children is especially important. It is commonly known that the most of the smokers start smoking in the early age. Many authors (for example Chaloupka Warner, 1999) find that once a person becomes smoker he/she is less likely to give up later.

Although there is considerable number of papers studying the effect of advertisement on smoking, the majority of them are concentrated on the USA and Western Europe. There are several reasons why the smoking behavior of Georgian youth may be different from that, observed in developed countries. For example one reason is cultural difference, which can be expressed by tighter personal relationship. This means that family members or other people (like friends) may have higher influence than in developed countries. This hypothesis is supported by the fact that teen unemployment rate in Georgia is much higher than the same indicator in the US. Out of our sample (consisting of more than 4500 individuals) only 0.9% had paid job. While in 2003, 41.8% of US teens worked at paid job¹. This fact may indicate that the youth in Georgia (and in other developing countries) is less independent in making the decision whether to

¹ Source: <http://www.commondreams.org/>

start smoking or not. As a result the effect of advertisement and anti-advertisement on the same decision may be negligible or even insignificant.

This paper aims to estimate the effect of advertisement on the smoking decision of young people and tries to answer the following questions: How does advertisement effect the decision whether to smoke or not? And does the advertisement change the amount of cigarettes smoked per day? Besides, the paper will also try to test the addictive pattern of smoking behavior among young people in Georgia. To my best knowledge there are no empirical studies of cigarette consumption in Georgia. Thus the given work represents the first effort to empirically analyze the individual demand for cigarette in Georgia.

Chapter 2

LITERATURE REVIEW

This section reviews previous studies in the given field. In the beginning some theoretical concepts, concerning the advertisement are outlined. After this, selected number of papers will be discussed.

The economic literature about tobacco, explores the link between smoking incentives and advertisement on the one hand, and between smoking and anti-advertisement on the other hand. But there are no studies (known to me) investigating simultaneous effect of both, advertisement and anti-advertisement. The proposed paper tries to cover this gap. The data² used in the work provides wide range of information on advertisement as well as anti-advertisement; this makes it possible to estimate the effect of advertisement on cigarette consumption, given that the person has seen any of the anti-advertisement messages. In this way it is possible to identify the extent, to which anti-advertisement compensate the effect of advertisement or vice versa. The results are important for those organizations (government, private health organizations, schools, etc.), which try to develop various anti-advertisement campaigns for reducing tobacco consumption in the country.

Before discussing empirical studies, it is useful to explain how advertisement can influence tobacco consumption. Bagwell (2001) discusses three views of advertising that emerged historically: *persuasive view* – the idea behind this is that advertisement affects demand by changing tastes and creating brand loyalty. In

² The Global Youth Tobacco Study (GYTS) data is already obtained. It has free access on the following web site: <http://apps.nccd.cdc.gov/GYTSDataSets/>.

other words: consumers are unenthusiastic to try new products of unknown quality, but heavy advertising can change their preferences in favor of newly established product.

The *informative view* implies that advertising affects demand by providing additional information. The informative view suggests further that “advertised products are generally of high quality, so that even seemingly uninformative advertising may provide the indirect information that the quality of the advertised product is high”

Finally, the *complementary view* suggests that advertising primarily affects demand by treating advertisement as a complement to the consumption of the advertised product. “As an example, it may be that a consumer values “social prestige” and advertising may then serve as an input that enables the consumer to derive more social prestige when the advertised product is consumed.”

Saffer and Chaloupka (1999) proposed one more reason. They suggest that advertising can increase market size through its role in “brand proliferation”. The brand proliferation is a market technique, designed to increase sales by increasing the number of brands available in the market. According to this view advertising creates new customers.

Many authors find it convenient to capture the aggregate effect of advertisement on smoking using aggregate time series data. However there exist several problems associated to aggregate level data. Particularly difficulties come from the fact that price and many of the key independent variables are highly correlated. A good example is price and advertisement. We can think that extensive advertisement campaign can increase price of a product. Consequently highly correlated variables can result in multicollinearity. Endogeneity is another

problem associated to aggregate data. As average price and total consumption in the country may be determined simultaneously, estimates parameters can be biased and unstable.

Finally, the aggregate nature of the data limits researcher to using aggregate or per capita measures for different explanatory variables. Thus it is not possible to capture the effect of different individual or social characteristics and what is more important the probability of becoming smoker.

Using cross-section data has some advantages. As Chaloupka and Warner (1999) note, “The use of individual level data helps avoid some of the problems inherent in using aggregate data. For example, because an individual's smoking decisions are too small to affect the market price of cigarettes, potential simultaneity biases are less likely. Similarly, individual-level income data and measures of socio-demographic determinants of demand are less correlated with price and policy variables than comparable aggregate measures.” Besides, the micro data usually are based on the various surveys and interviews. In other words information is obtained for each individual, not for the whole country. This gives the opportunity to control for different socio-demographic or individual characteristics. For example, most studies using individual-level data separately consider the probability of smoking or average cigarette consumption per day (per period). In addition, many researchers use to estimate the effects of advertisement on demand for various population subgroups (e. g. defined by age or gender). Finally, some have taken advantage of longitudinal data to test the addictive behavior of smokers.³

³ See below the discussion of addiction models.

From the earliest studies, Lewit et al. (1981) tried to estimate the effect of media campaign on teen smoking decision in the USA. Particularly the authors use “The Fairness Doctrine” – which is the key anti-advertisement acts by US government.

The demand for cigarettes in this paper is assumed to be the function of different social, demographic and personal characteristics. This specification, which will be used in my work too, allows the dependent variable to represent both amount of cigarettes consumed and the probability of becoming a smoker. In the first case the dependent variable is average number of cigarettes smoked per day, in the second case – dichotomous variable, taking the value one, if a person is the smoker.

The results obtained by Lewit et al. (1981) indicate the importance of media campaign. Price enters with the negative and significant coefficient in all specifications. On average the price coefficient was found to be greater than that for adults, providing support to the hypothesis that youth have less own price elasticity than adults. The Fairness Doctrine was found to have negative and statistically significant effect on the probability of becoming the smoker. It was found that during the doctrine teens were 3.0 percent more likely to smoke, than 16 months prior to the date of imposing it. This coefficient declined for the next year, suggesting that the fairness doctrine had the largest effect within the first year.

The authors also discuss one interesting problems, which may exist while using micro data. The basic problem is that the information is directly obtained from teenagers, but young people are generally supposed to underreport the level of smoking. Such kind of “response error” is not problematic, until it is systematic throughout the sample and/or is correlated to any of the independent variables.

Micro studies implicitly refer this error not to be systematic; however this hypothesis has to be proven.

Many papers find TV advertisement to have positive effect on smoking. Bauman et al. (1991) analyzed data on anti-advertisement messages for both TV and radio. The authors suggest interesting measure of subjective expected utility for smoking (SEU), defined as self-satisfaction from smoking reported by an individual. The measure for cigarette consumption was obtained from the reported smoking frequency by individuals. Main finding of this paper is that radio campaign had little negative but significant effect, both on SEU and probability of being a smoker.

Other authors have studied different types of advertisement. The aim of the paper by López et al. (2004) was to investigate the relationship between Spanish adolescent smoking behavior and cigarette advertisements on billboards. 3,664 Spanish children aged 13 and 14 years filled in self-completion questionnaires. Their results show that increased advertisement on billboards is associated with a higher smoking incidence and an increased risk of Spanish children becoming smokers.

The study by Biener and Siegel (2000) examined the effect of tobacco marketing on youth smoking. Tobacco marketing here means promotion of cigarette brands by offering different items with their names. The results show that: Adolescents who owned a tobacco promotional item and named a brand whose advertisements attracted their attention were more than twice as likely to become smokers, than adolescents who did not hold.

Finally there are some studies that investigate the effect of smoking in movies. Charlesworth and Glantz (2005) conducted the review survey, which summarised

40 papers on smoking in the movies from 1950 to 1990. As was noted by the authors since 2002, the total amount of smoking in movies was greater in youth-rated (G/P, G/PG-13) films than adult rated (R) films. In the end the authors conclude: the strong empirical evidence supports the hypothesis that smoking in movies increases adolescent smoking initiation.

Summarizing the cross-sectional studies we can note that almost in all cases they show positive effect of advertisement on the probability of becoming smoker. The GYTS data includes the wide range of variables, including TV, radio, movies, billboards, etc. so it provides good opportunity to estimate all the above mentioned effects.

One type of studies, which must not be left without attention, is addiction behavior models. There are two main directions in estimating the demand for cigarettes. First, using static models (which this paper uses) and second, addiction models of demand. *The Rational Addiction Model*, first presented by Becker and Murphy in 1988, based on the individual utility function assumes that the current consumption (C_t) is the function of past (C_{t-1}) and future (C_{t+1}) consumption.

$$C_t = (C_{t-1}, C_{t+1}, \mathbf{X})$$

(Where \mathbf{X} is a vector of all independent variables).

The Myopic Addiction Model presented by Cook and Moor (1995) includes only past consumption.

$$C_t = (C_{t-1}, \mathbf{X})$$

Number of authors has found the addition behavior in the demand for tobacco. Analyzing time series data on per capita cigarette use, Becker et al. (1990) found that the demand for tobacco in the USA indeed follows the rational model. Studying aggregate data for Italy Tiezzi (2005) obtained the results, which supported rational addiction model. But examining individual level data, she got

evidence of backward looking (myopic) behavior. Generally, the results are different for different data and specifications.

Unfortunately the static nature of the Global Youth Tobacco Survey (GYTS) data does not allow testing these hypotheses. The data do not include variables such as past and future consumption level, or any other variables that could be used as the instruments for them (example is past/future price). Still the job can be done to provide some helpful information in this direction: the “future participation” variable can be regressed on current cigarette consumption with other independent variables. In this way it is possible to estimate the probability of being a smoker in the future (one year from now), given the current characteristics of an individual. Such information about addiction behavior of Georgian youth is especially valuable.

Chapter 3

METHODOLOGY

Lewit et al. (1981), suggest the following specification of the individual demand for cigarette:

$$Y_i = \beta_0 + \beta_1 P_i + \beta_2 E_i + \beta_3 \mathbf{Z} + \beta_4 ADV_i + \beta_5 ANTIADV_i + e_i \quad (1)$$

Where the dependent variable in equation (1) can be either number of cigarettes consumed or probability of being a smoker and \mathbf{Z} – is a vector of characteristic variables.

The first equation in the paper to be estimated is the participation equation, which shows how the probability “that a person is a smoker” is affected by advertisement or other explanatory variables. In this equation dependent variable is a binary variable. Usually probit and logit models are used to estimate the probability of observing an event. Consequently in our case probit⁴ estimation technique is used. The equation has the following form:

$$S_i = \alpha_0 + \alpha_1 P_i + \alpha_2 E_i + \alpha_3 \mathbf{X} + \alpha_4 ADV_i + \alpha_5 ANTIADV_i + \varepsilon \quad (2)$$

Where \mathbf{X} is a vector of independent variables.

The second equation is consumption equation. Here the dependent variable is amount of cigarette smoked per day (C). As this variable is categorical variable two models can be used to estimate the demand for cigarettes. First is ordered probit, where the dependent variable is represented by seven categories⁵; the second is OLS method, where the dependent variable is constructed by computing mean values of each category.

⁴ The results obtained by logit model are very similar to those by probit. So only the probit model is discussed throughout the paper.

⁵ See below the description of the dependent variables.

One problem that arises in estimating demand equation is sample selection problem. Sample selection bias comes from the fact that we can not observe the values of the dependent variable if another variable (so called latent variables) is less than some fixed value. For example, in our case, if a person is not a smoker, then we can not measure the amount of cigarettes consumed. If there is no selection bias then the demand equation can be estimated by OLS method. But generally this bias has to be corrected, for which the Heckman Sample Selection Model is used. In our case, the results of the Heckman model show that sample selection is not a significant problem. Particularly the coefficient of correction term lambda (-7.037) is not statistically different from zero at 10% significance level. The P value of lambda equals to 0.756. This fact makes it possible to use OLS. Heckman model gives more precise results if two equations (main and selection) are identified. In our case the explanatory variables differ in two equations, particularly selection equation does not include the variable PLACE, as it is expected not to have effect on the probability of smoking.

The GYTS survey includes a question about the future smoking behavior of the young people. Accordingly the “future participation” variable is constructed. It is a dichotomous variable; equals 1 if a person is going to smoke in the next year and is zero otherwise ($S_{(t+1)}$). This variable is used in the probit regression to estimate the probability of “becoming a smoker in the future.” Obtaining such estimates is even more important than knowing how the current consumption is changed due to some personal characteristics of the youth. In order to success in reducing smoking prevalence it is useful to know what current variables effect the future decisions of school students. According to the addictive models the current consumption also matters. So this variable is also included in the regressions, which have the following specification:

$$S_{(t+1)i} = \beta_0 + \beta_1 P_i + \beta_2 E_i + \beta_3 X + \beta_4 ADV_i + \beta_5 ANTIADV_i + \beta_6 C_i + e_i \quad (3)$$

All regressions, discussed up to now have one common problem: our advertisement or anti-advertisement variables represent various types of advertisement and anti-advertisement.⁶ Because of this fact, a priori; we can expect that they will be correlated to each other. High correlation between explanatory variables may result in low significance in the regressions. To solve this problem Principal Component Analysis (PCA) is used in addition to the models discussed above.

The main idea of PCA is presented below. Suppose $X_1, X_2 \dots X_p$ are p independent variables. By using PCA we can create Y_j Principle Components (where $j \leq p$), which will be linear combinations of the original variables and will not be correlated to each other.

Each Y_j (j -th principal component) is taken to be linear combination of the X 's:

$$Y_j = a_{1j}X_1 + a_{2j}X_2 + \dots + a_{pj}X_p = a_j^T \mathbf{X}$$

Where

$$a_j^T = [a_{1j}, \dots, a_{pj}]$$

Is a vector of constants, sometimes they are also called “factor loadings.” Also the condition:

$$a_j^T a_j = \sum_{k=1}^p a_{kj}^2 = 1$$

must be satisfied.

The first component is obtained by maximizing its variance. So we solve maximization problem with respect to alphas. Every next component is obtained by the same maximization problem, but the condition: covariance with previous component is zero, is added. In our case, we can interpret these components as

⁶ see below the description of all types

indices of the advertisement, which incorporate the effect of all types of advertisement.

Chapter 4

DATA DESCRIPTION

The empirical work is based on the data from the Global Youth Tobacco Survey (GYTS), which is the joint project of CDC, World Health Organization (WHO) and the Canadian Public Health Association (CPHA). This survey of Georgian schools was held in 2002. It is based on direct interview and includes 86 questions, with number of observations equal to 4543. The sample of school-students aged up to 17 years was chosen randomly from different schools of Georgia. 49.5% of them were boys and 50.5% were girls.

The following dependent variables are taken from the data: 1) Participation variable (S): A binary variable, which takes on the value 1 if a person smoked during the previous 30 days and is 0 otherwise. 2) Consumption per day (C). In the survey this variable is given as categorical variable. It has seven categories: 1 – a person regularly smoked 0 cigarettes in the previous 30 days, 2 – less than 1 cigarettes, 3 – 1 cigarette, 4 – 2-5 cigarettes, 5 – 6-10 cigarettes, 6 – 11-20 cigarettes, 7 – more than 20 cigarettes. To estimate consumption equation by OLS we just compute mean value for each category and assign these values to these categories. To the last category (which is open interval) the value 20 is assigned. About 0.7% of the observations fall in this category.

Table 1 describes those variables, which are used in the research: 1) P - Is the price that a person usually pays for a pack of cigarettes. This is the self-reported variable and consists of seven categories. Interesting fact is that more than 15% of the sample does not buy cigarettes or does not buy by packs. This implies that part of those people who smoke get their cigarettes without paying money for

them. This, in its turn indicates another fact that price of cigarettes may have little effect on amount consumed, because some people can get the same amount of cigarettes as price changes. 2) *E* – expenditure on weekly needs by individuals in national currency. This variable can be used instead of income as the majority of our sample does not have paid job and therefore their own income. 3) *AGE*-age of an individual, 4) *GENDER*-gender of an individual. It equals 1 for boys and 0 for girls; 5) *GRADE*-in which grade a person is. This variable is represented by three dummies for 7th, 8th, and 9th grade respectively; 6) *JOB* – a dummy variable which equals 1 if a person has a paid job and is zero otherwise. In the whole sample only 0.9 percent had paid job, so this may cause insignificance of the results. Nevertheless it is really interesting to know the sign of this variable. 7) *PARENTS* - dummies for parents who smoke. Three dummies will be included in the regressions: if both parents smoke, if only a father smokes and if only a mother smokes; 8) *STUDENTS* – the amount of students who smoke in the class. This variable consists of four categories, from which only first three is include in the regressions and fourth category: “none” will be left as the base category; 9) *FRIENDS* – this variable has the same structure as the previous one. The base category is also “none” and dummies for each of the rest three categories are used; 10) *PLACE* - the place where a person usually smokes. Note, that including this variable makes sense only in demand regression (estimating quantity smoked by OLS or ordered Probit). While, in estimating probability it is excluded. The logic behind this is that if a person has his “favorite” place then he is already smoker, therefore estimating the probability of being a smoker is not sensible. In the regression only three dummies are included for the following categories: “at friend's home”, “in the school premise during school hours” and “out of school premise during school hours.” All other categories are used as base ones. 11) *NO_father* – dummy for an individual who does not have father. Usually, young people without parents experience lack of advice (or even control) from elders. For this reason the probability of smoking may be higher for such

people; 12) *NO_mother* - dummy for an individual who does not have mother; 13) *NO_siblings* – dummy for an individual who does not have brother or sister. 14) *INFO*- dummy if a person was taught about the harmful consequences of smoking at school. It is interesting that about 77.7 percent of the whole sample never got such information and 12 percent was not sure. So, by including this variable we can test whether informed people smoke less or not. 15) *Lessons* – How long ago did a person had discussion on smoking and health problems at lessons. We should think that having such a discussion in the previous term will higher effect on the young people’s decisions on how much to smoke than having the discussion two or more terms ago. However, only 27 percent of the sample had ever had such discussions at school. 16) *TEACHERS* – How often do a person see teachers smoking in the school premise during the school hours. 39.2 percent of the interviewed people reported that the teacher smokes either every day or sometimes. Of course such huge number occasions of teacher smoking in the schools may encourage school students to increase the consumption of cigarettes.

Table 1. Descriptive statistics of variables used.

| Dependent Variables | | | |
|---|--------|---------------------------|----------|
| C | | | S |
| do not smoke | 77.50% | nonsmoker | 77.50% |
| less than 1 cigarette per day | 6.48% | smoker | 22.48% |
| 1 cigarette per day | 7.70% | | |
| 2 to 5 cigarettes per day | 3.50% | | |
| 6 to 10 cigarettes per day | 2.60% | | |
| 11 to 20 cigarettes per day | 1.50% | | |
| more than 20 cigarettes per day | 0.70% | | |
| missing | 0.02% | | |
| Independent Variables | | | |
| P | | Students Smoke | |
| doesn't buy cigarettes or doesn't buy by pack | 15.50% | most of them | 4.50% |
| 0,2 lari | 0.60% | about half of them | 9.10% |
| 0,2 lari to 0,5 lari | 0.30% | some of them | 57.10% |
| 0,5 lari to 0,80 lari | 2.80% | none of them | 29.30% |
| 0,80 lari to 1,0 lari | 2.30% | | |
| 1,0 lari to 2 lari | 2.40% | Best Friends Smoke | |

| | | | |
|--------------------------------|--------|---|--------|
| more than 2 lari | 0.70% | all of them | 0.60% |
| E | | most of them | 7.60% |
| none | 35.80% | some of them | 43.80% |
| less than 6 lari | 27.80% | none of them | 47.90% |
| 6 lari to 8 lari | 14.90% | PLACE | |
| 10 lari to 14 lari | 8.70% | in own home | 7.70% |
| 16 lari to 20 lari | 6.70% | at the social events | 2.70% |
| | | in public places, such as on the streets, in cafes, parks, shopping centers | 2.20% |
| 22 lari to 28 lari | 2.70% | at friend's home | 7.40% |
| 30 lari to 40 lari | 1.20% | in the school premise during school hours | 3.70% |
| more than 40 lari | 2.10% | out of school premise during school hours | 1.50% |
| Age | | other | 9.50% |
| 11 years old or younger | 1.80% | No father | 7.40% |
| 12 years old | 22.50% | No mother | 4.60% |
| 13 years old | 31.00% | No sibling | 20.50% |
| 14 years old | 31.20% | INFO | |
| 15 years old | 12.80% | yes | 10.30% |
| 16 years old | 0.50% | no | 77.70% |
| 17 years old or older | 0.10% | not sure | 12.00% |
| Gender | | Lessons | |
| boy | 49.50% | never | 73.00% |
| girl | 50.50% | this term | 14.80% |
| | | last term | 5.40% |
| Grade | | 2 terms ago | 1.70% |
| 7th grade | 33.60% | 3 terms ago | 0.40% |
| 8th grade | 33.30% | more than one year ago | 4.70% |
| 9th grade | 33.10% | Teacher Smoke | |
| JOB | | about every day | 8.50% |
| yes | 0.90% | sometimes | 30.70% |
| no | 98.80% | never | 30.90% |
| Parents Smoke | | do not know | 29.90% |
| both | 10.10% | | |
| only father (male guardian) | 57.70% | | |
| only mother (female guardian) | 5.20% | | |
| none | 27.00% | | |
| Advertisement Variables | | Anti-Advertisement Variables | |
| Adv actors smoking | | Anti-adv TV | |
| a lot | 57.40% | a lot | 23.90% |
| a few | 30.90% | a few | 32.60% |
| none | 11.70% | none | 43.40% |

| | | | |
|------------------------------|--------|-------------------------------|--------|
| Adv item | | Anti-adv radio | |
| yes | 28.40% | a lot | 9.40% |
| no | 71.60% | a few | 17.30% |
| | | none | 73.20% |
| Adv TV | | Anti-adv billboard | |
| a lot | 38.10% | a lot | 18.20% |
| a few | 35.00% | a few | 35.30% |
| none | 26.80% | none | 46.50% |
| Adv billboards | | Anti-adv posters | |
| a lot | 44.00% | a lot | 16.90% |
| a few | 33.00% | a few | 33.20% |
| none | 23.00% | none | 50.00% |
| Adv press | | Anti-adv press | |
| a lot | 30.40% | a lot | 10.90% |
| a few | 43.60% | a few | 26.70% |
| none | 26.00% | none | 62.40% |
| Adv sports events | | Anti-adv cinema | |
| a lot | 26.10% | a lot | 4.40% |
| a few | 32.40% | a few | 14.50% |
| none | 31.50% | none | 81.10% |
| Adv concerts | | Anti-adv sports events | |
| a lot | 26.00% | a lot | 11.90% |
| a few | 40.40% | a few | 31.70% |
| none | 33.60% | none | 56.40% |
| Adv social gatherings | | | |
| a lot | 28.80% | | |
| a few | 38.80% | | |
| none | 32.50% | | |

Note: The table reports the total sample, before excluding missing values.
Missing values are not reported.

The advertisement and anti-advertisement variables in GYTS data are self-reported categorical variables. They consist of three categories: 1 – a lot, 2 – a few and 3 – none, which represent how much advertisement/anti-advertisement a person saw during the last 30 days. Two dummies for the first two categories are included in the regressions, leaving “none” as the base category. In this way we compare those people who have seen “a lot” or “a few” advertisement to those who have not seen at all. Besides another specification of model is used which

uses principal components instead of all types of advertisement/anti-advertisement. In the whole there are eight advertisement and seven anti-advertisement variables. The corresponding questions in the data are: advertisement, 1) "How often do you see actors smoking when you watch TV, videos, or movies", 2) "Do you have something (item) with a cigarette brand logo," 3) "How often have you seen cigarettes brand names for the last 30 days on TV," 4) "How many advertisements for cigarettes have you seen on billboard in your town/where you live for the last 30 days," 5) "How many advertisements or promotion for cigarettes have you seen in newspapers or magazines for the last 30 days," 6) "How often do you see advertisements for cigarettes when you go to sports events," 7) "How often do you see advertisement for cigarettes when you go to concerts," 8) "How often do you see the advertisements for cigarettes when you go to social gatherings." anti-advertisement, 1) "How many anti-smoking media messages have you seen on television for the last 30 days," 2) "How many anti-smoking media messages have you heard on the radio for the last 30 days," 3) "How many anti-smoking media messages have you seen on billboard for the last 30 days," 4) "How many anti-smoking media messages have you seen on posters for the last 30 days," 5) "How many anti-smoking media messages have you seen in newspapers or magazines for the last 30 days," 6) "How many anti-smoking media messages have you seen at the cinema for the last 30 days," 7) "How often do you see anti-smoking messages when you go to the sports events, fairs, concerts, or social gatherings."

Chapter 4

THE RESULTS

This section presents the results obtained for different regressions. We start from demand (OLS) regressions and go through ordered probit and probit. The full results of the OLS regression is given in table 1 in the appendix.

Demand for cigarettes

Table 2 demonstrates the results obtained by the OLS method. Here the dependent variable is the amount of cigarettes consumed per day. The results were obtained for five sub-samples: total sample, males, females, smokers – only those people who smoke and payers – only those people who pay money for cigarettes. The last two sub-samples are constructed in order to capture price effect. This effect is underestimated if we use the total sample. This is due to many nonsmokers in the sample, which cause the following problem: nonsmokers do not pay money and at the same time they consume zero amounts of cigarettes. So we get that people who pay, also smoke more. This is a biased result. To correct this bias we use the last sub-sample. For each sub-sample two specification is given. In the first specification (1) various types of advertisement and anti-advertisement variables are included, while the second specification (2) uses principal components instead of these variables. From the beginning we present the social-demographic and individual characteristic variables and finally the advertisement variables are discussed.

An important concept in studying the demand for cigarettes is price elasticity of demand (for example Chaloupka and Warner, 1999). Many authors have found

that price elasticity is higher for youth than for adults. This is due to the fact that adults are highly addicted to tobacco products; therefore as price changes they do not change their level of consumption significantly. Our results show that Georgian youth are also less sensitive to the price. Price was found to have no significant effect on the quantity of cigarettes consumed. Columns 1 through 4 in table 2 show that price coefficient enters the regressions with positive and significant sign. But this should not be interpreted as the positive relationship between price and quantity. The reason of such relationship may be the fact that we can not fully observe the price paid by majority of smokers. The fact is that about 15% of the whole sample, which constitutes 63% of all smokers, does not buy cigarettes at all or does not buy them by packs. Because of this a substantial part of these people may not pay money for the cigarettes they smoke. In its turn such people can be those, who do not smoke much or are not regular smokers. As a result we get that those young people who pay, smoke more cigarettes than those who do not pay. So in estimating the demand for these sub-samples we capture the positive effect. The situation is completely changed when the sample is restricted to only payers. In column 5 we already have negative coefficient of price, but insignificant even at 10% significance level. So we can conclude that price is not the factor which significantly influences youth decisions.

While price was found to be insignificant, weekly expenditure certainly has positive effect on the quantity demanded. Comparison among gender shows that for females this variable is not significant while for males strong positive effect is observed. This effect is even higher for smokers and equals to 0.058, which is quite large amount, implying that 100 unit increase of the weekly expenditure (expressed in national currency⁷) will increase the amount of cigarettes demanded by about 6 sticks per day.

⁷ 100 GEL equals about 60 USD.

Boys smoke 0.888 sticks more a day than girls. This result was expected as majority of smokers in Georgia are males.

Having coefficient of age negative and significant in the first column of the table 2 is rather strange, given that grade has positive sign. Also it must be mentioned that age is significant only in one specification, while grade has highly significant almost in all specifications. In fact age thus captures the effect people who are older in a given grade, so basically people who are behind school-schedule. This might be a proxy of less intelligent people or people from a less favourable background

One thing, what we are interested in is to what extent youth is influenced by their parents and other closely related people. In regressions such people are represented by dummy variables for parents, friends, class mates, siblings and teachers. Further we will call these variables “people related” variables. Our hypothesis that because of deep personal relationships the role of advertisement may not be significant also implies that people related variables are expected to have highly significant effect. This is strongly supported by the results of this study. Particularly it was found that parents, classmates, friends and teachers all have high influence on the smoking decision of young people. Among parents mother has higher influence than father. For example if only mother of a person smokes, then he is likely to smoke 0.338 more cigarettes compared to those whose parents do not smoke. The coefficient of dummy variable for father is less and equals to 0.185. Finally if both parents are smokers then the amount of cigarettes consumed by him increases by 0.214 sticks a day. The fact that mother has higher effect than father was expected and is consistent to the commonsense, because at least in Georgia it is known that women spend more time with their children than men. This, in turn, can be supported by the fact that employment rate among women is much lower than among men. But the fact that both

parents have lower effect than only mother is not so clear. This can be explained by the following: because of the fact that majority of Georgian men (of adult age) are smokers, it is very rare that only woman smokes in a family. So, those people who reported that only their mother is a smoker mainly are children without fathers. As a result the mother, who is the only parent, may have even higher effect than both parents together. We can think that in this way this variable captures the effect of not having father, this bias should be corrected by including dummy for not having father but the effect remains higher even after this. Finally such logic is not true for men, because among those people who reported that only the father was smoker majority also had a mother.

In the first column of table 2 the coefficient of FRIENDS for the dummy “all” is less than the coefficient of the dummy “most“. This also can be explained by the characteristics of the GYTS dataset. Here we may have the following problem: there are very few people whose every friend is smoker, because of this, only minor part of the sample (0.9%) fall in this category. As a result the effect of this category is low. The same problem is related to the variable STUDENTS. Here the sign is even negative, but again this result must not be interpreted as the true relationship among the given variables.

Table 2. OLS regressions. Selected variables.

| Variable | Total | Boys | Girls | Smokers | Payers |
|-------------------|---------------|---------------|---------------|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 |
| P | 3.359 | 3.4 | 1.276 | 2.507 | -0.236 |
| | (0.000)*** | (0.000)*** | (0.000)*** | (0.000)*** | 0.774 |
| E | 0.02 | 0.021 | 0.004 | 0.058 | -0.012 |
| | (0.000)*** | (0.016)** | 0.145 | (0.000)*** | 0.676 |
| AGE | -0.183 | -0.112 | -0.036 | -0.232 | -0.149 |
| | (0.001)*** | 0.283 | 0.247 | 0.246 | 0.743 |
| GENDER_boy | 0.888 | | | 2.403 | -0.2 |
| | (0.000)*** | | | (0.000)*** | 0.785 |
| GRADE_8th | 0.363 | 0.287 | 0.152 | 0.475 | 0.05 |
| | (0.001)*** | 0.143 | (0.008)*** | 0.178 | 0.957 |

| | | | | | |
|--------------------|---------------|---------------|---------------|---------------|---------------|
| GRADE_9th | 1.359 | 1.909 | 0.323 | 4.121 | 6.016 |
| | (0.000)*** | (0.000)*** | (0.000)*** | (0.000)*** | (0.000)*** |
| JOB | 0.081 | -0.698 | -0.057 | 0.259 | -0.477 |
| | 0.855 | 0.393 | 0.808 | 0.819 | 0.832 |
| PARENTS_both | 0.214 | 0.584 | 0.067 | -0.054 | 1.02 |
| | 0.105 | (0.013)** | 0.35 | 0.882 | 0.26 |
| PARENTS_father | 0.185 | 0.276 | 0.018 | -0.125 | 0.404 |
| | (0.039)** | (0.091)* | 0.708 | 0.698 | 0.569 |
| PARENTS_mother | 0.338 | 0.694 | -0.004 | 0.391 | 1.223 |
| | (0.046)** | (0.029)** | 0.965 | 0.422 | 0.196 |
| STUDENTS_all | -0.688 | -1.327 | -0.174 | 0.932 | 1.127 |
| | (0.002)*** | (0.003)*** | 0.126 | 0.353 | 0.604 |
| STUDENTS_most | 0.895 | 1.164 | 0.008 | -0.045 | -1.464 |
| | (0.000)*** | (0.000)*** | 0.922 | 0.955 | 0.418 |
| STUDENTS_some | -0.322 | -0.793 | 0.046 | -0.647 | -1.526 |
| | (0.002)*** | (0.000)*** | 0.412 | 0.387 | 0.374 |
| FRIENDS_all | 1.008 | -1.527 | 2.468 | 3.14 | 3.158 |
| | (0.066)* | 0.332 | (0.000)*** | (0.025)** | 0.216 |
| FRIENDS_most | 2.149 | 2.593 | 0.635 | 1.23 | 2.978 |
| | (0.000)*** | (0.000)*** | (0.000)*** | 0.117 | 0.138 |
| FRIENDS_some | 0.064 | 0.387 | 0.171 | 0.207 | 1.934 |
| | (0.000)*** | (0.000)*** | (0.000)*** | 0.117 | 0.138 |
| antiF1 | -0.144 | -0.202 | -0.033 | -0.32 | -0.436 |
| | (0.000)*** | (0.000)*** | (0.008)*** | (0.001)*** | (0.016)** |
| antiF2 | -0.077 | -0.226 | -0.011 | 0.163 | -0.238 |
| | (0.005)*** | (0.000)*** | 0.432 | 0.125 | 0.126 |
| antiF3 | 0.008 | 0.001 | 0.01 | -0.095 | -0.051 |
| | 0.827 | 0.982 | 0.559 | (0.000)*** | 0.84 |
| F1 | 0.155 | 0.261 | 0.018 | 0.208 | 0.882 |
| | (0.000)*** | (0.000)*** | 0.115 | (0.001)*** | (0.000)*** |
| F2 | 0.153 | 0.342 | -0.038 | -0.172 | 1.157 |
| | (0.000)*** | (0.000)*** | (0.005)*** | (0.062)* | (0.000)*** |
| F3 | 0.177 | 0.3 | 0.044 | -0.494 | -0.235 |
| | (0.000)*** | (0.000)*** | (0.016)** | 0.385 | 0.235 |
| INFO | 0.184 | 0.054 | 0.184 | -0.113 | 1.796 |
| | 0.195 | 0.836 | (0.017)** | 0.868 | 0.181 |
| LESSON_this term | -0.461 | -0.514 | -0.186 | -0.787 | -0.342 |
| | (0.000)*** | (0.032)** | (0.005)*** | 0.143 | 0.737 |
| LESSON_last term | -0.062 | 0.134 | -0.043 | -0.286 | -1.164 |
| | 0.751 | 0.727 | 0.66 | 0.723 | 0.433 |
| LESSON_two terms | 0.531 | 1.693 | -0.277 | 5.984 | 3.677 |
| | 0.441 | 0.101 | 0.569 | (0.001)*** | 0.188 |
| TEACHERS_everyday | 0.451 | 0.868 | 0.071 | 2.705 | 1.915 |
| | (0.003)*** | (0.001)*** | 0.43 | (0.000)*** | (0.021)** |
| TEACHERS_sometimes | 0.05 | 0.055 | -0.016 | 0.584 | 0.013 |
| | 0.57 | 0.736 | 0.74 | (0.035)** | 0.982 |

Another group of variables which is also of great importance is school related variables. It was found that if a person usually smokes out of the school premise during the school hour then he/she will smoke 0.665 sticks more cigarettes than those who smoke at other places. This fact indicates the importance of the school (in general the environment at school) in making smoking decision by children. Another school related variable, which has direct effect on youth decisions, is frequency of teachers smoking. As the results show if a person sees teacher smoking every day, than the cigarette consumption will increase by 0.451. This is quite high value and it should be taken into the account during designing any anti-advertisement campaign. As was found being frequent discussions of the smoking problem at lessons has negative and significant effect. If such a discussion was held this term, then its effect is -0.4 and is significant at 1% significance level. But as the time of having such discussion increases, the coefficient becomes insignificant and after fifth term even has positive and significant effect.

To estimate the effect of advertisement and anti-advertisement we construct principal components separately for both advertisement and for anti-advertisement. We use first three components for both, advertisement and anti-advertisement, as they jointly explain about 50% of the total variation. The results of the principal components analysis are given in the appendix by tables 2.1 and 2.2.

In table 2 principal components are represented by variables: antiF1, antiF2, antiF3 for anti-advertisement and F1, F2, F3 for advertisement. All three components of the advertisement have significant coefficients and have the expected signs (positive). First two anti-advertisement components reveal negative and significant effect on the cigarette consumption, while the third one

is insignificant. The interpretation of the effect of principal components depends on the factor loadings of the original variables (those used in PCA). The higher is the factor loading of the original variable the greater is its effect on the dependent variable. According to our results we can conclude that on the whole advertisement has highly significant and positive influence on youth's decision how much to consume. Especially those people who pay money for cigarettes appear to be highly affected by advertisement. This fact demonstrates the importance of informative view discussed earlier. In other words people who buy cigarettes are more interested in advertisement, may be because of new information. The same result is true for anti-advertisement, which has the highest effect on payers among sub-samples.

Table 3. Ordered probit regression.

| variable | outcome 1 not smoke | | outcome 2 less than 1 stick | | outcome 3 1 stick | | outcome 4 2-5 sticks | |
|---------------------|------------------------|------------|--------------------------------|------------|----------------------|------------|-------------------------|------------|
| | coefficient | P value | coefficient | P value | coefficient | P value | coefficient | P value |
| P | -0.222 | 0.000 | 0.118 | 0.000 | 0.092 | 0.000 | 0.009 | 0.000 |
| E | -0.003 | 0.000 | 0.002 | 0.000 | 0.001 | 0.000 | 0.000 | 0.000 |
| AGE | 0.020 | 0.016 | -0.010 | 0.016 | -0.008 | 0.017 | -0.001 | 0.023 |
| GENDER | -0.148 | 0.000 | 0.076 | 0.000 | 0.063 | 0.000 | 0.007 | 0.000 |
| GRADE | -0.092 | 0.000 | 0.047 | 0.000 | 0.040 | 0.000 | 0.004 | 0.000 |
| GRADE | -0.171 | 0.000 | 0.082 | 0.000 | 0.076 | 0.000 | 0.009 | 0.000 |
| JOB | -0.007 | 0.901 | 0.004 | 0.901 | 0.003 | 0.902 | 0.000 | 0.904 |
| PARENTS_both | -0.106 | 0.000 | 0.051 | 0.000 | 0.047 | 0.000 | 0.006 | 0.001 |
| PARENTS_father | -0.022 | 0.082 | 0.012 | 0.083 | 0.009 | 0.083 | 0.001 | 0.091 |
| PARENTS_mother | -0.007 | 0.762 | 0.004 | 0.761 | 0.003 | 0.764 | 0.000 | 0.767 |
| STUDENTS_all | -0.072 | 0.124 | 0.035 | 0.097 | 0.032 | 0.143 | 0.004 | 0.203 |
| STUDENTS_most | -0.253 | 0.000 | 0.104 | 0.000 | 0.121 | 0.000 | 0.019 | 0.001 |
| STUDENTS_some | -0.106 | 0.000 | 0.057 | 0.000 | 0.044 | 0.000 | 0.004 | 0.000 |
| FRIENDS_all | -0.731 | 0.000 | 0.087 | 0.008 | 0.335 | 0.000 | 0.146 | 0.000 |
| FRIENDS_most | -0.634 | 0.000 | 0.137 | 0.000 | 0.316 | 0.000 | 0.100 | 0.000 |
| FRIENDS_some | -0.283 | 0.000 | 0.131 | 0.000 | 0.127 | 0.000 | 0.018 | 0.000 |
| PLACE_friend's home | -0.043 | 0.018 | 0.022 | 0.014 | 0.018 | 0.024 | 0.002 | 0.045 |
| PLACE_in school | -0.137 | 0.000 | 0.063 | 0.000 | 0.063 | 0.000 | 0.008 | 0.001 |
| PLACE_out of school | -0.068 | 0.085 | 0.034 | 0.063 | 0.030 | 0.103 | 0.004 | 0.158 |
| NO_father | -0.115 | 0.003 | 0.054 | 0.001 | 0.052 | 0.006 | 0.007 | 0.028 |
| NO_mother | 0.024 | 0.394 | -0.013 | 0.407 | -0.010 | 0.383 | -0.001 | 0.358 |
| NO_sibling | -0.029 | 0.130 | 0.015 | 0.121 | 0.012 | 0.138 | 0.001 | 0.168 |

| | | | | | | | | |
|------------------------|---------------|-------|---------------|-------|---------------|-------|---------------|-------|
| antiF1 | 0.008 | 0.046 | -0.004 | 0.045 | -0.003 | 0.049 | 0.000 | 0.058 |
| antiF2 | 0.014 | 0.001 | -0.007 | 0.001 | -0.006 | 0.002 | -0.001 | 0.004 |
| antiF3 | 0.011 | 0.058 | -0.006 | 0.059 | -0.004 | 0.058 | 0.000 | 0.067 |
| F1 | -0.007 | 0.004 | 0.004 | 0.004 | 0.003 | 0.005 | 0.000 | 0.009 |
| F2 | -0.015 | 0.001 | 0.008 | 0.001 | 0.006 | 0.001 | 0.001 | 0.002 |
| F3 | -0.043 | 0.000 | 0.023 | 0.000 | 0.018 | 0.000 | 0.002 | 0.000 |
| INFO | 0.007 | 0.755 | -0.004 | 0.757 | -0.003 | 0.754 | 0.000 | 0.750 |
| LESSON_this term | 0.056 | 0.000 | -0.031 | 0.000 | -0.022 | 0.000 | -0.002 | 0.000 |
| LESSON_last term | 0.017 | 0.503 | -0.009 | 0.512 | -0.007 | 0.496 | -0.001 | 0.479 |
| LESSON_two terms | -0.076 | 0.438 | 0.037 | 0.396 | 0.034 | 0.462 | 0.004 | 0.526 |
| TEACHERS_everyday | -0.030 | 0.197 | 0.016 | 0.183 | 0.013 | 0.209 | 0.001 | 0.244 |
| TEACHERS_sometimes | 0.008 | 0.487 | -0.004 | 0.489 | -0.003 | 0.486 | 0.000 | 0.485 |
| Number of observations | 3878 | | | | | | | |
| Pseudo R squared | 0.337 | | | | | | | |

Table 3. Ordered probit regression (continued).

| variable | outcome 5 | | outcome 6 | | outcome 7 | |
|---------------------|-----------------|---------|-----------------|---------|---------------|---------|
| | coefficient | P value | coefficient | P value | coefficient | P value |
| P | 0.00263 | 0.000 | 0.00018 | 0.006 | 2E-06 | 0.117 |
| E | 0.00003 | 0.001 | 0.00000 | 0.013 | 3E-08 | 0.133 |
| AGE | -0.00023 | 0.032 | -0.00002 | 0.062 | -2E-07 | 0.186 |
| GENDER | 0.00218 | 0.000 | 0.00017 | 0.005 | 3E-06 | 0.101 |
| GRADE | 0.00135 | 0.002 | 0.00010 | 0.021 | 1E-06 | 0.14 |
| GRADE | 0.00314 | 0.001 | 0.00027 | 0.017 | 5E-06 | 0.127 |
| JOB | 0.00008 | 0.905 | 0.00001 | 0.906 | 7E-08 | 0.908 |
| PARENTS_both | 0.00189 | 0.006 | 0.00016 | 0.038 | 3E-06 | 0.162 |
| PARENTS_father | 0.00026 | 0.101 | 0.00002 | 0.137 | 2E-07 | 0.239 |
| PARENTS_mother | 0.00008 | 0.770 | 0.00001 | 0.773 | 7E-08 | 0.778 |
| STUDENTS_most | 0.00118 | 0.245 | 0.00009 | 0.311 | 1E-06 | 0.408 |
| STUDENTS_half | 0.00769 | 0.005 | 0.00083 | 0.037 | 2E-05 | 0.165 |
| STUDENTS_some | 0.00128 | 0.000 | 0.00009 | 0.013 | 1E-06 | 0.13 |
| FRIENDS_all | 0.12188 | 0.010 | 0.03689 | 0.109 | 3E-03 | 0.292 |
| FRIENDS_most | 0.06608 | 0.000 | 0.01460 | 0.001 | 8E-04 | 0.046 |
| FRIENDS_some | 0.00649 | 0.000 | 0.00064 | 0.002 | 1E-05 | 0.08 |
| PLACE_friend's home | 0.00061 | 0.063 | 0.00005 | 0.109 | 6E-07 | 0.223 |
| PLACE_in school | 0.00288 | 0.007 | 0.00026 | 0.043 | 5E-06 | 0.176 |
| PLACE_out of school | 0.00111 | 0.195 | 0.00009 | 0.261 | 1E-06 | 0.373 |
| NO_father | 0.00220 | 0.055 | 0.00019 | 0.118 | 3E-06 | 0.249 |
| NO_mother | -0.00025 | 0.345 | -0.00002 | 0.338 | -2E-07 | 0.371 |
| NO_sibling | 0.00037 | 0.190 | 0.00003 | 0.236 | 3E-07 | 0.33 |
| antiF1 | -0.00009 | 0.068 | -0.00001 | 0.103 | -8E-08 | 0.216 |
| antiF2 | -0.00016 | 0.008 | -0.00001 | 0.034 | -1E-07 | 0.159 |
| antiF3 | -0.00013 | 0.077 | -0.00001 | 0.112 | -1E-07 | 0.22 |
| F1 | 0.00009 | 0.015 | 0.00001 | 0.040 | 7E-08 | 0.156 |
| F2 | 0.00018 | 0.005 | 0.00001 | 0.023 | 2E-07 | 0.135 |
| F3 | 0.00051 | 0.000 | 0.00003 | 0.007 | 4E-07 | 0.119 |

| | | | | | | |
|-------------------|-----------------|-------|-----------------|-------|---------------|-------|
| INFO | -0.00008 | 0.749 | -0.00001 | 0.747 | -7E-08 | 0.748 |
| LESSON_this term | -0.00053 | 0.001 | -0.00003 | 0.016 | -4E-07 | 0.135 |
| LESSON_last term | -0.00019 | 0.470 | -0.00001 | 0.463 | -1E-07 | 0.478 |
| LESSON_two terms | 0.00129 | 0.561 | 0.00010 | 0.605 | 2E-06 | 0.656 |
| TEACHER_everyday | 0.00041 | 0.267 | 0.00003 | 0.305 | 4E-07 | 0.377 |
| TEACHER_sometimes | -0.00009 | 0.487 | 0.00001 | 0.495 | -8E-08 | 0.519 |
| Number of obs | 3878 | | | | | |
| Pseudo R square | 0.337 | | | | | |

Another model, which we use to estimate the demand for cigarettes (amount of cigarettes smoked per day) is ordered probit model. In this case the dependent variable is categorical variable, with seven outcomes. Accordingly for each outcome ordered probit computes marginal effects, that is the change in probability of observing a specific category due to change in other explanatory variables.

The results of ordered probit regression are absolutely consistent to those of OLS. Signs of coefficients of variables in two models, as well as their significance coincide to each other. For the first, which reflects the category “do not smoke” outcome we have opposite signs for all variables.

Smoking participation

The probability of being a smoker was estimated by probit and the results are presented in table 4. Column 1 corresponds to the current participation, while columns 2, 3 and 4 illustrate the results of future participation. All coefficients are marginal effects.

Among all people related variables friends have the highest effect. For example if most of the friends are smokers then the probability that a person will be a smoker increases by more than 60 percent. This is extremely high value and

deserves special interest. Given the fact that such important variables as discussing smoking at lessons, frequency of teachers' smoking, some advertisement and anti-advertisement variables have insignificant effect, friends can be viewed as the most influential reason of starting smoking. This fact once more confirms the huge importance of the peer effect in Georgia. Students also can influence their class mates' decision; however this effect is less than that of the friends'. This result was expected as it is frequently the case that not all students are close friends in a class. The effect of parents on their children is rather substantial. If both parents are smokers then probability increases by about 14%. The effect of the father is somewhat lower (0.023), and the coefficient for mother is even insignificant.

From non-people related variables we can mention the weekly expenditure and grade variables. Both variables enter with positive and significant coefficients. The effect of expenditure is quite high, even taking into account the fact that so many people can get cigarettes without paying money. For example 4.5% of the sample stole their cigarettes, while 2.5% got cigarettes from elder people. Because of this fact youth may not be very responsive to expenditure, which in fact represents the income of these young people.

Table 4. Probit regression. Marginal effects.

| variable | 1) Current Participation (with PCA) | | 2) Future Participation (one year, with current consumption) | | 3) Future Participation (one year) | | 4) Future Participation (five years) | |
|----------------|-------------------------------------|---------|--|---------|------------------------------------|---------|--------------------------------------|---------|
| | coefficient | P value | coefficient | P value | coefficient | P value | coefficient | P value |
| E | 0.005 | 0.000 | 0.000 | 0.001 | 0.004 | 0.000 | 0.002 | 0.002 |
| AGE | -0.016 | 0.063 | -0.008 | 0.010 | -0.013 | 0.054 | -0.008 | 0.364 |
| GENDER | 0.144 | 0.000 | 0.048 | 0.014 | 0.062 | 0.000 | 0.080 | 0.000 |
| GRADE | 0.110 | 0.000 | 0.058 | 0.020 | 0.073 | 0.000 | 0.068 | 0.000 |
| GRADE | 0.096 | 0.000 | 0.046 | 0.027 | 0.097 | 0.000 | 0.089 | 0.001 |
| JOB | -0.023 | 0.608 | 0.041 | 0.078 | 0.045 | 0.419 | 0.105 | 0.209 |
| PARENTS_both | 0.204 | 0.000 | 0.132 | 0.032 | 0.068 | 0.002 | 0.122 | 0.000 |
| PARENTS_father | 0.028 | 0.042 | 0.035 | 0.016 | 0.002 | 0.855 | 0.032 | 0.026 |

| | | | | | | | | |
|------------------------|---------------|--------------|---------------|--------------|---------------|--------------|---------------|--------------|
| PARENTS_mother | 0.009 | 0.728 | 0.059 | 0.036 | 0.025 | 0.262 | 0.057 | 0.075 |
| STUDENTS_most | 0.068 | 0.172 | 0.113 | 0.056 | 0.152 | 0.004 | 0.121 | 0.021 |
| STUDENTS_half | 0.318 | 0.000 | 0.247 | 0.046 | 0.201 | 0.000 | 0.261 | 0.000 |
| STUDENTS_some | 0.118 | 0.000 | 0.061 | 0.020 | 0.059 | 0.000 | 0.060 | 0.001 |
| FRIENDS_all | 0.726 | 0.000 | 0.567 | 0.116 | 0.783 | 0.000 | 0.624 | 0.000 |
| FRIENDS_most | 0.704 | 0.000 | 0.352 | 0.048 | 0.429 | 0.000 | 0.468 | 0.000 |
| FRIENDS_some | 0.303 | 0.000 | 0.212 | 0.019 | 0.151 | 0.000 | 0.209 | 0.000 |
| NO_father | 0.110 | 0.008 | -0.047 | 0.027 | 0.042 | 0.145 | -0.013 | 0.660 |
| NO_mother | -0.029 | 0.270 | -0.009 | 0.041 | 0.022 | 0.496 | -0.025 | 0.467 |
| NO_sibling | 0.062 | 0.004 | -0.073 | 0.017 | -0.058 | 0.000 | -0.077 | 0.000 |
| antiF1 | 0.002 | 0.536 | -0.004 | 0.004 | -0.006 | 0.048 | -0.007 | 0.059 |
| antiF2 | -0.016 | 0.000 | -0.026 | 0.005 | -0.016 | 0.000 | -0.028 | 0.000 |
| antiF3 | -0.015 | 0.008 | -0.011 | 0.006 | 0.002 | 0.670 | -0.008 | 0.166 |
| F1 | -0.002 | 0.453 | -0.020 | 0.003 | -0.008 | 0.000 | -0.014 | 0.000 |
| F2 | 0.001 | 0.794 | -0.015 | 0.005 | 0.002 | 0.672 | -0.010 | 0.051 |
| F3 | 0.038 | 0.000 | 0.051 | 0.006 | 0.042 | 0.000 | 0.053 | 0.000 |
| INFO | -0.032 | 0.086 | -0.033 | 0.022 | -0.035 | 0.004 | -0.020 | 0.340 |
| LESSON_this term | -0.054 | 0.000 | 0.003 | 0.022 | 0.023 | 0.174 | -0.007 | 0.726 |
| LESSON_last term | -0.054 | 0.004 | -0.095 | 0.019 | -0.015 | 0.458 | -0.070 | 0.001 |
| LESSON_two terms | 0.138 | 0.273 | 0.010 | 0.107 | 0.182 | 0.195 | 0.068 | 0.578 |
| TEACHER_everyday | -0.001 | 0.968 | 0.059 | 0.031 | 0.041 | 0.058 | 0.064 | 0.022 |
| TEACHER_sometimes | -0.018 | 0.127 | -0.057 | 0.013 | -0.032 | 0.000 | -0.045 | 0.000 |
| C | | | 0.032 | 0.000 | | | | |
| Number of observations | | <i>3870</i> | | <i>3870</i> | | <i>3950</i> | | <i>3959</i> |
| Pseudo R squared | | <i>0.492</i> | | <i>0.588</i> | | <i>0.444</i> | | <i>0.395</i> |

The effect of advertisement and anti-advertisement on the probability of being a smoker is somewhat vague. Out of three anti-advertisement components first two has negative and significant coefficients. This indicates that contemporaneous effect of anti-advertisement on probability of smoking is rather negative than positive. As for advertisement components, they have less significant effect. It is only the third advertisement component which has positive effect and is significant at 1% significance level. So we can conclude that advertisement has positive contemporary effect.

Columns 2 - 4 present the results of future participation equations. As it can be seen anti-advertisement components enter all three regressions with negative and

significant coefficients. Moreover, the columns 3 and 4, which do not include current consumption, show that coefficients of these components increase in column 4 compared to column 3. The interpretation for this is that anti-advertisement has higher effect on the long run decision than on the short run decision of future participation. The explanation for this may be purely subjective fact. For example young people, who watch anti-advertisement, realize that smoking is dangerous for their health and think that they will quit smoking in the future. So if this does not happen in the next year, then after five years they think they will certainly do.

Note that first two advertisement components in columns 2 and 4 and the first component in column 3 have negative signs and are significant mostly at 1% significance level. The explanation of this fact may be the structure of the people who reported that that will not smoke in the future. If we look at the composition of such people we find that about 30% of those people who were current smokers reported that they will not smoke in the next year. While about 26% of current smokers reported that they will not smoke within the five years from now. This leads to the following: current smokers who are simultaneously affected by advertisement, in other words who have seen a lot of advertisement will no longer be smokers in the future. As a result we get that majority of people who have seen advertisement will not be smokers in the future. This may be the reason of change of signs of the advertisement components. The reason why these people change their decision is the issue of further research and goes beyond the scope of our study.

Finally we discuss the addictive behavior of Georgian youth. In column 2 of table 3 presents the results of the probit regression which includes the current consumption variable. By including this variable we can test whether Georgian youth follow the myopic addiction model or not, that is if the amount of

cigarettes smoked at present has effect on the participation decision in the future. The coefficient of the variable C equals 0.032 and is highly significant (P value equals 0.000). This suggests that increasing current cigarette consumption by one stick a day increases the probability of future smoking in the next year. What myopic addiction model states is that current consumption of cigarettes depends on the past consumption. Our variable is somewhat different, as it represents the potential participation, which has not been realized yet. Despite this including current consumption into future participation regression provides good understanding of the addictive behavior of youth.

CONCLUSIONS

From the results obtained by this study we can draw the following conclusions: Using Principal Component Analysis we find that, in general, both advertisement and anti-advertisement have more significant effect on amount demanded than probability of being a smoker. These results are consistent with *persuasive*, *informative* and *complementary* views, while *brand proliferation* theory seems to be less important in Georgia than in developed countries. These results support our hypothesis that due to deep interpersonal relationships effect of advertisement and anti-advertisement variables on the smoking probability may be low.

Because of the fact that considerable part of the youth in Georgia can get cigarettes without paying money for them, the price has not significant effect on the amount of cigarettes consumed. This result differs from the results obtained by majority of authors in USA or Europe. For example Lewit et al. (1981), Bauman et al. (1991), López et al. (2004), Charlesworth and Glantz (2005) etc. all find positive relationship between price and cigarette consumption. But some authors have obtained different results, for example Gruber (2000) found that price is not the important determinant of smoking among young teens, even though they do not say anything about whether youth can get cigarettes without paying or not. For sure such minor role of price in smoking decision should be attributed to the specific features of Georgian youth.

Parents, close friends, class mates have crucial effect on the youth. These people are involved in the decision-making process of youth and can seriously influence their choice. Especially this is true for participation decision, for which other factors have relatively low or even insignificant effect.

Finally, it must be mentioned that school seems to be the place where youth are highly affected. For example having discussions on smoking and health in this term has higher effect, in terms of amount consumed, than seeing any type of anti-advertisement in the past month. Moreover the frequency of smoking by teachers also affects school students, with total effect greater than that of parents’.

Based on the conclusions above, we can develop several recommendations for policymaker authorities which are concerned about the smoking problem in the country. 1) Before imposing any restrictions on advertisement the government should very carefully evaluate the costs and benefits of such a policy. According to our results advertisement affects the amount consumed, while the effect on the probability of being a smoker is lower and less significant. Because of this restricting advertisement may lead to reducing of total amount of cigarettes consumed, while leaving number of smokers unaffected. On the other hand tobacco advertisement industry is a substantial source of tax revenue and restricting this industry will cause losses in terms of government income, jobs places and private earnings. Therefore, before restricting advertisement all costs must be evaluated. 2) Any anti-advertisement campaign should be designed in such a way that it could reach the targeted group of society with lowest costs. Our results suggest that an anti-advertisement campaign at schools will be highly effective. Therefore to reduce smoking prevalence level the government can design such campaigns at schools which may be less costly than other types of anti-advertisement.

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Appendix

Table 2. OLS regressions. All variables.

| Variable | Sub Samples | | | | | | | | | |
|---------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| | Total | | Boys | | Girls | | Smokers | | Payers | |
| | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 |
| P | 3.288 | 3.359 | 3.271 | 3.4 | 1.213 | 1.276 | 1.931 | 2.507 | -0.251 | -0.236 |
| | (0.000)*** | (0.000)*** | (0.000)*** | (0.000)*** | (0.000)*** | (0.000)*** | (0.000)*** | (0.000)*** | 0.757 | 0.774 |
| E | 0.018 | 0.02 | 0.016 | 0.021 | 0.004 | 0.004 | 0.033 | 0.058 | -0.01 | -0.012 |
| | (0.000)*** | (0.000)*** | (0.055)* | (0.016)** | (0.095)* | 0.145 | (0.005)*** | (0.000)*** | 0.722 | 0.676 |
| AGE | -0.22 | -0.183 | -0.13 | -0.112 | -0.012 | -0.036 | -0.166 | -0.232 | 0.174 | -0.149 |
| | (0.000)*** | (0.001)*** | 0.194 | 0.283 | 0.697 | 0.247 | 0.322 | 0.246 | 0.68 | 0.743 |
| GENDER_boy | 0.835 | 0.888 | | | | | 0.933 | 2.403 | -0.165 | -0.2 |
| | (0.000)*** | (0.000)*** | | | | | (0.000)*** | (0.000)*** | 0.808 | 0.785 |
| GRADE_8th | 0.433 | 0.363 | 0.275 | 0.287 | 0.111 | 0.152 | 0.151 | 0.475 | -0.703 | 0.05 |
| | (0.000)*** | (0.001)*** | 0.143 | 0.143 | (0.055)* | (0.008)*** | 0.613 | 0.178 | 0.425 | 0.957 |
| GRADE_9th | 1.366 | 1.359 | 1.479 | 1.909 | 0.219 | 0.323 | 2.596 | 4.121 | 3.317 | 6.016 |
| | (0.000)*** | (0.000)*** | (0.000)*** | (0.000)*** | (0.006)*** | (0.000)*** | (0.000)*** | (0.000)*** | (0.004)*** | (0.000)*** |
| JOB | -0.142 | 0.081 | -0.815 | -0.698 | -0.094 | -0.057 | -0.359 | 0.259 | 1.79 | -0.477 |
| | 0.742 | 0.855 | 0.3 | 0.393 | 0.686 | 0.808 | 0.708 | 0.819 | 0.394 | 0.832 |
| PARENTS_both | 0.288 | 0.214 | 0.466 | 0.584 | 0.022 | 0.067 | -0.009 | -0.054 | 0.525 | 1.02 |
| | (0.026)** | 0.105 | (0.043)** | (0.013)** | 0.758 | 0.35 | 0.978 | 0.882 | 0.535 | 0.26 |
| PARENTS_father | 0.178 | 0.185 | 0.201 | 0.276 | 0.016 | 0.018 | 0.188 | -0.125 | -0.504 | 0.404 |
| | (0.043)** | (0.039)** | 0.199 | (0.091)* | 0.744 | 0.708 | 0.495 | 0.698 | 0.46 | 0.569 |
| PARENTS_mother | 0.264 | 0.338 | 0.475 | 0.694 | -0.005 | -0.004 | 0.417 | 0.391 | 0.425 | 1.223 |
| | 0.112 | (0.046)** | 0.121 | (0.029)** | 0.956 | 0.965 | 0.312 | 0.422 | 0.627 | 0.196 |
| STUDENTS_most | -0.529 | -0.688 | -0.526 | -1.327 | -0.099 | -0.174 | 1.135 | 0.932 | -1.096 | 1.127 |
| | (0.016)** | (0.002)*** | 0.232 | (0.003)*** | 0.38 | 0.126 | 0.192 | 0.353 | 0.598 | 0.604 |
| STUDENTS_half | 1.001 | 0.895 | 1.285 | 1.164 | -0.064 | 0.008 | -0.288 | -0.045 | -4.307 | -1.464 |
| | (0.000)*** | (0.000)*** | (0.000)*** | (0.000)*** | 0.44 | 0.922 | 0.667 | 0.955 | (0.015)** | 0.418 |
| STUDENTS_some | -0.157 | -0.322 | -0.422 | -0.793 | 0.044 | 0.046 | -0.167 | -0.647 | -3.814 | -1.526 |
| | 0.139 | (0.002)*** | (0.032)** | (0.000)*** | 0.44 | 0.412 | 0.791 | 0.387 | (0.026)** | 0.374 |
| FRIENDS_all | 1.249 | 1.008 | -1.523 | -1.527 | 2.459 | 2.468 | 2.067 | 3.14 | 3.626 | 3.158 |
| | (0.020)** | (0.066)* | 0.313 | 0.332 | (0.000)*** | (0.000)*** | (0.086)* | (0.025)** | 0.138 | 0.216 |
| FRIENDS_most | 2.289 | 2.149 | 2.814 | 2.593 | 0.53 | 0.635 | 1.072 | 1.23 | 2.524 | 2.978 |
| | (0.000)*** | (0.000)*** | (0.000)*** | (0.000)*** | (0.000)*** | (0.000)*** | 0.11 | 0.117 | 0.2 | 0.138 |
| FRIENDS_some | 0.216 | 0.064 | 0.659 | 0.387 | 0.139 | 0.171 | 0.235 | 0.207 | 2.022 | 1.934 |
| | (0.020)** | 0.493 | (0.000)*** | (0.038)** | (0.004)*** | (0.000)*** | 0.713 | 0.78 | 0.293 | 0.319 |
| PLACE_friend's home | 1.12 | 1.176 | 1.521 | 1.541 | 0.067 | 0.064 | 1.061 | 1.621 | -0.128 | -0.321 |
| | (0.000)*** | (0.000)*** | (0.000)*** | (0.000)*** | 0.407 | 0.427 | (0.000)*** | (0.000)*** | 0.809 | 0.584 |
| PLACE_in school | -0.031 | 0.075 | -0.587 | -0.479 | 0.824 | 0.799 | -0.187 | 0.458 | -1.024 | -2.015 |
| | 0.862 | 0.676 | (0.030)** | (0.082)* | (0.000)*** | (0.000)*** | 0.531 | 0.189 | 0.211 | (0.025)** |
| PLACE_out school | 0.665 | 0.666 | 0.325 | 0.116 | 0.243 | 0.335 | 0.246 | 0.435 | -1.09 | -1.13 |
| | (0.023)** | (0.026)** | 0.402 | 0.773 | 0.476 | 0.33 | 0.598 | 0.431 | 0.175 | 0.197 |
| NO_father | 0.286 | 0.303 | 0.768 | 0.985 | -0.062 | -0.065 | 0.904 | 1.293 | 0.672 | 0.294 |

| | | | | | | | | | | |
|--------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| | 0.1 | (0.089)* | (0.018)** | (0.003)*** | 0.504 | 0.485 | 0.111 | (0.051)* | 0.599 | 0.815 |
| NO_mother | -0.068 | -0.247 | -0.243 | -0.722 | -0.004 | 0.057 | 0.141 | -0.755 | 2.452 | -1.246 |
| | 0.753 | 0.265 | 0.53 | (0.072)* | 0.975 | 0.637 | 0.851 | 0.39 | 0.159 | 0.494 |
| NO_sibling | -0.204 | -0.05 | -0.282 | 0.166 | 0.008 | -0.035 | -1.183 | -0.627 | -5.878 | -4.079 |
| | (0.078)* | 0.647 | 0.18 | 0.401 | 0.905 | 0.555 | (0.003)*** | 0.184 | (0.000)*** | (0.012)** |
| anti-adv TV_a lot | -0.295 | | -0.22 | | -0.03 | | -1.037 | | -1.326 | |
| | (0.022)** | | 0.328 | | 0.682 | | (0.029)** | | 0.357 | |
| anti-adv TV_a few | -0.406 | | -0.577 | | -0.039 | | -0.827 | | -3.7 | |
| | (0.000)*** | | (0.001)*** | | 0.45 | | (0.050)* | | (0.002)*** | |
| anti-adv radio_a lot | -0.152 | | -0.554 | | -0.119 | | -0.83 | | -1.208 | |
| | 0.347 | | (0.062)* | | 0.168 | | 0.204 | | 0.434 | |
| anti-adv radio_a few | -0.127 | | -0.139 | | -0.114 | | -0.168 | | 1.487 | |
| | 0.284 | | 0.527 | | (0.068)* | | 0.752 | | 0.177 | |
| anti-adv billboard_a lot | 0.085 | | 0.11 | | -0.009 | | -0.262 | | 2.851 | |
| | 0.589 | | 0.701 | | 0.917 | | 0.697 | | (0.060)* | |
| anti-adv billboard_a few | 0.132 | | 0.229 | | 0.084 | | -0.442 | | -1.265 | |
| | 0.284 | | 0.33 | | 0.187 | | 0.391 | | 0.266 | |
| anti-adv posters_a lot | -0.286 | | -0.373 | | 0.014 | | -0.364 | | 0.419 | |
| | (0.078)* | | 0.214 | | 0.875 | | 0.592 | | 0.799 | |
| anti-adv posters_a few | -0.3 | | -0.387 | | -0.023 | | -1.184 | | -1.589 | |
| | (0.014)** | | 0.1 | | 0.711 | | (0.042)** | | 0.203 | |
| anti-adv press_a lot | 0.079 | | 0.021 | | -0.032 | | -1.277 | | -5.475 | |
| | 0.643 | | 0.946 | | 0.729 | | (0.043)** | | (0.001)*** | |
| anti-adv press_a few | 0.18 | | -0.001 | | 0.069 | | 0.522 | | 1.841 | |
| | 0.118 | | 0.998 | | 0.26 | | 0.25 | | (0.035)** | |
| anti-adv cinema_a lot | -0.344 | | -0.44 | | 0.152 | | -1.434 | | -2.062 | |
| | 0.105 | | 0.203 | | 0.241 | | (0.030)** | | 0.158 | |
| anti-adv cinema_a few | 0.077 | | 0.069 | | -0.023 | | -0.365 | | -3.416 | |
| | 0.534 | | 0.774 | | 0.723 | | 0.486 | | (0.004)*** | |
| anti-adv sports_a lot | -0.218 | | -0.309 | | -0.053 | | 0.255 | | 1.9 | |
| | 0.149 | | 0.26 | | 0.515 | | 0.703 | | 0.158 | |
| anti-adv sports_a few | -0.275 | | -0.777 | | -0.021 | | -0.608 | | 0.549 | |
| | (0.012)** | | (0.000)*** | | 0.719 | | 0.232 | | 0.587 | |
| ADV actors smoking_a lot | 0.634 | | 0.759 | | -0.476 | | 1.603 | | 0.393 | |
| | (0.000)*** | | (0.001)*** | | (0.000)*** | | (0.000)*** | | 0.701 | |
| ADV actors smoking_a few | 1.599 | | 2.46 | | -0.447 | | 4.72 | | 5.159 | |
| | (0.000)*** | | (0.000)*** | | (0.000)*** | | (0.000)*** | | (0.000)*** | |
| ADV item | 0.391 | | 0.274 | | 0.148 | | 0.603 | | 0.91 | |
| | (0.000)*** | | (0.090)* | | (0.003)*** | | (0.017)** | | (0.086)* | |
| ADV TV_a lot | -0.089 | | 0.178 | | -0.16 | | 0.506 | | -1.981 | |
| | 0.465 | | 0.396 | | (0.021)** | | 0.169 | | (0.020)** | |
| ADV TV_a few | -0.118 | | -0.237 | | -0.053 | | 1.029 | | -0.917 | |
| | 0.285 | | 0.22 | | 0.398 | | (0.003)*** | | 0.252 | |
| ADV billboards_a lot | 0.193 | | 0.334 | | 0.092 | | 0.791 | | 2.51 | |
| | 0.111 | | 0.118 | | 0.173 | | (0.063)* | | (0.006)*** | |

| | | | | | | | | | |
|-------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| ADV billboards_a few | -0.107 | | -0.422 | | 0.176 | | -1.098 | | 0.274 |
| | 0.356 | | (0.041)** | | (0.006)*** | | (0.009)*** | | 0.765 |
| ADV press_a lot | -0.058 | | -0.04 | | -0.071 | | 0.568 | | -0.156 |
| | 0.59 | | 0.843 | | 0.222 | | (0.073)* | | 0.837 |
| ADV press_a few | 0.374 | | 0.675 | | -0.002 | | 1.018 | | 0.936 |
| | (0.000)*** | | (0.000)*** | | 0.967 | | (0.000)*** | | 0.148 |
| ADV sports events_a lot | -0.168 | | -0.476 | | 0.203 | | -0.831 | | -2.013 |
| | 0.193 | | (0.051)* | | (0.003)*** | | (0.086)* | | (0.088)* |
| ADV sports events_a few | 0.092 | | 0.207 | | -0.023 | | -0.245 | | -1.988 |
| | 0.382 | | 0.305 | | 0.688 | | 0.582 | | (0.093)* |
| ADV concerts_a lot | 0.266 | | 0.585 | | -0.131 | | -0.716 | | 0.42 |
| | (0.063)* | | (0.023)** | | (0.090)* | | 0.18 | | 0.73 |
| ADV concerts_a few | -0.186 | | -0.05 | | -0.068 | | -1.5 | | -0.541 |
| | 0.11 | | 0.817 | | 0.275 | | (0.002)*** | | 0.64 |
| ADV gatherings_a lot | 0.363 | | 0.627 | | 0.064 | | 2.465 | | 3.429 |
| | (0.012)** | | (0.016)** | | 0.412 | | (0.000)*** | | (0.005)*** |
| ADV gatherings_a few | -0.335 | | -0.673 | | 0.067 | | 0.788 | | 1.756 |
| | (0.006)*** | | (0.003)*** | | 0.298 | | 0.102 | | 0.147 |
| ADV offer | -0.219 | | -0.343 | | -0.051 | | -0.483 | | -2.145 |
| | (0.075)* | | 0.101 | | 0.476 | | 0.196 | | (0.007)*** |
| antiF1 | -0.144 | | -0.202 | | -0.033 | | -0.32 | | -0.436 |
| | (0.000)*** | | (0.000)*** | | (0.008)*** | | (0.001)*** | | (0.016)** |
| antiF2 | -0.077 | | -0.226 | | -0.011 | | 0.163 | | -0.238 |
| | (0.005)*** | | (0.000)*** | | 0.432 | | 0.125 | | 0.126 |
| antiF3 | 0.008 | | 0.001 | | 0.01 | | -0.095 | | -0.051 |
| | 0.827 | | 0.982 | | 0.559 | | (0.000)*** | | 0.84 |
| F1 | 0.155 | | 0.261 | | 0.018 | | 0.208 | | 0.882 |
| | (0.000)*** | | (0.000)*** | | 0.115 | | (0.001)*** | | (0.000)*** |
| F2 | 0.153 | | 0.342 | | -0.038 | | -0.172 | | 1.157 |
| | (0.000)*** | | (0.000)*** | | (0.005)*** | | (0.062)* | | (0.000)*** |
| F3 | 0.177 | | 0.3 | | 0.044 | | -0.494 | | -0.235 |
| | (0.000)*** | | (0.000)*** | | (0.016)** | | 0.385 | | 0.235 |
| INFO | 0.24 | 0.184 | 0.09 | 0.054 | 0.185 | 0.184 | 0.538 | -0.113 | 2.865 |
| | (0.086)* | 0.195 | 0.722 | 0.836 | (0.015)** | (0.017)** | 0.369 | 0.868 | (0.041)** |
| LESSON_this term | -0.4 | -0.461 | -0.379 | -0.514 | -0.136 | -0.186 | -0.413 | -0.787 | -1.568 |
| | (0.001)*** | (0.000)*** | 0.103 | (0.032)** | (0.037)** | (0.005)*** | 0.388 | 0.143 | 0.134 |
| LESSON_last term | -0.02 | -0.062 | 0.291 | 0.134 | 0.015 | -0.043 | 0.263 | -0.286 | -0.674 |
| | 0.916 | 0.751 | 0.43 | 0.727 | 0.878 | 0.66 | 0.702 | 0.723 | 0.64 |
| LESSON_two terms | 0.72 | 0.531 | 2.097 | 1.693 | -0.164 | -0.277 | 6.217 | 5.984 | 6.177 |
| | 0.284 | 0.441 | (0.036)** | 0.101 | 0.734 | 0.569 | (0.000)*** | (0.001)*** | (0.028)** |
| TEACHER_everyday | 0.489 | 0.451 | 0.888 | 0.868 | 0.122 | 0.071 | 2.419 | 2.705 | 1.774 |
| | (0.001)*** | (0.003)*** | (0.001)*** | (0.001)*** | 0.176 | 0.43 | (0.000)*** | (0.000)*** | (0.024)** |
| TEACHER_sometimes | 0.087 | 0.05 | 0.232 | 0.055 | -0.007 | -0.016 | 0.632 | 0.584 | 0.282 |
| | 0.326 | 0.57 | 0.149 | 0.736 | 0.878 | 0.74 | (0.009)*** | (0.035)** | 0.598 |
| Constant | 1.252 | 1.613 | 0.391 | 1.222 | 0.43 | 0.306 | -0.353 | 1.147 | 2.199 |
| | | | | | | | | | 5.5 |

| | | | | | | | | | | |
|--------------|----------|-----------|--------|--------|--------|--------|--------|--------|--------|--------|
| | (0.078)* | (0.024)** | -0.758 | -0.346 | -0.271 | -0.427 | -0.871 | -0.651 | -0.723 | -0.381 |
| Observations | 3876 | 3876 | 1845 | 1845 | 2031 | 2031 | 975 | 975 | 315 | 315 |
| R-squared | 0.513 | 0.479 | 0.62 | 0.573 | 0.285 | 0.249 | 0.72 | 0.579 | 0.757 | 0.647 |

Note: P values in parenthesis

Table 2.1. Principal Component Analysis. Factor loadings and proportions are given for anti-advertisement variables.

| Variable | first com | second com | third com |
|-------------------|-----------|------------|-----------|
| TV a lot | 0.41668 | -0.02754 | 0.06539 |
| TV a few | -0.06554 | 0.391 | 0.01953 |
| radio a lot | 0.33712 | -0.08056 | 0.26685 |
| radio a few | 0.16053 | 0.281 | -0.25605 |
| billboard a lot | 0.4072 | -0.15438 | -0.12287 |
| billboard a few | 0.00978 | 0.4652 | 0.33827 |
| posters a lot | 0.38063 | -0.09162 | -0.25216 |
| posters a few | 0.02861 | 0.41114 | 0.48378 |
| press a lot | 0.35161 | -0.1616 | 0.14154 |
| press a few | 0.2185 | 0.36422 | -0.20224 |
| cinema a lot | 0.19623 | -0.02308 | 0.24218 |
| cinema a few | 0.18896 | 0.22359 | -0.13674 |
| sport event a lot | 0.30051 | -0.08825 | 0.34796 |
| sport event a few | 0.18754 | 0.35517 | -0.41479 |
| Proportion | 0.219 | 0.172 | 0.0963 |

Table 2.2. Principal Component Analysis. Factor loadings and proportions are given for advertisement variables.

| Variable | first com | second com | third com |
|--------------------------|-----------|------------|-----------|
| ADV actors smoking_a lot | 0.0453 | -0.3715 | -0.3789 |
| ADV actors smoking_a few | -0.0773 | 0.4207 | 0.226 |
| ADV item | -0.0773 | -0.0097 | 0.322 |
| ADV TV_a lot | 0.3385 | 0.0436 | 0.2826 |
| ADV TV_a few | -0.2375 | 0.1976 | -0.1695 |
| ADV billboards_a lot | 0.2012 | 0.3847 | -0.2532 |
| ADV billboards_a few | -0.1634 | -0.1349 | 0.4609 |
| ADV press_a lot | 0.1116 | 0.4159 | -0.242 |
| ADV press_a few | -0.0237 | -0.4046 | 0.1137 |
| ADV sports events_a lot | 0.3921 | 0.093 | 0.0996 |
| ADV sports events_a few | -0.2365 | 0.0057 | 0.3728 |
| ADV concerts_a lot | 0.3889 | 0.0572 | 0.1924 |
| ADV concerts_a few | -0.2922 | 0.2566 | 0.1156 |
| ADV gatherings_a lot | 0.405 | 0.0581 | 0.166 |
| ADV gatherings_a few | -0.3329 | 0.2428 | 0.1339 |
| ADV offer | 0.0706 | 0.0311 | 0.0156 |
| Proportions | 0.2334 | 0.159 | 0.1189 |

Table 3. Smoking Prevalence Level in Georgia. By age groups.

| Age groups | Percentage % | | |
|--------------|--------------|-------------|-------------|
| | Female | Male | Total |
| 14-16 years | 4.2 | 19.9 | 12.0 |
| 17-20 | 14.2 | 58.6 | 36.3 |
| 21-25 | 15.5 | 58.0 | 36.1 |
| 26-35 | 16.7 | 71.2 | 43.3 |
| 36-59 | 4.6 | 65.6 | 32.0 |
| 60 and more | 3.0 | 35.3 | 16.0 |
| Total | 7.6 | 55.7 | 29.5 |

Source: Department of Statistics of Georgia.

Figure 1. Smoking prevalence level in GYTS sample.



