H N P   D I S C U S S I O N   P A P E R

Economics of Tobacco Control Paper No. 4

Cigarette Demand, Taxation, and the Poor

A Case Study of Bulgaria

Özgen Sayginsoy, Ayda A. Yürekli and Joy de Beyer

25402

HEALTH, NUTRITION, AND POPULATION
THE WORLD BANK

Tobacco Free Initiative
World Health Organization

December 2002

CIGARETTE DEMAND, TAXATION, AND THE POOR

A Case Study of Bulgaria

Özgen Sayginsoy, Ayda A. Yürekli and Joy de Beyer

December 2002

Health, Nutrition and Population (HNP) Discussion Paper

This series is produced by the Health, Nutrition, and Population Family (HNP) of the World Bank's Human Development Network (HNP Discussion Paper). The papers in this series aim to provide a vehicle for publishing preliminary and unpolished results on HNP topics to encourage discussion and debate. The findings, interpretations, and conclusions expressed in this paper are entirely those of the author(s) and should not be attributed in any manner to the World Bank, to its affiliated organizations or to members of its Board of Executive Directors or the countries they represent. Citation and the use of material presented in this series should take into account this provisional character. For free copies of papers in this series please contact the individual authors whose name appears on the paper.

Enquiries about the series and submissions should be made directly to the Editor in Chief. Submissions should have been previously reviewed and cleared by the sponsoring department which will bear the cost of publication. No additional reviews will be undertaken after submission. The sponsoring department and authors bear full responsibility for the quality of the technical contents and presentation of material in the series.

Since the material will be published as presented, authors should submit an electronic copy in a predefined format (available at www.worldbank.org/hnppublications on the Guide for Authors page) as well as three camera-ready hard copies (copied front to back exactly as the author would like the final publication to appear). Rough drafts that do not meet minimum presentational standards may be returned to authors for more work before being accepted.

The Editor in Chief of the series is Alexander S. Preker (apreker@worldbank.org,: For information regarding this and other World Bank publications, please contact the HNP Advisory Services (healthpop@worldbank.org) at: Tel (202) 473-2256; and Fax (202) 522-3234.

The Economics of Tobacco Control sub-series is produced jointly with the Tobacco Free Initiative of the World Health Organization. The findings, interpretations, and conclusions expressed in this paper are entirely those of the author/s and should not be attributed in any manner to the World Health Organization or to the World Bank, their affiliated organizations or to members of their Executive Boards or the countries they represent.

The editors for the Economics of Tobacco Control papers are: Joy de Beyer (jdebeyer@worldbank.org), Emmanuel Guindon (guindone@who.int) and Ayda Yürekli (ayurekli@worldbank.org).

For free copies of papers in this series please contact the individual author whose name appears on the paper, or one of the editors. Papers are posted on the publications pages of these websites: www.worldbank.org/hnp and www.worldbank.org/tobacco

Health, Nutrition and Population (HNP) Discussion Paper

Cigarette Demand, Taxation, and the Poor:
A Case Study of Bulgaria

Özgen Sayginsoy[a], Ayda A. Yürekli[b] and Joy de Beyer[b]

[a] Economics Department, Cornell University, Ithaca New York, USA
[b] Health, Nutrition and Population, Human Development Network, World Bank, Washington DC, USA

Abstract: This paper uses the Living Standards Measurement Study (LSMS) Household Survey, conducted in 1995, to analyze demand for cigarettes in Bulgaria and the effects on the poor of a hypothetical revenue-maximizing specific excise tax increase levied on cigarettes. A description of the survey methodology and a discussion of cigarette-related summary statistics precede the derivation and estimation of a demand equation. The estimation uses two-stage least squares for three income groups (low and lower-middle, upper-middle, and high income), and also for the whole sample. The price elasticity is estimated to be –0.80 for the whole sample, –1.33 for low and lower-middle income group, -1.02 for upper-middle income group, and –0.52 for the high-income group. Simulation studies based on these elasticity estimates show that a 72% revenue-maximizing specific excise tax increase on cigarettes in Bulgaria leads to a 28% increase in the retail price of a pack of cigarettes, if all of the tax increase is passed onto consumers. Furthermore, such a tax increase would lead to a decline of 26.5% in the overall consumption of cigarettes, and to a 5.3% decline in the overall expenditure on cigarettes. On the other hand, total tax revenues would increase by 11.8% as a result of the tax change, implying that specific excise tax elasticity of cigarette revenues is equal to 0.164 in Bulgaria. One important finding is that the tax increase has a beneficial effect on the poor, in the sense that the tax burden on the low and lower-middle income group is reduced (as measured by the percentage of total cigarette tax paid by this income group). Finally, Lorenz and concentration curve comparisons reveal that specific excise taxes on cigarettes are regressive in Bulgaria, even though *increases* in these taxes are progressive.

Keywords: tobacco, Bulgaria, tobacco tax, cigarette tax, economics of tobacco, economics of tobacco control, smoking, tobacco policy, price elasticity, demand for cigarettes, tax incidence, impact on poor

Correspondence Details: Özgen Sayginsoy, Department of Economics, Uris Hall 4th Floor, Cornell University, Ithaca, NewYork 14853 USA. Email: os19@cornell.edu.

Ayda A. Yürekli, The World Bank, 1818 H Street NW, Washington DC, 20433 USA; Mail Stop G7-701, Health, Nutrition and Population Unit, Human Development Network, USA. Tel: (202) 473-3749, fax: (202) 522-3234, email: Ayurekli@worldbank.org website : www.worldbank.org/tobacco

Joy de Beyer, The World Bank, 1818 H Street NW, MSN G7-702, Washington DC 20433; Tel: (858) 622-1731 ext 1703; Fax: (858)642-7403; Email: jdebeyer@worldbank.org; Web: www.worldbank.org/tobacco

!!!
..

`

Table of Contents

List of Figures

List of Tables

Λ

PREFACE

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

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

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

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

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

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

The report presented in this Economic of Tobacco Discussion Paper makes a valuable contribution to our understanding of the issues and likely economic impact of tobacco control in a specific country-setting. Our

hope is that the information, analysis and recommendations will prove helpful to policy makers, and help result in stronger policies to reduce the unnecessary harm caused by tobacco use.

Joy de Beyer

Tobacco Control Coordinator
Health, Nutrition and Population
World Bank

ACKNOWLEDGMENTS

1. INTRODUCTION

This paper uses data from the Living Standards Measurement Study (LSMS) Household Survey, conducted in 1995, to analyze demand for manufactured cigarettes in Bulgaria and the effects on the poor of a hypothetical revenue-maximizing specific excise tax increase on cigarettes.[1] A description of the survey methodology and a discussion of cigarette-related summary statistics are presented in Section 2.

A cigarette tax increase is the single most effective and cost-efficient measure to reduce smoking. However, before anything can be said about the possible effect of tax increases on different income groups in a given population, estimates of price and income elasticities are needed. Consequently, the first objective of this paper is to estimate the price and income elasticities of consumption for cigarettes in Bulgaria by income groups. These results shed light on the sensitivity of Bulgarian cigarette consumption to price increases and changes in real income, as discussed in Section 3.

The second objective of this paper is to simulate the impact of changes in specific excise taxes on consumption, tax burdens and government revenues from cigarette taxes. A major concern among policymakers is that an increase in cigarette taxes could have a disproportionate impact on the poor. Therefore, it is of interest to isolate the effects of simulated taxation policies by income group. This is achieved in Section 4. Concluding comments are given in Section 5.

2. BULGARIA INTEGRATED HOUSEHOLD SURVEY

The management, organization, and field work for the LSMS survey was carried out by Gallup International in Sofia, liaising with the World Bank office in Bulgaria. The principal objective of this household survey was to collect detailed information on a variety of characteristics of the Bulgarian population to enable an analysis of the standard of living of the poor in comparison to other income groups. The survey was conducted mainly throughout June 1995, and collected consumption and expenditure data relating to the previous month, May. The data are, therefore, monthly, cross-sectional, household level data.

2.1 SAMPLING

Bulgaria is divided into approximately 40,000 statistical sectors (SS), each sector containing approximately 75 households. The average household size is 3 people. This implies totals of about 2.9 million households nationwide and a population of about 8.7 million in 1995, which matches closely the 8.45 million people obtained in the national population count in December 1993.

The sampling for the survey involved a self-weighting design in which each household had the same probability of being included in the survey. At the first stage, a number of clusters of households were selected from an available list of clusters. The selection of clusters was done randomly according to a density that determined the probability of selection of a cluster in proportion to the number of households in that cluster. Then, the households in chosen clusters were organized by: (i) 28 regions in Bulgaria, (ii) cities, towns, and villages in each region, (iii) the size of each city and town in the corresponding region, (iv)

---

[1] LSMS household surveys are available for various developing countries, and a complete list of these countries can be obtained at http://www.worldbank.org/lsms.

the size of households in each city or town. At the second stage, an equal number of households were selected from each cluster. As a result, a geographically grouped household sample was obtained.

The survey selected 500 statistical sectors and 5 households from each statistical sector, giving a total of about 2500 households Appendix Table 1 lists the exact regional and provincial sampling distribution of all the households.

2.2. EXPENDITURE AND INCOME AGGREGATES

2.2.1. Calculation of the Expenditure Aggregate

Total expenditure at the household level was obtained by summing all expenditures in cash and kind that were reported. The design of the expenditure section of the questionnaire received particular attention because of the high inflation rate of approximately 100% in Bulgaria in 1995, and also the existence of lumpy purchases of food commodities that are believed to be in short supply, such as vegetable oil and sugar. To minimize misreporting, the expenditure section was based on a variable recall method to collect information on a weekly or monthly basis. There were three sets of questions: The first set dealt with the actual consumption of food commodities, broken down by sources, regardless of the time of purchase. A second set of questions asked the actual or estimated current prices. And finally, the third set of questions collected information on weekly and monthly expenditures made by the households during the past month. All inquiries were recorded in standardized units.

Total expenditure figures were arranged under three sections: education, food, and other non-food expenditures. All expenditures were seasonally adjusted using estimates derived from the 1994 Household budget survey where monthly expenditure pattern fluctuations were analyzed for 25 commodity groups in three regions (Sofia, other urban areas, and rural areas) and in three separate income groups: the bottom quintile, the middle 60 percent, and the top income quintile. Finally, because households in different parts of the country face a different price structure, which affects welfare comparisons, total expenditure was adjusted using regional price deflators for urban and rural areas.

2.2.2. Calculation of Total Income

Total income for each household was calculated as the sum of agricultural income (net of costs), wages, self-employment income, social benefits, child allowances, net remittances, other revenues, and rent from real estate assets. (Charts 8, 9 and 10 in the Appendix show the composition of income by source, for each of the three income groups we define.)

Agricultural net income was obtained as the sum of agricultural revenues and consumption of agricultural production, less costs. Consumption of crops and animal products were valued at resale prices. When prices were not available, median prices by commodity and area were used. Revenues from the production of livestock included the net value of purchases, sales, and consumption.

Income from dependent jobs includes take-home pay (net of taxes), plus the value of benefits received, if there were any. Income from social services was mostly payments under old age pension programs. Child allowance were extracted from different sections of the questionnaire, since it was reported in combination with salary or social program payments. Other components of income were very small, and include the value of net remittances, and actual and potential revenues from owned properties. Net remittances were calculated as the difference between amounts received and amounts given out. Amounts remitted to other households are excluded from the originating household's disposable income. Revenues from owned properties include the actual rent amounts received, and if not rented, estimates of the potential rent revenue that could be received (using the median of the rental value of each unit by location).

2

OBSERVATIONS AND COMMENTS ON THE SURVEY RESULTS

Overall, 1628 households (nearly three quarters of the sample) reported higher aggregate expenditures than their monthly incomes. In the "cleaned" sample of 2259 households, 29 households have monthly expenditures that are more than ten times larger than their reported monthly incomes, 75 have expenditures more than five times their monthly incomes, and 530 households have expenditures more than two times their reported monthly incomes.

This could be attributed to various factors, one being the high annual inflation rate of around 100% in 1995 coupled with a prolonged, continuous decline in real income that started in 1990. It is expected that such a long and persistent income decline would lead to many households financing a large part of their consumption stream by drawing on savings, resulting in expenditures larger than incomes. Clearly this is not sustainable; savings would become depleted.

Another possible explanation is that families tend to make bulk purchases of scarce food commodities, such as sugar, vegetable oil, and canned products. Since households were asked about their purchases within the last thirty days, it is very likely that figures reported include expenditures on bulk purchasing of some food commodities that would be consumed over a period longer than a month. Other one-time lump-sum non-food expenditures, such as money spent on the purchase of a car or furniture, could fall in the survey period, leading to overestimates of average monthly individual household spending. It is also possible that commodities bought on credit to be paid over some time span in the future are reported in total in the month in which the transaction is made.

All these factors combined make reported expenditures a questionable measure of welfare, since the monthly figures are subject to large fluctuations. Therefore, in this paper, we use monthly household income per capita as the welfare measure variable, although some adjustments to total household income figures had to be made before further analysis.

On examining total household monthly incomes, we noticed that some households had monthly incomes much larger than might be expected. Close inspection of the various sources of income revealed that a number of households were reporting very high agricultural revenues, but very small agricultural costs, reflecting large net agricultural incomes. We assumed that if a household is engaging in major agricultural production, which we defined to be more than 10,000 levs per month of production value, but is reporting costs corresponding to less than 10% of the reported production value, then there must be inaccurate reporting, and these households were dropped from the sample. Using this criterion, the total number of such households that were dropped form the sample was 73. The reason why it was not considered necessary to eliminate households below the threshold agricultural income is that LSMS data include the value of "backyard" agricultural production when calculating agricultural revenues. Small scale "backyard" production for the household's private use may well have negligible costs, and thus eliminating those households would not be appropriate.

After "cleaning" outliers from the income data, households were classified according to regionally deflated and seasonally adjusted real household incomes per capita into three categories: low and low-middle income, high-middle income, and high-income. The poverty line used is 2000 levs a month, or one US dollar a day per person (at the 1995 average exchange rate of 67 levs per US dollar), or 30 US dollars a month per person.[2] We consider households with per capita incomes larger than two times the poverty level to be high-income. This leaves all households that earn between 2000 and 4000 levs per person per month in the middle-income category. We additionally divide the middle-income group into two groups: low-middle and high-middle. The division point is taken to be 1.25 times the poverty line, that is, 2500 levs. These criteria
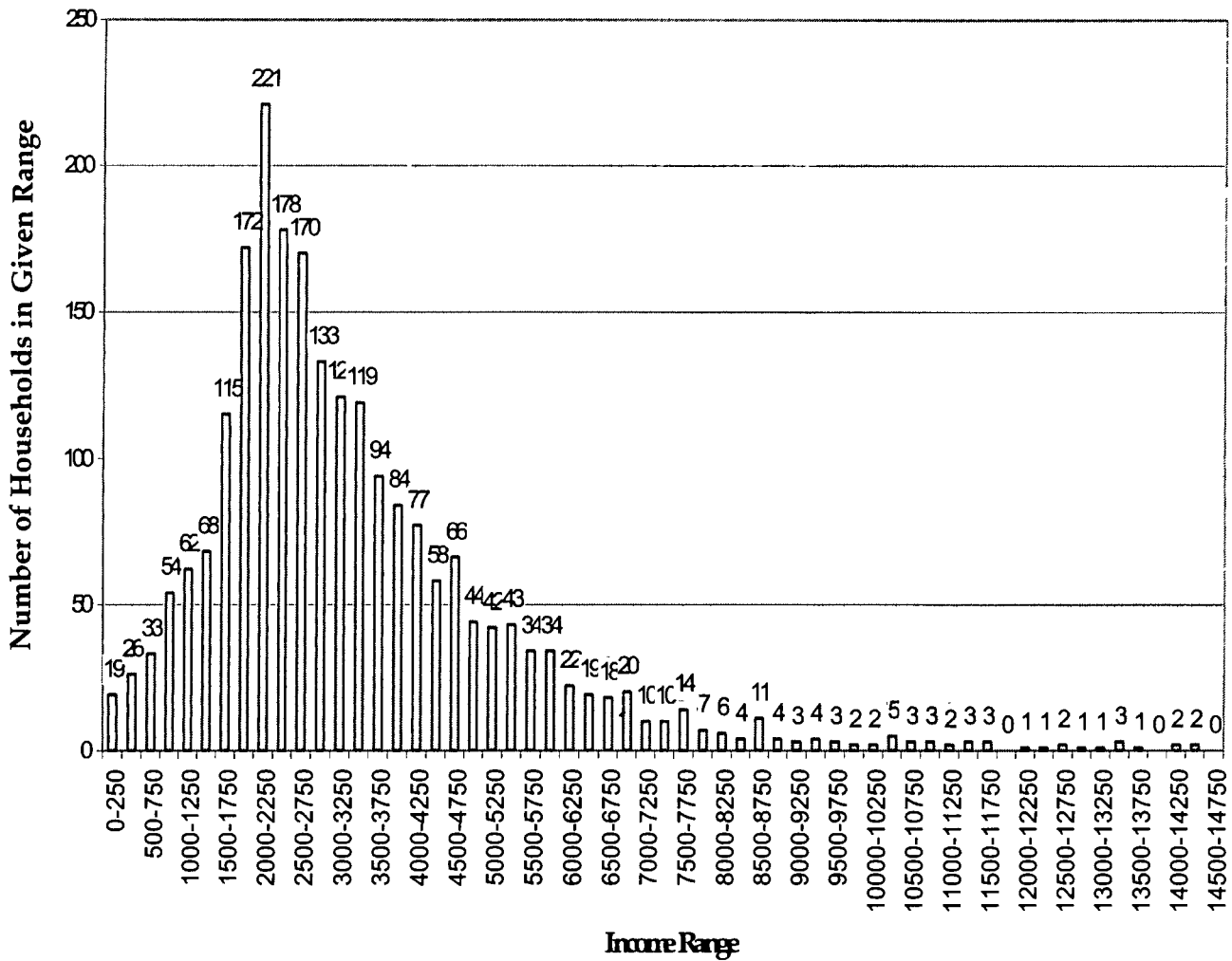
---

[2] One dollar per day is the World Bank standard criterion for poverty, and is widely accepted.

put 549 households in the low income group, 399 in low-middle income, 721 in high-middle, and 590 in the high income group. The distribution of households in the sample by income is illustrated in Figure 1. [3]

The cigarette data collected in the survey include consumption and expenditures. The households were first asked if they had at least one smoking member, and those who did were asked how many packs of 20 cigarettes the household smoked per month, and how much they paid per pack on average. Just under half of all households (44.5%, 1006 households) include at least one smoker. The proportion varied by income: about 37.7% of the low and low-middle income households include smokers, 48% of the high-middle income group and 51% of the high income group are smokers. The number of "smoker households" in each income group was 216 low-income, 141 low-middle, 346 high-middle and 303 high-income households. As is typical in other countries, high income households paid more on average for a pack of cigarettes than lower income households: 26.4 levs, as opposed to 21.1 and 22.6 paid by the low/low-middle, and high-middle income groups respectively.

---

[3] The survey also collected information on ethnic groups, which is often strongly correlated with poverty, and with smoking prevalence. We did not analyze the data through an ethnic lens, however. For the interest of the reader, Appendix Charts 1 and 2 show the distribution of the sample population and households by ethnic group, and chart 3 shows the percentage of households in each ethnic group that include one or more smokers. Charts 5 and 6 show the intensity of smoking across the ethnic groups, and the percentage of adults in each population group.

Figure 1: Distribution of Households According to Income per Capita

Number of Households in Given Range (y-axis)

Bar values (left to right): 19, 26, 33, 54, 62, 68, 115, 172, 221, 178, 170, 133, 127, 119, 94, 84, 77, 66, 58, 44, 42, 43, 34, 34, 22, 19, 18, 20, 10, 10, 14, 7, 6, 4, 11, 4, 3, 4, 3, 2, 2, 5, 3, 3, 2, 3, 3, 0, 1, 1, 2, 1, 1, 3, 1, 0, 2, 2, 0

Income Range (x-axis): 0-250, 500-750, 1000-1250, 1500-1750, 2000-2250, 2500-2750, 3000-3250, 3500-3750, 4000-4250, 4500-4750, 5000-5250, 5500-5750, 6000-6250, 6500-6750, 7000-7250, 7500-7750, 8000-8250, 8500-8750, 9000-9250, 9500-9750, 10000-10250, 10500-10750, 11000-11250, 11500-11750, 12000-12250, 12500-12750, 13000-13250, 13500-13750, 14000-14250, 14500-14750

3. METHODOLOGY

3.1. VARIABLES IN THE MODEL

This section estimates the price and income elasticities of consumption using a demand equation for cigarette consumption. The variables in the linear regression model are described in Table 1. Price and income are in logarithm form and both are seasonally adjusted, and in real terms.

The dependent variable for the model is the monthly number of packs of 20 cigarettes smoked by the household per capita. Consequently, the double-log functional form could not be used, since the dependent variable would be 0 for non-smoking households, and the logarithm of zero is undefined. Dropping non-smoking households would lead to sample truncation bias, because households that do not smoke face the same prices in the market but choose not to consume.

5

Table 1: Variables in the Model

Sample Size:
2259

Variables	Description of Variables	Mean	Std. Error
Dependent Variable:			
QUANTIPC	Number of packs of 20 cigarettes smoked by the household per month per capita.[4]	4.96	7.86
Independent Variables:			
PRICE	If the household is smoking, this is the average price paid by the household for a pack of cigarettes last month; if the household is not smoking, this is the average price faced by the household in their income quintile. The income quintiles are determined by using real income per capita figures for each household (regionally deflated).	22.99	7.52
INCOME	Total household income (seasonally adjusted & regionally deflated).	9352.25	7503.88
MEANAGE	Mean age of all members of the household.	47.1	19.28
MAXEDUC	Number of years of education received by the most educated household member.	10.79	4.02
ALCOHPC	Liters of pure alcohol consumed per capita in each household. Total pure alcohol consumed is calculated by taking 5% of the amount of beer, 12% of the amount of wine, and 40% of the amount of hard liquors reported to be consumed within the past month by each household.	0.363	0.642
MALERATIO	This is the ratio of number of adult males in each household to the size of the household.	0.392	0.265
MARRPROB	Dummy. [= 1 if the household has at least one member who is a widow(er), divorced, living separate from husband/wife, or is older than 35 and not married at all.]	Marrprob = 1 in 754 cases	
CONST	Regression intercept term.		

Source: Author's calculations using LSMS data

---

[4] Chart 4 in the Appendix shows the average number of packs smoked per household and per adult in households that include at least one smoker, by income group. The high income group has a higher smoking intensity than the other 4 quintiles.

The price elasticity of consumption can be computed only if price is included as an independent variable. When interviewed, smoking households were asked how much they smoked per month and the average price they paid per pack of 20 cigarettes. However, for non-smoking households, there was naturally no price reported. To resolve this problem, we divided the sample into quintiles according to real household income per capita, and assigned the mean price paid by the households in that income quintile as the price faced by the non-smoking households in that quintile. Mean prices were 20.8, 21.6, 21.8, 23.5 and 27.3 levs respectively for quintiles 1-5. Figure 2 shows that the most popular cigarettes in Bulgaria were priced at 20 levs, followed by 15, 16, 25, 18, 30 and 22 levs, in descending order of popularity.

Figure 2 Distribution of Prices Paid by Households (price per pack)
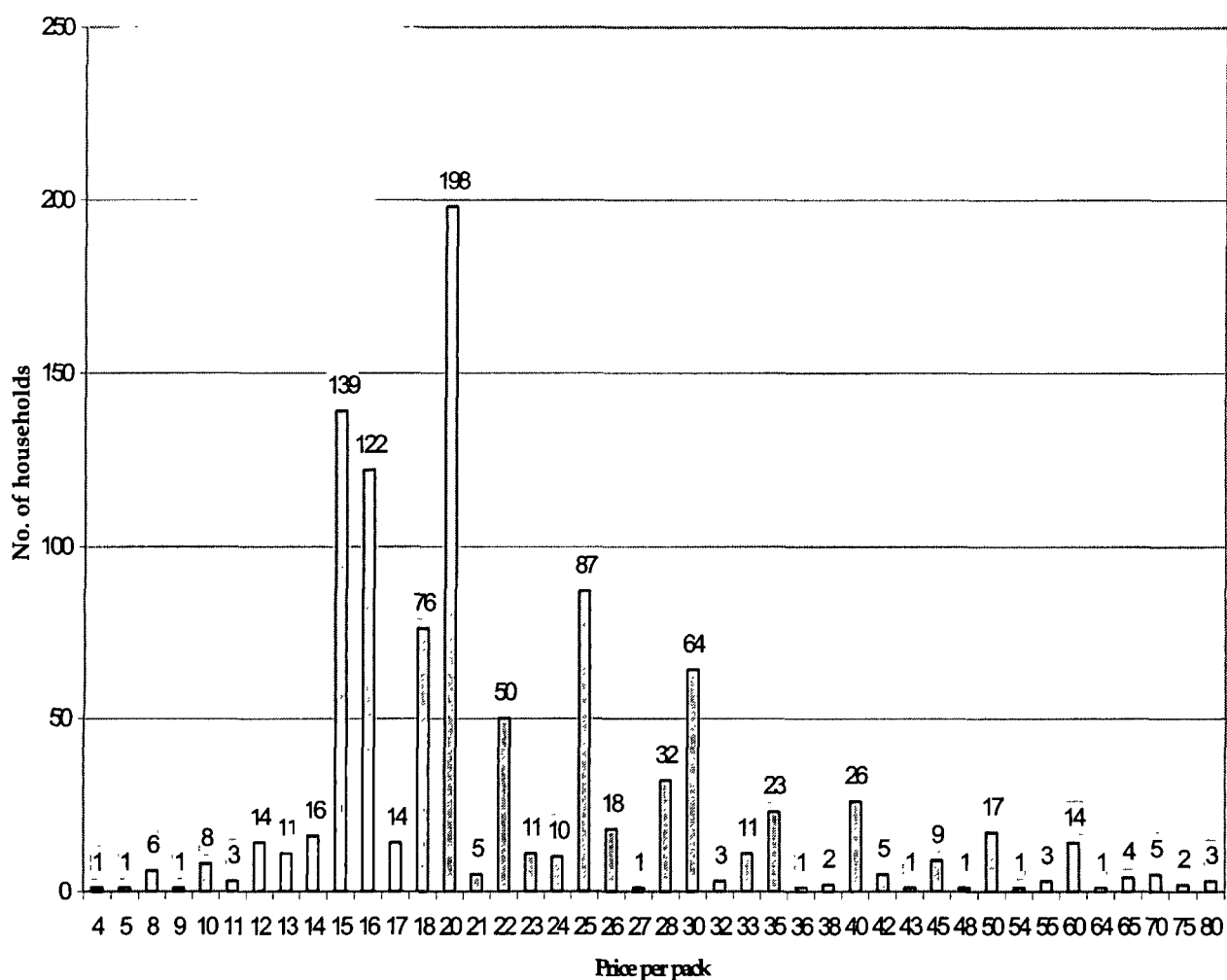
Source: Authors' calculations using LSMS data

We had access to, but not the option of including individual ages of household members in the regression equation, since quantity, price, and income variables were available only at the household level. Therefore, we used the average age of members of each household to define the variable MEANAGE. It is usually the

7

case in developed countries that as the average age of a household increases, the amount of smoking per capita goes up. This is because most smokers start as teenagers or young adults, and people who entered adulthood in the 1950s, 1960s and 1970s when smoking was highly popular, are more likely to have picked up the habit at the time, and thus to be smokers in the 1990s. In many countries, smoking incidence and prevalence has declined with gradually increasing awareness of the harms of smoking, and stricter policies and laws restricting public smoking. However, in Bulgaria, as in many other developing countries, age is negatively correlated with smoking prevalence. The older an individual is, the less likely that he smokes. This is due to two factors. First of all, smoking started gaining popularity in Bulgaria in the mid-1970s, reached high levels in the 1980s, and has become increasingly popular among young people since then. People who were middle-aged adults at the time of the survey were young – and hence most vulnerable to becoming smokers—in the mid-1970s. However, older people, aged above 50 years in 1990s, smoke less because the youthful vulnerable period was in an era when smoking was less common. The second factor is the Bulgarian population distribution, with high proportions in the older age groups. About 80% of the population is 18 years or older, 36% is 50 years or older, and about 24% is 60 years or older. With such high proportions having been young during periods when there was less smoking, coupled with the popularity of the habit among youths in 1990s, we expect a negative sign on variable MEANAGE. Summary statistics provided in Charts 6 and 7 in the appendix show the percentage of adults in the sample, within each income group, and within each ethnic group.

Education level might also affect the decision to smoke. More educated people are more likely to know about the harmful consequences of cigarette consumption, and hence perhaps less likely to smoke. Since we are dealing with household level data, the education variable used is the number of years of education of the most educated household member. It is reasonable to assume that the most well-educated household member might share what they know about the dangers of smoking with other household members, and perhaps influence their cigarette consumption. Calculating the average education level of the household was considered, but decided against. The presence of children who have not yet completed their education would pull down the household education average, even in households with highly educated non-smoking adult members, and perhaps obscure the relationship between education and smoking.

It is well-known that alcohol consumption highly complements cigarette smoking. In the LSMS survey, households were asked how many liters of beer, wine, or hard liquor they had consumed within the past month. Beer and hard liquor cannot simply be aggregated, so alcohol consumption data had to be weighted according to the type of drink consumed. We chose to apply weights that correspond to the average percentage of alcohol content, and thus to weight beer consumption by 0.05, wine by 0.12 and hard liquor by 0.40. The alcohol variable thus is a measure of pure alcohol consumption within the household, and included in per capita format.

In general, smoking prevalence is higher among men than women. Smoking status was not available individually for each member of the household, and thus prevalence among men and women separately cannot be determined. However, we can get some idea by defining an independent variable that is the ratio of adult males to household size. This variable is labeled MALERATIO and is also included in the model.

Finally, a dummy variable is included that isolates the effect of marital problems or isolation on the average smoking level in a household. It is expected that marital problems and loneliness lead to heavier smoking and perhaps also a higher percentage of smokers in a household. The variable MARRPROB takes a value of 1 if there is at least one household member who is a widow(er), divorced, living separately from their spouse, or is never married despite being at least 35 years of age.

8

3.2 THE MODEL AND ESTIMATION

Of the total number of observations of 2259 households, 1006 have at least one smoking member. The following regression model is estimated four times; for each of the three income sub-samples (the low and low-middle income group, the high-middle income group, and the high income group), as well as for the full sample:

$$QUANTIPC = const + \theta_1 \log(PRICE) + \theta_2 \log(INCOMEPC) + \theta_3 MEANAGE + \theta_4 MAXEDUC$$
$$+ \theta_5 ALCOHPC + \theta_6 MALERATIO + \theta_7 MARRPROB + \delta,$$

where δ is the error term.

Directly estimating this regression equation by ordinary least squares would lead to biased and inconsistent estimates of regression parameters, since the price variable is endogeneous, as verified by Wu-Hausman tests. Consequently, each regression is estimated by two-stage least squares (2SLS) with three instruments for log(PRICE): log(TAX), PAPER, and LENGTH.

The TAX variable is created using data from two sources. The first is a list of fixed retail prices of all tobacco products in Bulgaria from March 1994 until June 1995. Table 2 shows fixed retail prices of cigarettes in Bulgaria between January 3rd and June 1st 1995. The price list includes five major categories: luxury cigarettes, prime quality and brand marked cigarettes, popular cigarettes, non-filtered cigarettes, and finally other tobacco products, such as cigars, cigarillos and pipe tobacco. We are interested in the first four categories, which make up almost all of the tobacco market in Bulgaria. The first category, luxury cigarettes, contains all imported brands, such as Marlboro, Rothmans, etc. The other three groups are all domestically produced cigarettes, and are further categorized by the length of cigarettes (69mm, 80mm, 85mm, or 100mm), by whether they are sold in carton or paper packs of 20 cigarettes, and by brand names. Therefore, given the prices reported by households (see Figure 2), we were able to easily determine the quality and length of cigarettes a household smoked, and whether they purchased them in carton or paper packs. In this way, we defined dummy variables PAPER and LENGTH. PAPER takes on the value 1 if the cigarettes are sold in paper packs, and zero otherwise. LENGTH takes on a value of 1 if the cigarettes are 100mm in length, and zero otherwise.

9

Table 2: Fixed Retail Prices of Cigarettes in Bulgaria (Jan 1 - June 1, 1995)

Description of Cigarettes (Quality, etc)	Price (Levs)
Imported Luxury Cigarettes:	
• Marlboro, Rothmans, Winston, Camel, Kent, West, etc.	75
Licensed **Imported Luxury Cigarettes:**	
• Marlboro, Rothmans, Winston, Camel, Kent, West, HB	65
Prime Quality and Brand Marked Cigarettes:	
<u>Domestic Production 100mm:</u>	
Carton pack:	
• Vector, American/Virginia blend	35
• Sredetz, Femina, Bridge	28
Paper pack:	
Sredetz, Bridge, Fenix	26
<u>Domestic Production 80mm & 85mm:</u>	
Carton pack:	
• Victory	33
• Dji D, Golden Eagle	32
• BT Deluxe, Victory (red and brown), MM, Reks, Welcome (red and green), Seven Hills, Marsa	28
Popular Cigarettes:	
<u>Domestic Production 100mm:</u>	
Carton pack:	
• Sunny, Nevada, Golden Sun	25
Paper pack:	
• Sunny, Nevada, Golden Sun	22
<u>Domestic Production 80mm & 85mm:</u>	
Carton pack:	
• Sredetz, Prestige, Nevada, Golden Sun, Vector (American and Virginia blends), Legal, Job, Moon	20
• BT, Femina (blue,red,green), Rodopi, Fenix, Pleven, Chaskovo, Shoumen, Kenton (blue, green, yellow), Florida, Summer, Melnik, Club R, Radoev, Ok, Pirin, Bridge, Arda, Na-na, Nevada	18
Paper pack:	
• BT, Rodopi, Fenix, Pleven, Chaskovo, Shoumen, Kenton (blue, green, red), Slantze, Express, Vidin, Femina (blue, red), Alia, Na-na	
• Arda, Stuardessa, Opal, Inter, TU 134, Rado, OK, Frema, Alia, Na-na	16
	15
Non-filtered Cigarettes:	
<u>Domestic production 69mm & 85mm:</u>	
• Yantra, Dunav, Arda, varna, Rodopi, Slantza, Rali	8

10

The other useful information available is a list of specific excise tax rates[5] that Bulgarian authorities assigned according to the cigarettes "quality" group. From April 1st until June 18th 1995, these taxes were 20 levs for a pack of luxury cigarettes, 12 levs for a pack of premium filter-tipped cigarettes, 6 levs for a pack of regular filter-tipped cigarettes, and 2 levs for a pack of non-filtered cigarettes.[6] Since we could easily identify the category of cigarettes from the price reported by the households, we could also determine how much tax was being paid by these households. Following this method, we assigned specific excise taxes of 2 levs if the price paid per pack was less than or equal to 14 levs, 6 levs if price paid was between 15 and 25 levs inclusive, 12 levs if price paid was between 26 and 45 levs inclusive, and 20 levs if price paid was greater than 45 levs. Besides excise taxes, there is also a 20% Value Added Tax that corresponds to about 18% net on retail prices.

Finally, the total tax paid on a pack of cigarette is defined as:

$$total\ tax = specific\ excise + 0.18 \times (retail\ price).$$

At the first step for 2SLS, log(PRICE) is regressed on log(TAX), PAPER and LENGTH and all other exogenous variables in our model to obtain predicted log(PRICE) values. At the second step, the log(PRICE) variable in the original model is replaced by the predicted log(PRICE) values from the first step and the equation is re-estimated. 2SLS results are reported in Table 3.

The presence of heteroskedasticity is verified by Breusch-Pagan LM tests, and therefore, all reported results employ heteroskedasticity-robust Newey-West standard errors. It is worthwhile to note here that, with heteroskedasticity, all regression coefficients are still consistent and unbiased, but they are not best, that is, they do not have the minimum variance among all linear and unbiased estimators. Therefore, the presence of heteroskedasticity does not bias the elasticity estimates, even whether or not the Newey-West standard errors are used.

3.3. DISCUSSION OF RESULTS

All variables in the overall estimation are significant at the 1% level. Price and income elasticities in each income group are obtained by dividing the corresponding coefficients on log(PRICE) and log(INCOME) by the average quantity consumed within that income group. The coefficient on MEANAGE is –0.118 implying that if the mean household age goes up by one year, then the number of packs consumed per capita goes down by 0.118 packs per month, holding other variables constant. The sign of this variable is as expected, as discussed in Section 3.1. Across income groups, the negative effect of high age on quantity consumed increases as income level increases.

The education variable MAXEDUC has a coefficient of –0.126. So for each additional year of education of the most educated household member, consumption per capita goes down by about 0.126 packs per month, holding everything else constant. This variable has the correct sign, but is not statistically significant for the lowest income group. This could be because there is limited variation in education level within this group, so the regression cannot identify a strong correlation. Among low and lower-middle income households, only 18% have at least one member with university education. This value is 28% and 32% for upper-middle income, and high income groups respectively, and the coefficient on the education variable is significant for the upper-middle and high income groups.

---

[5] Copyright DMG Business Media

[6] Up until July 1st 1996, Bulgarian authorities assigned specific excise taxes by the "quality" of cigarettes. After this date, a flat ad valorem rate of 60% was introduced for all cigarettes, both domestic and imported. This new flat rate was introduced with a view to Bulgaria's membership in the World Trade Organization for which negotiations were entering the final stage.

The "pure" alcohol consumption variable is significant in each income group, and for the full sample estimate, where the coefficient is 3.24, indicating that if per capita alcohol consumption in the household goes up by 1 liter per month (corresponding to 20 liters of beer, or 8.3 liters of wine, or 2.5 liters of hard liquor or some combination), then cigarette consumption per capita is expected to go up by 3.24 packs, holding everything else constant. This result verifies the strong correlation between cigarette and alcohol consumption noted in the global literature.

On the other hand, the coefficient on MALERATIO is significant in all income groups and overall. Since adult male prevalence rate is 50% compared to 25% for adult females, the results are as expected. An overall coefficient of 5.291 on this variable indicates that if the ratio of adult males in the household goes up by 0.1, then the monthly cigarette consumption per capita is expected to go up by 0.53 packs, holding everything else constant.

Finally, the dummy variable, MARRPROB, that captures households situations where adults are not living with a spouse, is significant at the 1% level only for the full sample. A coefficient of 0.826 on this variable tells us that households with at least one member without a spouse present in the household smoke 0.83 packs more per month per capita than households with married couples.

As would be expected, the log(INCOME) variable is highly significant for the full sample, but loses statistical significance in the estimations for income sub-samples, where the variations of income are fairly narrow. In Bulgaria, on average, 40% of household income comes from government social benefit transfers. As illustrated in charts 8-10, on average about 59% of household income in the low and lower-middle group comes from social benefit transfers, and only 27% from wages. For the upper-middle income group, on average 34% of income is from social benefit transfers, and 44% is from wages. In the high income group, these figures are at 17% for social benefit transfers, and 50% for wages. These figures clearly illustrate the remnants of a socialist regime under which income equality of all households were favored. This makes pre-transfer households income distribution very different from the distribution net of transfers, since the high benefit transfers reduce income inequality, and lower the variation in incomes. It is likely that if the analysis were to be conducted using only non-transfer income, then the income variable would be statistically significant.

Price elasticities are −1.33 for the low and lower-middle income group, about −1.00 for the upper-middle income group, and −0.52 for the high income group. This gradation is as to be expected from economic theory and common sense: people with lower incomes are likely to react more to prices changes. However, it is a notable finding, both because it varies so monotonically with income, and because very few other published analyses have the data needed to be able to disaggregate the estimates of elasticity in this way. Overall price elasticity is about −0.80, and this figure is consistent with estimates of price elasticities for other developing countries. Price and income elasticities are to be interpreted in the usual way: for example, if cigarette prices go up by 10%, overall cigarette demand per capita would be expected to go down by 8%.

12

Table 3: Two-Stage Least Squares Regression Results

Dependent Variable: QUANTIPC	LOW AND LOW-MIDDLE INCOME No = 948	HIGH-MIDDLE INCOME No = 721	HIGH INCOME No = 590	OVERALL No = 2259
Independent Variables	Coefficient (t- statistic)	Coefficient (t- statistic)	Coefficient (t- statistic)	Coefficient (t- statistic)
LOG(PRICE)	-4.707*	-5.363*	-3.539*	-3.974*
	(-3.784)	(-3.447)	(-2.625)	(-4.884)
LOG(INCOME)	0.567	2.700	0.491	1.663*
	(1.386)	(1.214)	(0.399)	(6.297)
MEANAGE	-0.090*	-0.119*	-0.161*	-0.118*
	(-9.457)	(-7.889)	(-7.483)	(-15.034)
MAXEDUC	-0.042	-0.205**	-0.189**	-0.126*
	(-0.787)	(-2.536)	(-2.116)	(-3.088)
ALCOHPC	2.719*	2.570*	4.306*	3.240*
	(4.324)	(4.139)	(6.485)	(7.557)
MALERATIO	2.855*	6.309*	7.233*	5.291*
	(3.687)	(4.009)	(4.909)	(7.253)
MARRPROB	0.406	0.925**	1.151	0.826*
	(1.046)	(2.043)	(1.627)	(2.950)
CONST	16.400*	3.800	17.736	7.322*
	(3.746)	(0.207)	(1.662)	(2.825)
Price Elasticities	-1.329	-1.016	-0.518	-0.802
Income Elasticities	not significant	not significant	not significant	0.335

*significant at 1%   **significant at 5%

Source: Authors' estimates

13

4. TAXATION AND THE POOR

This section answers the following question: If a tax revenue-maximizing specific excise tax increase on cigarettes in Bulgaria were to be implemented, how much additional tax burden, if any, would be imposed on the poor? Is it possible to have a regressive tax, for which tax increases would be progressive?

The estimated price elasticities from the previous section are used to simulate the change in cigarette demand (and hence, in government revenues) that would be brought about by a specific excise tax increase. In order to assess the additional burden created by the tax increase, the resulting change in cigarette expenditures as a share of total incomes is calculated by income group. Finally, Lorenz curves for income are compared with pre- and post-tax increase concentration curves for total taxes on cigarettes, to determine the regressivity or progressivity of the taxes and tax increases.

There is no study in the literature that provides an analysis of cigarette taxation and related inequality in Bulgaria, and few for other countries. A small number of key studies in the related literature deserve to be mentioned, even though they do not focus on Bulgaria.

Borren *et al* (1992) evaluate the question of whether or not increases in cigarette excise taxes are regressive in the United Kingdom. They conclude that income does not have a strong impact on smoking, and that "the re-distributive effects on tax paid and welfare are regressive on average." They do not speculate on whether their findings might generalize to countries like Bulgaria, where incomes are significantly lower than in the United Kingdom.

Browning (1978) takes a general-equilibrium approach to argue that excise taxes are progressive elements in a tax system where government transfers are an important source of income, since governments can easily redistribute the tax revenues. This paper does not address re-distributive issues. But it does address a question that Browning (1978) did not consider: whether increases in excise taxes within such a tax system make them more progressive or regressive.

Quite opposite to the findings of Borren et al. for the United Kingdom, this study shows that as income goes up, the intensity of smoking increases in Bulgaria. This finding is contrary to the more common situation where smoking prevalence is higher among the poor. Moreover, this paper constitutes a real example where a revenue-maximizing increase in excise taxes could be progressive for a developing country, in contrast to the general belief that excise tax increases are regressive.

Table 4 gauges the intensity of smoking in each income group. A household is considered to be smoking if at least one member of the household is a smoker. The average number of adults per household in each income group is approximately 2.4 adults.[7] Therefore, the higher intensity of smoking as income increases cannot be attributed to the presence of relatively more adults in higher income households, but rather to the fact that income is higher.

---

[7] All individuals of at least 16 years of age are considered adults. Appendix Chart 7 shows that the total proportion of the sub-samples made up by adults rises with income, from 75% for the low income group, to 84% for the high income group.

Table 4: Smoking Intensity

	Income Group			
	Low and Lower-Middle	Upper-Middle	High	Overall
Percentage of households smoking	32.3	43.5	51.4	42.5
Average price paid per pack (leva)	17.2	21.7	28.9	22.1
Average number of packs consumed per smoking household per month	29.7	33.1	37.5	34.1

Source: Derived from the LSMS household survey on Bulgaria, 1995.

The total tax rate on cigarettes in Bulgaria is considerably lower than in all European Union (EU) countries. In our sample, the total tax rate (excise and VAT) on cigarettes in Bulgaria is equal to 51% of the retail price on average. EU regulations currently require members to maintain an excise tax rate of at least 57% of the retail price. Total tax rates in EU range from 68% in Luxembourg to 81% in Denmark. Given these facts, we suggest a revenue-maximizing specific excise tax increase on cigarettes in Bulgaria.

Given our price elasticity estimates, the revenue-maximizing specific excise tax increase is 72% from its level at the time of the survey. The effect of this tax increase on consumption, expenditure, and tax revenues are simulated using the Stata program and are summarized in Table 5.

Table 5: Effects of 72% Increase in Specific Cigarette Excise Taxes on Variables of Interest

	Income Groups							
	Low and Lower-Middle		Upper-Middle		High		Overall	
	Before	% change after tax increase	Before	% change after tax increase	Before	% change after tax increase	Before	% change after tax increase
otal quantity onsumed within oup (packs, onthly)	11,404	-36.7	11,685	-28.3	11,358	-14.3	34,447	-26.5
otal expenditure on garettes within oup (monthly, in va)	236,146	-19.9	260,583	-8.7	296,922	+9.3	793,651	-5.3
otal tax paid within oup (monthly, in va)	119,912	-3.5	132,481	+10.7	150,854	+24.9	403,247	+11.8

urce: Derived from the LSMS household survey on Bulgaria, 1995

An excise tax increase of 72% leads to an increase in the retail price of a pack of cigarettes by 28% on average, assuming that all of the tax increase is passed onto consumers. This would raise the cigarette excise

tax from 33% of the retail price to 42.5% of the retail price on average. However, this value is still short of the EU required 57%. We also observe that total tax as a percentage of the retail price rises from 51% to 60.5% on average, but even after the rise it would be lower than all EU countries.

Table 5 shows that the tax increase would lead to a sharp decline in consumption, especially among relatively poorer households. This follows from the magnitudes of the price elasticity estimates. Before the tax increase, each income group consumes about one-third of total cigarette sales. After the tax increase, these proportions change to 28.4%, 33.1% and 38.5% from lowest income group to the highest respectively.
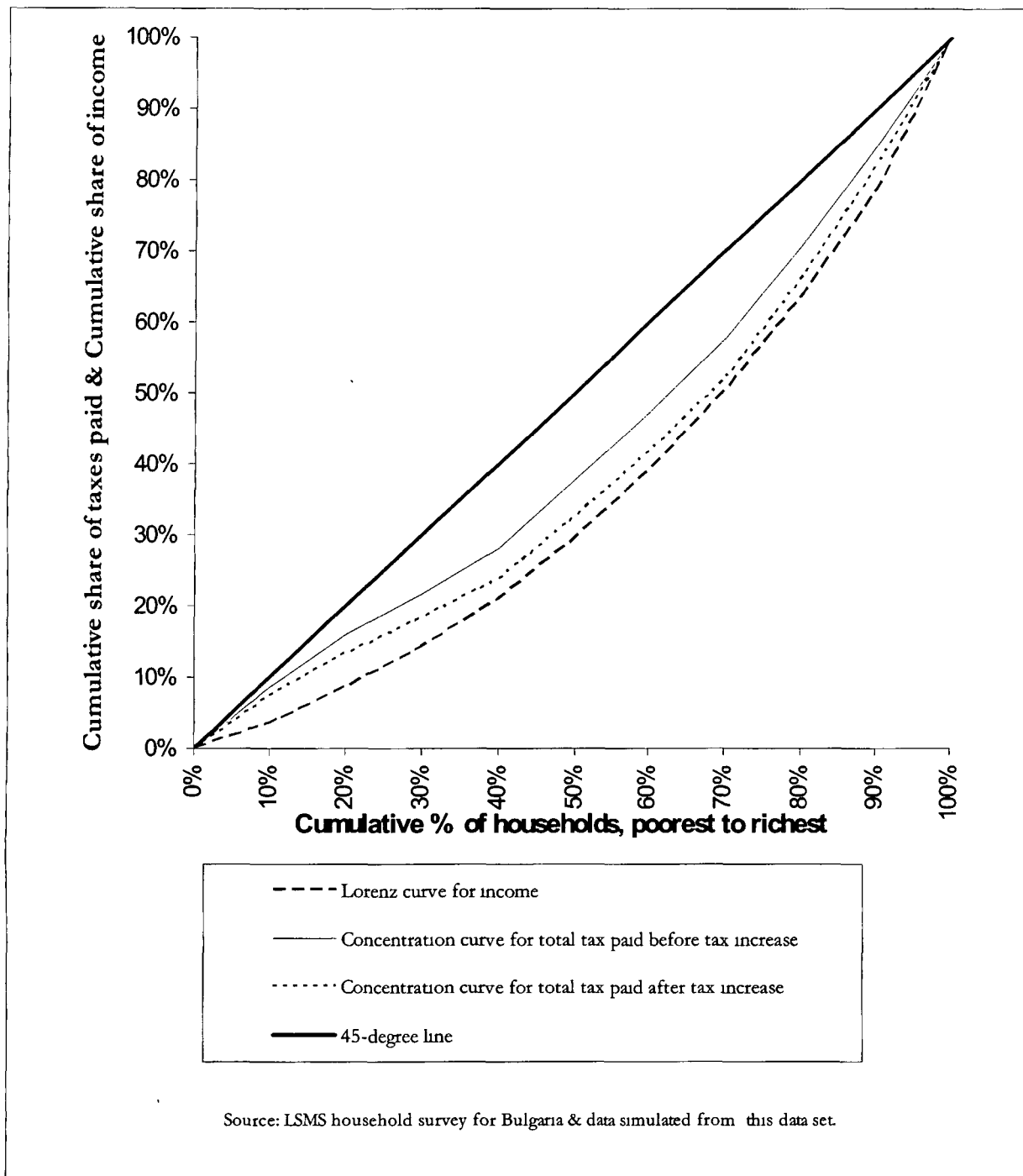
Policy makers are likely to be concerned about the impact of this tax increase on the poor. Before the tax increase, the low and lower-middle income group spent about 4.9% of total income on cigarettes, while this figure was 3.8% and 3.1% for the upper-middle and high income groups respectively. After the tax increase, the share of income spent on cigarettes becomes more equal across the groups: 3.96%, 3.45%, and 3.43% respectively from the lowest income group to the highest.

How about the progressivity of the excise tax increase? Before the tax increase, the low and lower-middle income group paid 29.7% of the total tax, whereas the upper-middle and high income groups paid 32.9% and 37.4% of total cigarette taxes respectively. After the tax increase, these figures change to 25.7%, 32.5%, and 41.8% respectively from the lowest income group to the highest. The tax increases reduces the tax burden on the low and lower-middle income group, and increases the tax burden on the high-income group. The tax share of the upper-middle income group decreases very slightly.

In Figure 3 concentration curves for total cigarette taxes paid before and after the tax increase are plotted on the same diagram as the Lorenz curve for income.[8] This figure illustrates the well-known fact that cigarette excise taxes are regressive, with tax concentration curves that lie above the Lorenz curve for income. However, increases in excise taxes need not be regressive. The figure shows that the revenue-maximizing specific excise tax increase moved the concentration curve closer to the Lorenz curve, implying a more progressive total tax after the increase, than before. This is as expected, since an increase in the specific excise tax will result in a proportionally smaller increase in the tax burden of poor households than of more affluent households, given the price elasticity estimates.

---

[8] A tax whose concentration curve is below the Lorenz curve is progressive, and a tax whose concentration curve is above the Lorenz curve is regressive.

Figure 3: Concentration Curves for Total Tax Paid, compared to Lorenz Curve for Income

- - - - Lorenz curve for income

——— Concentration curve for total tax paid before tax increase

· · · · · · Concentration curve for total tax paid after tax increase

——— 45-degree line

Source: LSMS household survey for Bulgaria & data simulated from this data set.

17

5. CONCLUSION

In Bulgaria, the available data indicate that as income increases, the intensity of smoking also increases. Furthermore, the higher intensity of smoking as income increases cannot be attributed to a larger number of adults in higher income households, but appears to be a pure income effect.

A 72% revenue-maximizing specific excise tax increase on cigarettes in Bulgaria would lead to a 28% increase on average in the retail price of a pack of cigarettes, assuming that all of the tax increase is passed onto consumers. Given price elasticity estimates of -1.33, -1.02, and -0.52 respectively from the lowest to the highest income group, the overall consumption of cigarettes would decline by 26.5%. Total overall expenditure on cigarettes would decline by 5.3%, much less than the decrease in the number of packs of cigarettes that would be smoked. Total government revenues from cigarettes would rise by 11.8% as a result of the tax increase, implying a specific excise tax elasticity of cigarette revenues of 0.164.

Effects of the tax increase on the poor are beneficial: the share of the tax burden on the low and lower-middle-income group would fall, as measured by the percentage of total cigarette taxes that would be paid by this group. Cigarette expenditures of the group would fall by about 20%, and consumption would fall quite dramatically by 36.7%. To the extent that the consumption fall is the result of smokers giving up (and not just reducing the number of cigarettes smoked) or non-smokers being deterred from starting to smoke, this would result in fewer smoking-related health problems in the future. Moreover, less money spent on cigarettes would mean more spent on other goods and services, which are more likely to have a beneficial effect, rather than the serious health risks of smoking. As a consequences of the tax increase, income groups would spend a more equal share of their income on cigarettes, whereas before the tax increase, lower income groups devoted much more of their income to cigarettes.

Lorenz and concentration curve comparisons illustrate that although specific excise taxes on cigarettes in Bulgaria are regressive, increases in specific cigarette excise taxes would be progressive.

This paper examined a specific excise tax increase on cigarettes in Bulgaria without discussing redistributive issues. The next research question that should be asked is how the additionally generated tax revenues could be used to decrease income inequality, decrease poverty, or otherwise improve welfare. This is an important issue in the case of Bulgaria since on average about 40% of household income comes from social benefit transfers from the government. In the case of poor households in the LSMS survey, this figure is about 58%. Therefore, the distributional impact of additional tax revenues is potentially large.

REFERENCES ·

Borren, Pim and M. Sutton. "Are increases in cigarette taxation regressive?" Health Economics, Vol. 1: 245-253 (1992)

Browning, Edgar K . "The Burden of Taxation," The Journal of Political Economy, Vol. 86: 649-671 (1978)

Chaloupka, F.J., T. Hu. K E Warner, R. van der Merw, and A. Yurekli, "The taxation of tobacco products," in Jha, P. and F.J. Chaloupka (editors), Tobacco Control in Developing Countries, Oxford University Press.

Fields, Gary S., Poverty, Inequality and Development. (New York: Cambridge University Press, 1980).

Van Walbeek, Corné. "The Impact of Tobacco Taxation on Consumption: The South African Experience," Presentation at 11th World Conference on Tobacco or Health, August 2000.

World Bank, Living Standards Measurement Study on Bulgaria (1995).

APPENDIX

Table 1. Regional and Provincial Distribution of Surveyed Households

Region Code	Region Name	Province Number	Province Name	Interviewed* HH	Res	All	Actual Population#
1	Sofia City	21	Sofia City	385	972	985	1,190,123
2	Bourgas	2	Bourgas	125	347	354	440,372
2	Bourgas	19	Sliven	62	190	199	234,785
2	Bourgas	28	Yambol	55	167	172	176,552
3	Varna	3	Varna	140	433	446	464,945
3	Varna	24	Dobrich	61	197	204	232,780
3	Varna	27	Shumen	60	179	181	220,320
4	Lovech	4	Veliko Tarnovo	98	285	288	318,252
4	Lovech	7	Gabrovo	48	125	130	161,987
4	Lovech	10	Lovech	55	127	140	190,262
4	Lovech	14	Pleven	95	271	285	346,614
5	Montana	5	Vidin	37	91	92	151,636
5	Montana	6	Vratsa	80	212	219	270,679
5	Montana	11	Montana	65	150	152	208,198
6	Plodviv	12	Pazardjik	85	239	255	326,123
6	Plodviv	15	Plodviv	205	618	648	734,495
6	Plodviv	20	Slolyan	50	134	143	159,752
7	Russe	16	Razgrad	45	120	125	167,410
7	Russe	17	Russe	80	202	208	288,702
7	Russe	18	Sillistra	45	131	139	161,063
7	Russe	25	Targovishte	39	105	109	151,339
8	Sofia Region	1	Blagoevgrad	95	311	315	351,637
8	Sofia Region	9	Kyustedil	59	167	168	181,347
8	Sofia Region	13	Pernik	55	132	132	163,307
8	Sofia Region	22	Sofia Region	90	293	295	289,962
9	Haskovo	8	Kardjali	55	192	197	213,806
9	Haskovo	23	Stata Zagora	114	343	363	397,339
9	Haskovo	26	Haskovo	85	249	255	295,503
			TOTAL	2468	6982	7199	8,489,290

*HH = Number of households interviewed.
Res = Number of respondents interviewed.
All = Total number of individuals in the households.

According to the national population count in December 1993.
Source: LSMS survey data

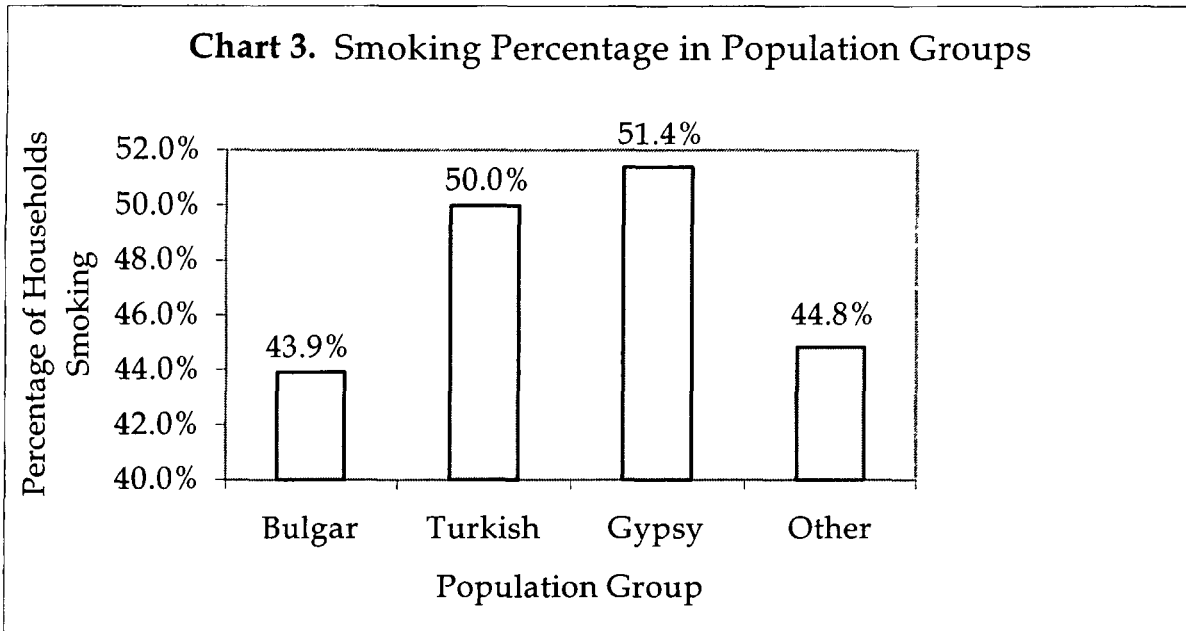**Chart 1. Distribution of Individuals in the Sample According to Population Group (LSMS data, Bulgaria, 1995)**

7.3% 4.6% 1.7%

Bulgar
Turkish
Gypsy
Other

86.4%
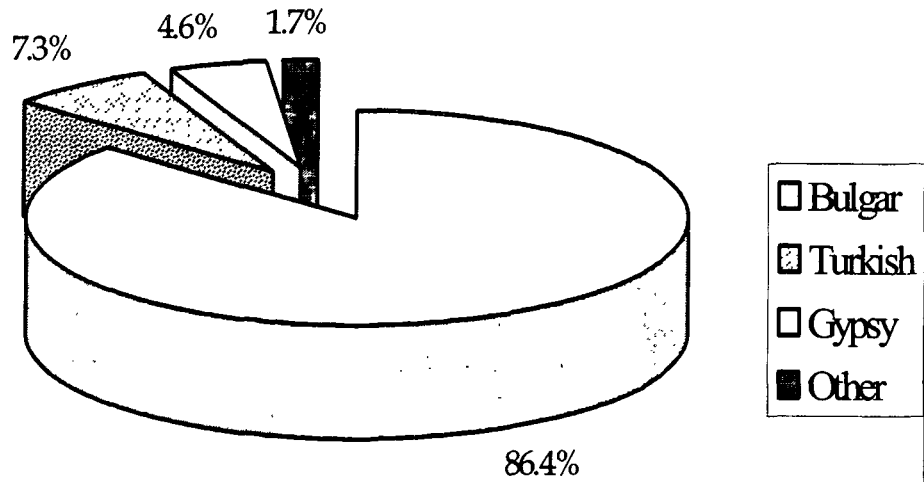
Source: Author's estimates using LSMS data

Chart 2. Distribution of Sample Households by Population Group (LSMS Data, Bulgaria 1995)
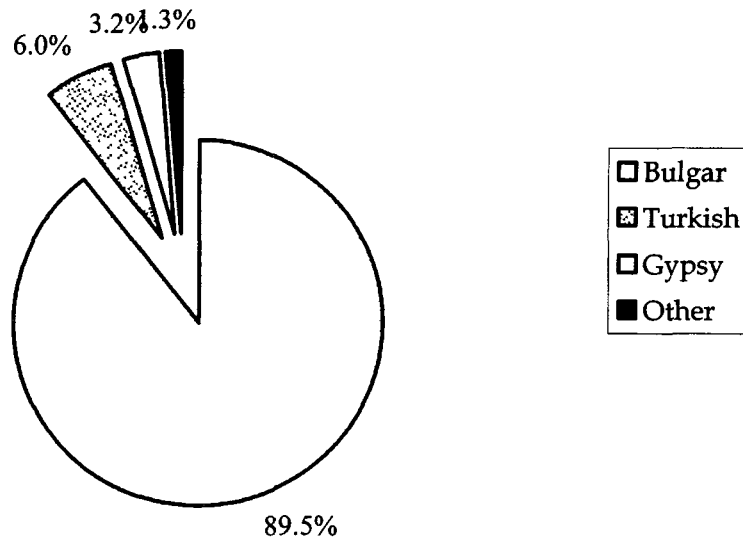
6.0% 3.2% 1.3%

Bulgar
Turkish
Gypsy
Other

89.5%

Source: Author's estimates using LSMS data

Chart 3. Smoking Percentage in Population Groups

Source: Author's estimates using LSMS data

Chart 4. Intensity of Smoking Among Smoking Households by Income Group

□ Average Packs per Smoking Household per Month

▦ Average Packs per Adult in Smoking Households per Month

Source: Author's estimates using LSMS data

23
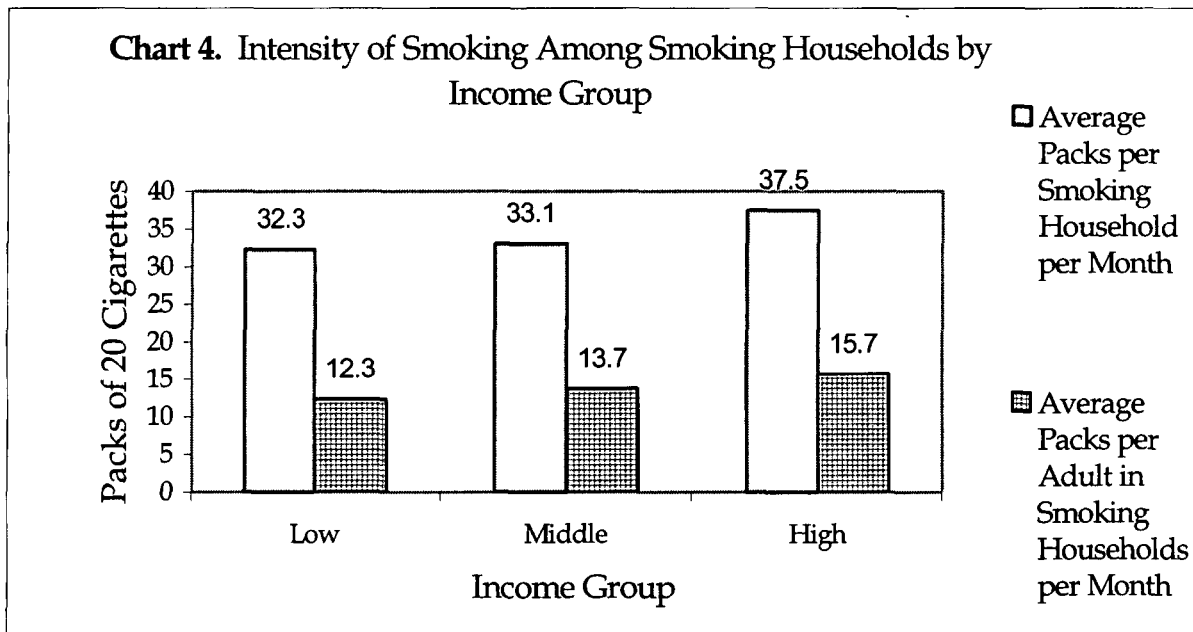
Chart 5. Intensity of Smoking Among Smoking Households by Population Group
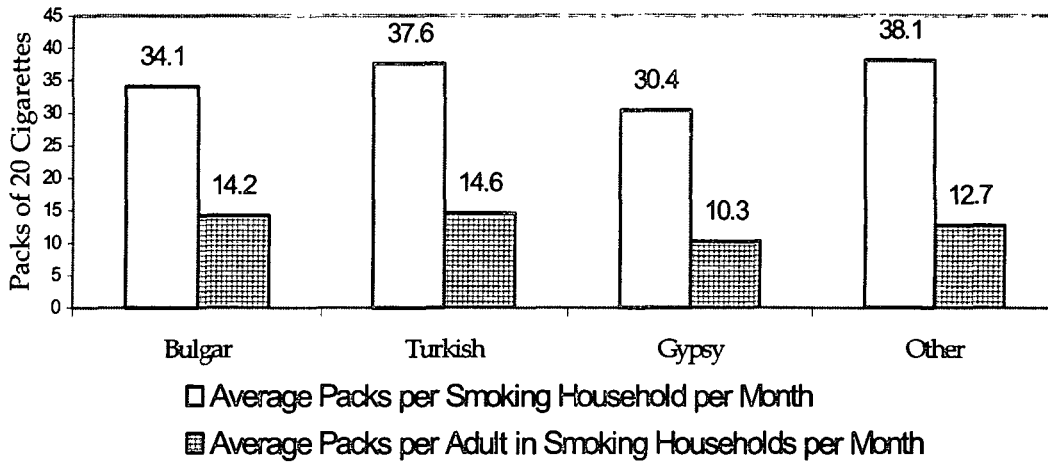
Source: Author's estimates using LSMS data

Chart 6. Percentage of Adults (age at least 18) in Each Population Group

Source: Author's estimates using LSMS data

24
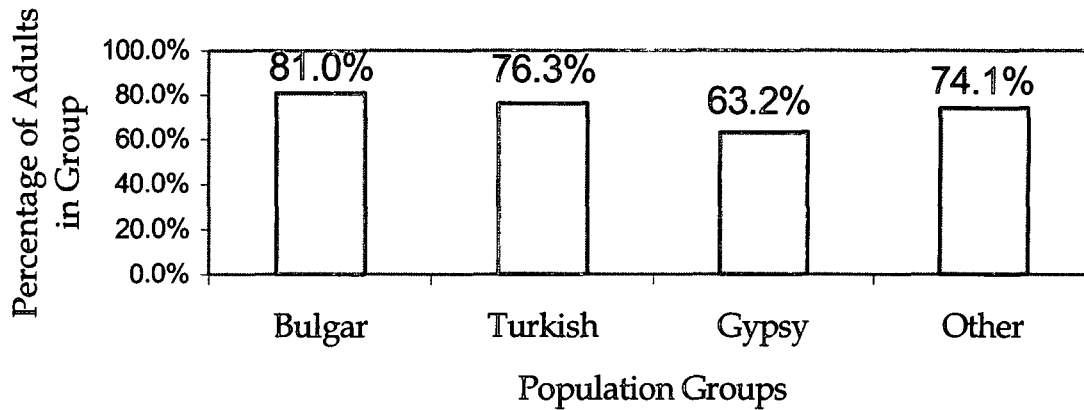
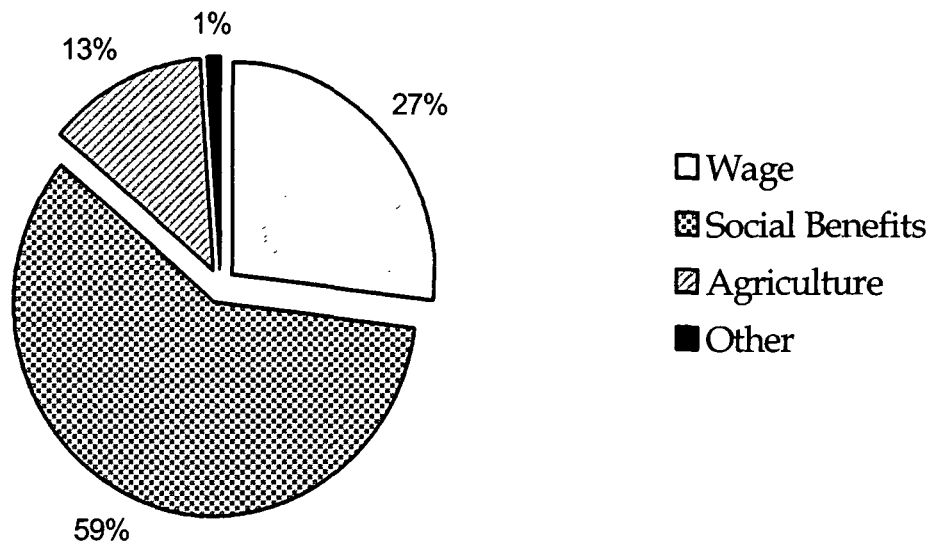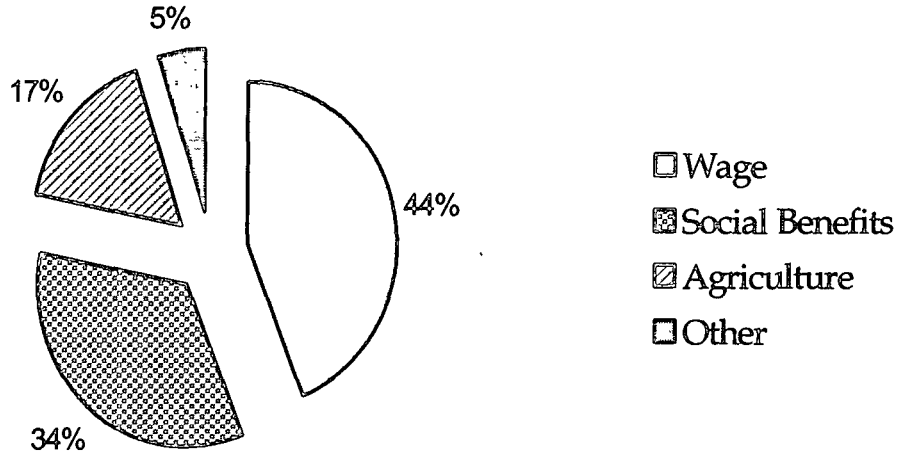**Chart 7.** Distribution of Adults by Income Group
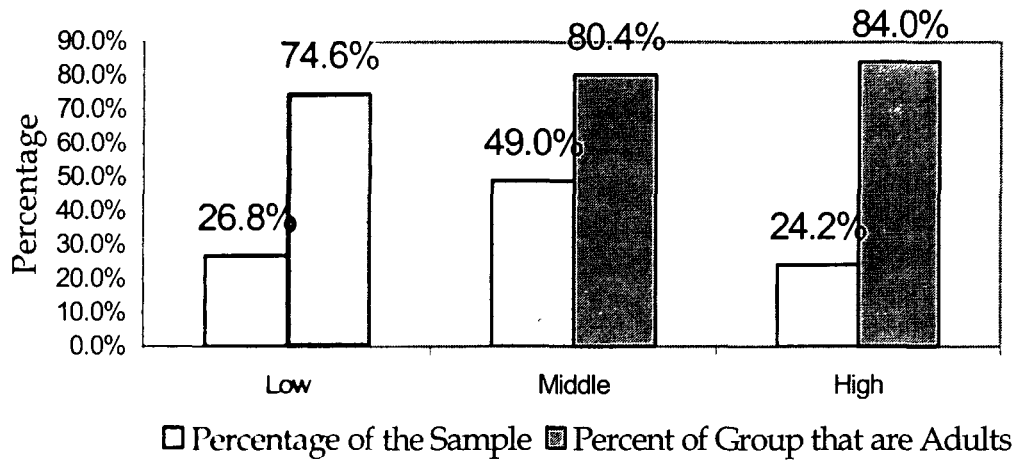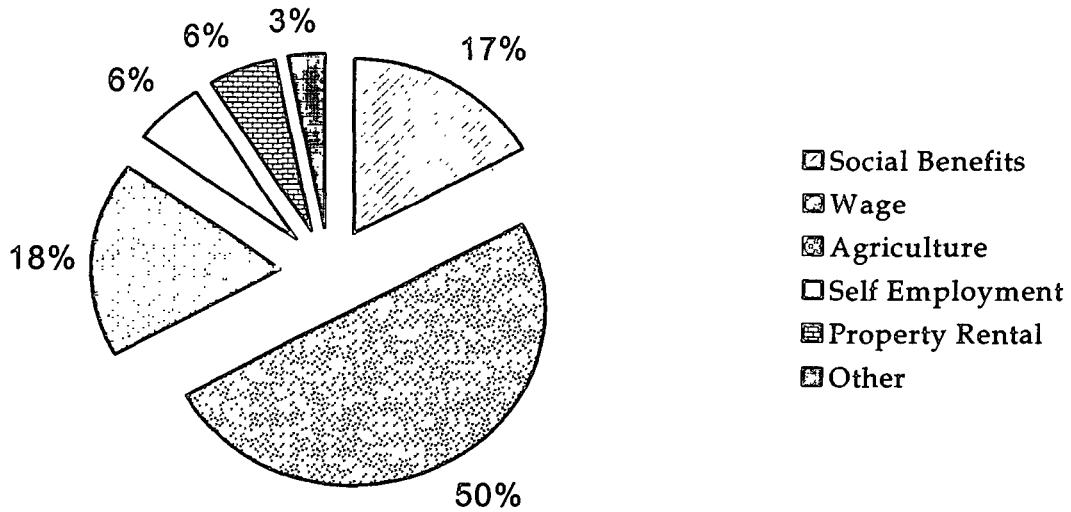

Chart 8. Components Making Up Income (Low and Lower-MI)

- ☐ Wage
- ⊠ Social Benefits
- ▨ Agriculture
- ■ Other

Source: Author's estimates using LSMS data

Chart 9. Components Making Up Income (Upper-MI)

5%

17%

44%

34%

☐ Wage
▨ Social Benefits
▨ Agriculture
☐ Other

Source: Author's estimates using LSMS data

Chart 10. Components Making Up Income (High-Income)

6% 6% 3%

17%

18%

50%

☐ Social Benefits
☐ Wage
▨ Agriculture
☐ Self Employment
▨ Property Rental
▨ Other

Source: Author's estimates using LSMS data

HEALTH, NUTRITION,
AND POPULATION

HNP

HEALTH, NUTRITION AND POPULATION
THE WORLD BANK

HUMAN DEVELOPMENT NETWORK

THE WORLD BANK

About this series...

This series is produced by the Health, Nutrition, and Population Family (HNP) of the World Bank s Human Development Network The papers in this series aim to provide a vehicle for publishing preliminary and unpolished results on HNP topics to encourage discussion and debate The findings, interpretations, and conclusions expressed in this paper are entirely those of the author(s) and should not be attributed in any manner to the World Bank, to its affiliated organizations or to members of its Board of Executive Directors or the countries they represent Citation and the use of material presented in this series should take into account this provisional character For free copies of papers in this series please contact the individual authors whose name appears on the paper

Enquiries about the series and submissions should be made directly to the Editor in Chief Alexander S. Preker (apreker@worldbank org) or HNP Advisory Service (healthpop@worldbank.org, tel 202 473-2256, fax 202 522-3234) For more information, see also www worldbank org/hnppublications.

The Economics of Tobacco Control sub-series is produced jointly with the Tobacco Free Initiative of the World Health Organization The findings, interpretations and conclusions expressed in this paper are entirely those of the authors and should not be attributed in any manner to the World Health Organization or to the World Bank, their affiliated organizations or members of their Executive Boards or the countries they represent.

The editors for the Economics of Tobacco Control papers are: Joy de Beyer (jdebeyer@worldbank.org), Emmanuel Guindon (guindone@who int) and Ayda Yurekli (ayurekli@worldbank.org).