tobaccotaxation
Economic Research Informing Tobacco Taxation Policy

Impacts of Tobacco Excise Increases on Cigarette Consumption and Government Revenues in Southeastern European Countries

Regional study

Albania, Bosnia and Herzegovina, Kosovo, Montenegro, North Macedonia, and Serbia

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Disclaimer

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Executive summary

Consumption of tobacco products, especially cigarettes in Southeastern Europe (SEE) imposes a significant economic burden on households and society in general. This report examines increases in the price of cigarettes through tobacco excise increases and their associated impacts on tobacco consumption, household expenditures, and tax burdens in different income groups as well as the impact of these increases on government revenues.

Using secondary data from household budget surveys (HBS) for periods ranging from 3 to 12 years, depending on data availability, in six countries (Albania, Bosnia and Herzegovina (B&H), Montenegro, North Macedonia, Kosovo, and Serbia), this research estimates the price and income elasticity of smoking prevalence and intensity, both for the full population and by income group.

For all countries studied, this research finds that price increases achieved through an increase in tobacco excises would result in lower consumption, higher budget revenues, and positive redistribution effects. In order to maximize the effectiveness of tobacco taxation policies, country specifics such as income growth, different elasticities, and behavioral responses of different income groups should be considered when designing policy. The findings are outlined in greater detail below:

- **Increasing excises (that results in the increase of cigarette prices) will result in lower cigarette consumption**

Results suggest that in all countries studied, a price increase of cigarettes will result in lower cigarette consumption. Therefore, if the excise increase leads to a price increase, tobacco consumption in the region will decrease. In most of the countries, the decrease in consumption stems from both a decrease in smoking prevalence and a decrease in the consumption of cigarettes by those who smoke. Prevalence elasticities range from as much as -0.636 in Montenegro to -0.165 in Albania, while in Kosovo prices do not impact the decision to smoke. Total elasticities range from -1.065 in Montenegro to -0.387 in Kosovo. The income elasticities range from 0.595 in North Macedonia up to 1.113 in Albania. Given that income elasticities in all countries studied are high, the response of consumers to excise increases will depend on the rate of income growth. Therefore, when designing the excise increase, policymakers should take into account the expected growth of income in the country. In other words, the increase of excises will result in lower consumption of cigarettes if it reduces the affordability of cigarettes.

- **An increase in cigarette excises will result in an increase in government revenue**

In addition, the change in government income from taxes levied on cigarettes is simulated for a scenario in which retail prices would increase either by changing the excise tax or by simultaneously changing the tax and producers' price. In all the countries the price increase would result in increased budget revenue.

The change in budget revenue would be the highest in Kosovo, with an estimated increase of 26 percent as a result of a price increase of 25 percent, followed by Serbia and Albania with over 17 percent increased revenues. The lowest increase in budget revenues could be expected in B&H, due to a very high price elasticity, where an increase in the specific excise of 25 percent (which would lead to a 17 percent price increase) would result in a 2.5 percent increase in budget revenues. In the long-run, further positive fiscal effects could be expected since the decrease in cigarette consumption will likely lower health expenditures related to the harmful effects of cigarettes.

These research findings suggest that claims about the negative impact of excise increase on budget revenues fueled by the industry are not based on rigorous evidence. Thus, even if a narrow analysis is applied, focusing strictly on budgetary impact, there are still positive fiscal effects.

- **In most of the countries studied, an increase in cigarette excises would have an additional redistributive effect.**

Total demand elasticities among low-, middle-, and high-income households have proven to be significantly different. In most countries, low-income households have the highest price elasticity, and high-income households have the lowest. As a result, the cigarette price increase is followed by the largest reduction in consumption in low-income households. Unlike the middle- and high-income groups, low-income households also reduce their total expenditures on cigarettes which also has positive effect on their living standard. In the long-run, further redistributive effects could be expected, as lower consumption of cigarettes will benefit the health of low-income households and decrease their expenditures for tobacco-related illnesses. On the other hand, policy makers should also bear in mind that low-income households are at the same time the most sensitive with regard to changes in their income. Research results show that the income increase would be associated with a comparatively higher increase in consumption within the low-income group. Therefore, improved taxation policy should be designed to include eventual changes in income.

These research results refute the fallacy, often promoted by the tobacco industry, about regressive effects of tobacco taxes. Research in all countries shows that tobacco excise increases would have a progressive effect as the additional tax burden is the lowest for low-income households and the highest for most high-income households, whereas in some countries the share of budget expenditures for cigarettes among low-income households is actually decreased.

1 Introduction

This report presents the research findings from the second research year of the project "*Accelerating Progress on Effective Tobacco Tax Policies in Low- and Middle-Income Countries*". The research was undertaken in six middle-income countries in Southeastern Europe (SEE): Albania, Bosnia and Herzegovina (B&H), Kosovo, North Macedonia, Montenegro, and Serbia. The research was conducted in 2019. The same research methodology was used in all the countries and applied on secondary data from the Household Budget Survey (HBS), thereby providing a comparative analysis for all the countries. The research includes three topics of analysis, performed as follows:

1. Using HBS data, estimate the cigarette price elasticity of demand on the extensive (in other words, prevalence elasticity) and the intensive margin (in other words, conditional demand (intensity) elasticity);
2. Using HBS data, estimate the cigarette price elasticity of demand by income group;
3. Simulate the impact of an increase in tobacco excise and price on consumption and government revenue.

This report builds on the theoretical framework of the two-part model developed by Mullahy and Manning[1]. This model estimates the overall demand elasticity as a (corrected) sum of two elasticities: prevalence elasticity and conditional demand (in other words, intensity) elasticity. The prevalence elasticity is estimated via a logit model. The Deaton model and Generalized Linear Model (GLM) are used for the estimation of conditional demand (intensity). The GLM is used as a robustness check (detailed explanation of the Deaton model and the general methodology is presented in chapter 2).

First, the described analyses are performed separately for each country on the overall sample of households. The sample of households is then split into three equal groups: low-, middle-, and high-income groups with the same analyses performed on income subsamples and then, results are compared. Finally, the estimated elasticities are utilized to simulate the effect of price increases on overall cigarette consumption and government revenues.

The remaining part of the report is structured as follows. Chapter 2 describes the methodology used in the analysis, while chapters 3-8 present and discuss the results by country. The report concludes with chapter 9. Supporting tables from chapters 3-8 are included in the appendix, which is available on the online project web page (http://tobaccotaxation.org/).

[1] Manning, W. G., and J. Mullahy. (2001) "Estimating Log Models: To Transform or Not to Transform?" *Journal of Health Economics* 20, no. 4: 461–494.

2 Data and methodology

This chapter describes the data and methodology used in the report. More precisely, it outlines the methodology used to estimate the price participation and intensity (conditional) elasticity of cigarettes. In addition, this chapter discusses the methodology for the estimation of price elasticity at different income levels. The estimates are then used to simulate the impact of a price increase on consumption and government revenue. The same econometric models and simulation methods are applied in all the countries. However, due to slight differences in available data and country specifics, there are minor variations in model specification and years of available data.

All analyses use microdata from HBS data to estimate the price and income elasticities of cigarette use. HBS, an annual survey, provides detailed information on household consumption, as well as on individual characteristics of household members. The price elasticities (and the effects of other variables) are estimated at the household level because information on cigarette consumption is collected for the household as a whole. Table 2.1 reports the available years for the analysis in each country.

Table 2.1: Household Budget Survey data available for each country

Country	Years available
Albania	2014-2017
Bosnia and Herzegovina	2007, 2011, 2015
Kosovo	2007-2017
Montenegro	2006-2015 and 2017
North Macedonia	2015-2017
Serbia	2006-2017

The methodology applied in each of the research topics is described below.

2.1 Estimation of the price elasticity of demand

Cigarette consumption is often characterized by a mixed distribution that is partly discrete and partly continuous. More precisely, cigarette consumption is characterized by a large proportion of non-smokers, for which the variable describing the consumption takes a zero value and the remaining outcomes that are strictly positive. More formally, the distribution can be expressed as

$$y=0,\ n = 0, 1, \dots ni$$

$$y>0,\ n = ni+1, ni+2, \dots nN \qquad (1)$$

The distribution reflects the fact that when faced with the market prices and their own budget constraints and given the utility that they derive from cigarettes used, households are facing two decisions. The household first decides whether to smoke or not smoke (extensive margin). If the household decides to smoke, they then decide how many cigarettes to smoke (intensive margin).

The literature suggests a two-part model to independently model the two decisions[2]. This model is well suited for cigarette use, as the proportion of non-smokers (y=0) globally is high. The World Health Organization (WHO) estimates the proportion of smokers to be approximately 21 percent. [3] The first part of the model estimates cigarette prevalence. It estimates the probability of observing positive tobacco consumption (vs. no consumption), conditional on the set of independent variables. The model is typically estimated by a parametric binary probability model, such as logit or probit. The second part of the model deals with the intensity (level) cigarette consumption. The model estimation is conditional on $y_i>0$, where the dependent variable is typically a linear function of independent variables. Therefore, it can be estimated via an ordinary or a generalized linear model.

The main variables that enter both models are price and income. These two variables provide the basis for the calculation of price elasticity, income elasticity of cigarette prevalence and the intensity of cigarette use. Since HBS data do not contain the prices of cigarettes, unit values are used as a proxy for prices. The unit values are calculated as the ratio between total household expenditure on cigarettes (in local currency) and total household consumption on cigarettes (in cigarette packs). However, a potential identification problem arises by using this proxy because of the joint determination of cigarette demand and price as well as because of unobserved heterogeneity across regions. This problem is resolved by calculating prices as municipality[4] averages and controlling for an extensive set of control variables and region fixed effects. Additionally, total household consumption is used as a proxy for household disposable income, as information on income is not consistently available in all the countries.

As the models are estimated separately and independently, the total price and income elasticity is calculated as the corrected sum of the prevalence and the conditional demand (intensity) elasticity, that is, (the method for each component and the aggregation correction is presented in more detail below).

Aside from prices (that is, the average municipality unit value) and income (that is, total household consumption), the models include a set of covariates, consisting of household characteristics (share of men and adults in the household, maximum or mean level of education and activity of the household members), region and settlement fixed effects and variables representing institutional changes relevant to cigarette consumption. Next, the models estimating the prevalence and then the intensity elasticity of cigarette use are presented.

[2] Belotti, F., Partha D., Manning W. G., and Norton E., C. (2015): "Twopm: Two-Part Models." *Stata Journal* 15, no. 1: 3–20.

[3] World Health Organization. (2017): *WHO report on the global tobacco epidemic, 2017: monitoring tobacco use and prevention policies.* World Health Organization.

[4] A primary sampling unit is used if the municipality identifier is not available. This applies to prevalence and GLM models, while the Deaton model initially uses unit values as a dependent variable in the first stage equation. In the second stage unit values are used to purge out household characteristics. These are then also aggregated to the municipality or primary sampling unit level.

2.1.1 Estimation of the prevalence elasticity

The first part of the model analyzes whether the price of tobacco impacts the decision of a household to smoke, conditional on the set of independent variables. This decision is typically modeled by using the binary choice model. The nature of the dependent variable is the main difference between a binary choice and the classical linear regression model. Instead of modeling a continuous variable in the binary choice models, the probability that the dependent variable y_i takes value one, which represents the households with positive cigarette expenditure/consumption, versus value zero, which represents the households with zero consumption, is modeled. Consequently, instead of a linear combination of independent variables, a (nonlinear) function of that linear combination is used to explain the probability that a household has positive tobacco expenditures. The most commonly used functions are probit and logit, and in this case, a logit specification is used.

More formally, the following model is estimated:

$$Y = P(y_i > 0) = f(\beta_1 p_i + \beta_2 i_i + \Gamma' X) \qquad (2)$$

where y_i is cigarette consumption of the household *i*. Y is an indicator variable taking value 1 if household consumption is positive; p_i and i_i are prices and total household consumption, respectively. *X* represents the vector of covariates used in the analysis. After the estimation model is defined, a maximum likelihood procedure is used to fit the coefficients to the logit model.

The logit model assumes that the linear combination of the independent variables $z = \beta_1 p_i + \beta_2 i_i + \Gamma' X$ is related to the dependent variable via the logit function $f(z) = e^z/(1 + e^z)$. Coefficients β_1 and β_2, as well as the vector of the coefficients Γ, do not represent the marginal effects and have no clear interpretation. For binary choice models, the marginal effects are not constant, but are a function of all independent variables in the model, as the first derivative of the function is also a function of the probability density. The probability density is a function of the linear combination of all independent variables in the model. Therefore, the marginal effects of the price are calculated as

$$ME_p = \Delta P(y_i > 0)/\Delta p_i = f(z) * \beta_1 \qquad (3)$$

and is interpreted as the increase in the likelihood that the household has positive cigarette expenditures for a unit increase in price. The marginal effects for the other variables in the model are analogously calculated; the first derivative is taken with respect to the variable of interest. As before, the derivative is a function of the linear combination of all independent variables in the model[5].

Finally, the price elasticity of cigarette prevalence is calculated as

$$\xi_{p1} = ME_p(\bar{p}/\bar{Y}) \qquad (4)$$

where $\bar{p}$, and $\bar{Y}$ are the average price and prevalence, respectively. The interpretation of the elasticity is that if the prices increase by 1 percent then the probability of positive cigarette

[5] Green, W. H. (2008): Handbook of Econometrics. *Applied Econometrics*, 2, 413-556.

consumption at the household level increases by ξ_{p1} percent. The interpretation of these effects is, at the level of average prices and the average level of all the variables in the model. The income (that is, total household consumption) elasticity is calculated in a similar fashion.

For a more intuitive understanding of the model results, marginal effects expressed in terms of the percentage point change in prevalence resulting from a percentage change in prices are also calculated. This indicator is calculated as

$$\xi_{p1,pp} = ME_p * \bar{p} \quad (5)$$

The interpretation of the indicator is as follows: for a 1 percent increase in price, the probability that the household will have positive cigarette consumption will increase by $\xi_{p1,pp}$ percentage points.

2.1.2 Estimation of the conditional demand (intensity) elasticity

For the estimation of conditional demand (intensity) elasticity the Deaton demand model[6] is used, with the GLM as a robustness check. Deaton is the preferred model because it relies on Deaton's consumer theory, and also provides a built-in identification strategy and controls for so-called quality shading and measurement error. These characteristics of the Deaton model make the estimates more robust and precise than the GLM estimates.

Deaton model

The Deaton demand model is a consumer behavior model in which total expenditure on goods is defined as a product of quantity, quality, and prices. Therefore, the household utility function is augmented as it includes quality of the good. Given its definition as the ratio between the total expenditure and the quantity purchased, the unit value represents the product of quality and price[7]. As the model assumes that all households within a cluster (typically a small territory unit, such as municipality or village) face the same market price, within-cluster variations in purchases depend only on total household expenditure and characteristics that reflect the variation in quality, while cross-cluster variations in purchase are due to genuine price variations, among other factors.

The starting point of the Deaton model is comprised of two equations: [8]

$$w_{hc} = \alpha^0 + \beta^0 lnx_{hc} + \gamma^0 . z_{hc} + \theta lnp_c + (f_c + u_{ch}^0) \quad (6)$$

$$lnv_{hc} = \alpha^1 + \beta^1 lnx_{hc} + \gamma^1 . z_{hc} + \psi lnp_c + u_{hc}^1 \quad (7)$$

[6] Deaton, A. (1988): Quality, quantity, and spatial variation of price. *American Economic Review*, 78 (3), 418–430.
[7] John, R. M. (2008): Price elasticity estimates for tobacco products in India. *Health Policy and Planning*; 23(3), 200-209.
[8] Deaton, A. (1997): *The Analysis of Household Surveys: A Microeconometric Approach to Development Policy.* Johns Hopkins University Press, Baltimore.

where indices *h* and *c* represent households and clusters, respectively. The left hand-side variables in equations (8) and (9) are w_{hc} – share of the household budget spent on cigarettes (in percentages) and the natural logarithm of v_{hc} – cigarette unit values. On the right hand-side of both equations, there is x_{hc} – total expenditures of the household *h* in cluster *c*, z_{hc} – other household characteristics, p_c – price of the cigarettes in cluster c, while u_{ch}^0 and u_{hc}^1 represent the error term.

Finally, in equation (1) f_c are the cluster level effects on the budget share, which are assumed to be uncorrelated with the price effect on the budget share. [9] Since the prices are not observed, the parameters θ and ψ cannot be directly estimated from equations (8) and (9). However, the assumption that market prices do not vary within the cluster (hence the absence of the index *h* next to prices) enables consistent estimates of the remaining parameters. Therefore, the usage of the cluster deviation-from-the-mean approach cancels the effect of prices from the equations. We estimate the parameters by including cluster-fixed effects (dummy variables for each cluster) in the regression, which yields identical estimates as deviation-from-the-mean approach. [10]

In the unit value equation (equation 9), coefficient β^1 represents the expenditure elasticity, while ψ represents the price elasticity in unit values. When cigarette prices change, assuming a constant budget, households can either decrease their cigarette consumption or switch to a less expensive brand to keep their consumption at the same level. The latter is referred to as quality shading. If there is no quality shading, the value of ψ would be equal to one (as the change of the unit value would correspond to change of the price) and β^1 would be approximately equal to zero. On the other hand, in the presence of quality shading, ψ will be less than one (unit value change will be slower than the change of the price) and β^1 would be approximately equal to zero.

The second stage uses the estimates from the first stage to remove the effects of total household expenditure, and other household characteristics from the budget shares and the unit values. Variables constructed in this way are then used to create cluster averages of budget shares and unit values, which in accordance with equations (8) and (9) can now be written as

$$y_c^0 = \alpha^0 + \theta ln p_c + f_c + u_c^0 \qquad (8)$$

$$y_c^1 = \alpha^1 + \psi ln p_c + u_c^1 \qquad (9)$$

The estimation of the parameter θ, which represents the price semi-elasticity is not feasible since the price is not directly observed. However, Deaton's model uses the presence of price in both equations to establish a relationship between budget shares and unit values. The

[9] John, R. M. (2008): Price elasticity estimates for tobacco products in India. *Health Policy and Planning*; 23(3), 200-209.

[10] Frisch, R., and F. V. Waugh. (1933): Partial time regression as compared with individual trends. *Econometrica* Vol. 1, No. 4, 387-401.

result is parameter ϕ, a hybrid of price and quality elasticity. Deaton proves that $\phi = \psi^{-1}\theta$. [11]

In the third stage, the weak separability assumption is introduced. Given the budget share is defined as the product of the quantity of cigarettes and unit value divided by total expenditures, parameter θ can be estimated as:

$$\hat{\theta} = \hat{\phi}/[1 + (w - \hat{\phi})\frac{\hat{\beta}^1}{\hat{\beta}^0 + w(1-\hat{\beta}^1)}] \qquad (10)$$

where $\hat{\beta}^1$ and $\hat{\beta}^0$ are coefficients estimated in equations (8) and (9), while *w* is the average value of the budget share. The value of $\hat{\psi}$ is then equal to $\hat{\phi}^{-1}\hat{\theta}$. From there, price elasticity of demand can be estimated as:

$$\hat{\epsilon}_p = \left(\frac{\hat{\theta}}{w}\right) - \hat{\psi} \qquad (11)$$

Similarly, since equation (8) has budget shares instead of the logarithm of quantity, parameter β^0 does not estimate the expenditure elasticity. Instead, the total elasticity of expenditure can be estimated as:

$$\hat{\epsilon}_i = 1 - \hat{\beta}^1 + (\frac{\hat{\beta}^0}{w}) \qquad (12)$$

Following John [12]symmetry restrictions are imposed to increase the precision of the parameter estimates. Furthermore, the system incorporates a composite commodity variable that accounts for all other purchased goods. Due to the calculation procedure, standard errors of price elasticity cannot be taken directly from the regression analyses. Instead, the standard errors of the estimated price elasticity are calculated by using the bootstrapping procedure with 1000 replications.

Estimation of the conditional demand (intensity) elasticity via GLM

For the households that have positive cigarette expenditures, the number of cigarette packs smoked per month is modeled as a linear function of the independent variables. Therefore, the model is estimated as follows:

$$E(y_i \,|y_i > 0) = \alpha_1 p_i + \alpha_2 i_i + \Theta' X \qquad (13)$$

where, as before, y_i is cigarette consumption of household *i*, p_i and i_i are prices and total household consumption, respectively. *X* represents the vector of other covariates used in the analysis. The interpretation of the coefficients α_1, α_2 and the coefficients vector Θ is straightforward. They represent the marginal effects of the independent variables. The model is typically estimated via ordinary least squares (OLS) or GLM. The dependent variable is generally represented in the log form as it helps to stabilize non-constant error variance (that is, heteroscedasticity). However, it is necessary to re-transform the coefficients to in-

[11] Deaton, A. (1997): *The Analysis of Household Surveys: A Microeconometric Approach to Development Policy.* Johns Hopkins University Press, Baltimore.

[12] John, R. M. (2008): Price elasticity estimates for tobacco products in India. *Health Policy and Planning*; 23(3), 200-209.

terpret them as marginal effects. The downside to this method is that during the re-transformation, prediction bias may be introduced into the conditional demand.

Manning and Mullahy propose that the second part of the model is estimated via GLM, which does not require the assumption of homoscedasticity or normality.[13] GLM is estimated by the maximum likelihood method. GLM estimates the following model:

$$g\{E(y_i \,|y_i > 0)\} = \alpha_1 p_i + \alpha_2 i_i + \Theta' X \,,\; y \sim F \qquad (14)$$

where g{.} is the so-called "link function". The link function describes the relationship that the dependent variable and the linear combination of the predictors have. The type of link function that should be used in GLM is tested via the Box-Cox test. [14] Since the GLM does not assume a constant variance, within the model a function F is defined as the distributional family that is used to describe the relationship between the variance and mean. When the link function is determined, the Modified Park test is used to find the best approximation of the dependent variable variance.

A standard practice in health economics is to use GLM with gamma family and a log link function. This combination has been proposed to be a more robust alternative to a semi-log regression specification. [15] The difference between the OLS and GLM methods is that the OLS estimator estimates E[ln y $|\boldsymbol{x}$]. Once obtained, the OLS coefficients require retransformation. The GLM estimator estimates ln[$E(y|\boldsymbol{x})$], and therefore estimates the marginal effect directly, thereby circumventing the prediction bias issue present in the OLS method. The GLM estimator is consistent even if the variance distribution is not properly defined and does not assume homoscedastic errors. After the model estimation, we calculate the conditional (intensity) elasticity of cigarettes quantity demanded as

$$\xi_{p2} = ME_p(\bar{p}/\bar{y}) \qquad (15)$$

where $\bar{p}$, and $\bar{y}$ are the average price and quantity of cigarettes consumed by households with positive consumption respectively. The interpretation of conditional demand elasticity is that if the price increases by 1 percent, cigarette consumption would decrease by ξ_{p2} percents, assuming that the smoking participation decision does not depend on the price. Income (that is, total household consumption) elasticity is calculated in a similar way.

2.1.3 Estimation of the total demand elasticity

In previous chapters, the methodology of the estimation of the prevalence and the conditional demand (intensity) elasticity was explained. Although the literature suggests that these two decisions can be modelled independently[15], total elasticity cannot be calculated as simple sum of the two elasticities. Instead, this sum needs to be corrected for the fact that a change in the smoking prevalence can attenuate or enlarge the effect of the conditional de-

[13] Manning, W. G., and J. Mullahy. (2001) "Estimating Log Models: To Transform or Not to Transform?" *Journal of Health Economics* 20, no. 4: 461–494.
[14] Box, G. E., & Cox, D. R. (1964). An analysis of transformations. *Journal of the Royal Statistical Society: Series B* (Methodological), 26(2), 211-243.
[15] Manning, W. G., Basu A:, and Mullahy J. (2005): "Generalized Modeling Approaches to Risk Adjustment of Skewed Outcomes Data." Journal of Health Economics 24, no. 3: 465–88

mand (intensity) elasticity. In order to make this more clear, an example is provided with the formula that converts the two elasticities into total elasticity.

Assume that the total population of country XYZ is 10 million people, that that country has a prevalence rate of 40 percent, and that conditional average consumption per person is 25 cigarettes per day (including only those people who smoke). This means that about 4 million people smoke, and total consumption amounts to 100 million cigarettes per day. This situation is presented in table 2.2. column baseline.

Also assume that the prevalence price elasticity in a country is -0.3, while the conditional demand (intensity) elasticity is -0.5. This means that if the prices increase by 1 percent, the prevalence would be lower by 0.3 percent (that is, to 39.88 percent), while the consumption per person would be lower by 0.5 percent (that is, to 24.875 cigarettes per day). This decrease the number of people smoking to 3.988 million (that is, by 0.3 percent), but the total consumption calculated as the product of new prevalence and consumption would decrease by -0.7985 percent, which is less than a simple sum of two elasticities of 0.8 percent. Therefore, due to the prevalence change, a total change in consumption will not be a simple sum of the two elasticities, so the change in prevalence should be corrected for when adding up the change in consumption.

Table 2.2: Hypothetical example for the calculation of the total demand elasticity

		Baseline	Price increases by 1%	% change
Total population	1	10,000,000	10,000,000	
Prevalence	2	40.0%	39.88%	-0.30%
Consumption per person (in cigarettes)	3	25	24.875	-0.50%
Number of people smoking	4=1*2	4,000,000	3,988,000	-0.30%
Total consumption	5=4*3	100,000,000	99,201,500	**-0.7985%**

More formally the total elasticity can be calculated according to the following formula:

$$\xi_p = \xi_{p1} + (1 + \xi_{p1}) * \xi_{p2} \qquad (16)$$

Where ξ_{p1} represents the prevalence elasticity, ξ_{p2} represents the conditional demand (intensity) elasticity and ξ_p represents the total elasticity, if all the elasticities are expressed as percentages.

2.2 Estimation of elasticities at different parts of the income distribution

As mentioned in the introduction, the second part of the analyses estimates the price and income elasticity of demand by income group. Income groups are constructed based on total household consumption (a proxy for income) per capita. Given the relatively small sample size in some countries, three income groups are created: low-income, middle-income, and

high-income. As in all the countries, several waves of HBS is used, and the division into three income groups is done for each year, so that an equal number of households belongs to each of the three groups in all years.

After dividing the sample into three income groups, prevalence elasticity is estimated using a logit model and conditional demand (intensity) elasticity using the Deaton model, followed by use of the above formula for total elasticity to calculate total elasticity by income group.[16]

2.3 Simulation of price and excise increase on consumption and government revenue

Finally, within topic 3, the estimated price and income elasticities are used to simulate the impact of price and excise tax increase on consumption and government revenue. As mentioned in the introduction, the total price and income elasticities are calculated as a corrected sum of prevalence elasticity and intensity (that is, conditional demand) elasticity from the Deaton model. In both cases, the elasticities are used when applying the models to the overall sample.

The starting point of the analysis is cigarette consumption, which is obtained from the administrative data on cigarette packs for the year for which the latest HBS is available (a more detailed data source description will be given in each country chapter). In order to account for the impact of an increase in income on consumption, the following inputs are used: total HBS real expenditure growth (a proxy for income growth) based on the ratio between the total expenditure in the year t+1 and the total expenditure in the year t, where t is the latest year when HBS is available[17]. Three scenarios are simulated, presenting the estimated impact of three alternative price increases: of 10, 25, and 50 percent.

In order to calculate a change in quantity demanded (or consumption), the following formula is applied:

$$D_{t+1} = D_t(1 + \xi_p * \Delta p[\%] + \xi_i * \Delta i[\%]) \qquad (17)$$

where D_{t+1} is the new demand, D_t is the demand in year *t*, ξ_p and ξ_i are price and income elasticities, while $\Delta p[\%]$ and $\Delta i[\%]$ represent the percentage increases of real prices (which are set arbitrarily at 10, 25 and 50 percent) and real income (fixed, calculated as a ratio between the total consumption in the year *t+1* and the total consumption in the year *t*, where *t* is the latest year when HBS is available).

The calculation of a change in government revenue stemming from taxes on cigarettes is done in two steps. In the first step, for year *t*, the excise and VAT is calculated for a single cigarette pack according to the current taxation rules in each country and this rule is applied to the weighted average price of cigarettes in the country in year *t*. The change in price that

[16] The prevalence model, as well as the GLM for estimation of the conditional demand (intensity), uses the price proxy calculated based on the unit values from the overall sample. Therefore, all households, regardless of the income groups they belong to, are "facing" the same price.

[17] Although the data from the year t+1 are not available in all the countries this information can be found in the statistical reports.

would occur in year *t+1* is simulated, and the impact that this would have on excise and VAT in each country for year *t+1* is calculated. Where the country has a specific excise rate, the increase in the specific excise from the year *t* to year *t+1* will be at the same rate as the increase of the price (that is, by 10, 25 and 50 percent in the three simulation scenarios).

In the second step, for the year *t*, the total excise and VAT is calculated as a product of the excises and VAT charged on the single pack (price at the average weighted price level) according to the prices and taxation rules from the year *t*, and total demand from the administrative data from the year *t*. For the year *t+1*, similarly, the total excise and VAT is calculated as a product of the excises and VAT charged on the single pack according to the increased prices and taxation rules from the year *t+1*, and the simulated demand calculated in the equation (15). Data is presentenced in euros so that they are more easily comparable across six countries in the SEE region.

2.3.1 Simulation of the impact of price on demand and expenditures of income groups

Finally, the impact of a price change on cigarette demand and expenditure on cigarettes for each of the income groups is calculated. The simulation strategy is similar to the one for the overall sample and based on the estimated elasticities (the methodology for the estimation of the elasticities is explained in section 2.2.). The starting point of the analysis is the cigarette consumption in each of the income groups. As the administrative data are not available for each of the income groups, HBS data for the last year available is used to calculate the share of cigarette consumption of each income group in total country consumption. These shares are multiplied by the total consumption from administrative data to derive the estimated consumption of each of the income groups.

The total expenditure growth of each of the income groups is calculated as an increase in the total expenditure between the last two years of the HBS data available (2016 and 2017). The scenario in which prices increase by 25 percent is simulated as a middle increase among the previous solutions. In order to arrive at the demand change for each of the income groups, equation (17) and the data for each of the income group is used. The change in expenditure for each income group is calculated as the difference in products of weighted average price and the demand for each income group in year t and year t+1 in which the prices increase by 25 percent.

3 Albania

Albania has one of the highest smoking prevalence rates in the region, with tobacco consumption as one of the most significant health concerns of the population, especially for low- and middle-income households. Despite existing tobacco control policies combining price and non-price measures, Albania has still one of the lowest tax levels on cigarettes compared to other Western Balkan and European Union (EU) countries.

A tax increase on tobacco is a win-win solution: the country could be healthier and wealthier. Using an empirical analysis at the household level in Albania over the period 2014-2017, this study demonstrates the effectiveness of price-based policy measures in reducing tobacco consumption. Despite some arguably potential economic benefits produced by tobacco such as tax revenues, its economic benefits are only observed in the short run. The empirical results show that a price increase of 25 percent, resulting from a 43.6 percent specific excise tax increase, would lead to a decrease of cigarette consumption by 15.0 percent, and on the other hand increase government revenue by 17.9 percent (29.7 million euros). The expected increase is more than one-third of the current total revenue collected from tobacco excises. With that in mind, the Government of Albania should increase specific excise duty on cigarettes from 49 euros per 1000 sticks in 2019[18] to 70 euros in 2020.

Different income groups react differently to price and income changes. The results differ between different income groups in terms of both income and price elasticity. More specifically, the empirical results suggest that low-income households are highly affected by price increases. Thus, for this group, increased taxes would cause a sharp decrease in tobacco consumption accompanied by a slight increase in government revenues. For middle- and high-income households, the reduction of tobacco consumption is lower, but the revenues generated from these groups as a result of price increases are higher relative to the low-income group.

This chapter presents prevalence and conditional price and income elasticities of demand for cigarettes in Albania using Household Budget Survey (HBS) data. The analysis consists of two approaches. Firstly, all households are pooled to estimate the elasticities without distinguishing between income groups. Then, households are divided into three income groups and the analysis is conducted separately for each.

3.1 Data and descriptive statistics

To estimate the elasticity of cigarette demand, this study uses the HBS as a pooled cross-sectional data from the years 2014 to 2017. HBS is nationally representative (28,748 households over 4 years) – and covers urban and rural areas across the 12 prefectures of Albania. As to the number of observations per year, it is noted that the year 2017 has the largest number of observations; more precisely, the number of observations in years 2014, 2015, 2016 and 2017 are 6,542, 7,334, 7,353 and 7,519 respectively.

[18] 6,000 ALL per 1000 sticks: Law No. 98/2018 dated 3 December 2018 on Additions to Law No. 61/2012 on Excise Taxes is published on Official Gazette No. 187 dated 28 December 2018 and becomes effective from 1 January 2019 (https://qbz.gov.al)

A note of caution is in order when referring to the elasticities estimated in this analysis as they do not include cut tobacco and cigars. While data on the quantity of cut tobacco are not reported in HBS, households reporting on the quantity and expenditures on cigars represent only 0.25 percent of total households.

Before explaining the estimation results of price and income elasticities of cigarette demand, some descriptive statistics are provided to better understand the heterogeneity of the data in different years. As reported in Table 1, the average number of cigarettes smoked per household over years (2014-2017) appears to be within the range of 17-20, with a slight increasing trend from 2016 to 2017. Though, in all the years, the average number of cigarettes smoked per household appears to be below 20. In comparison to other countries, Albanian households, as reported in HBS, smoke fewer cigarettes than those in the region.[19] Smoking prevalence decreased, from 38.7 percent in 2014 to 31.7 percent in 2017. Average household expenditures on cigarettes decreased from 2014 to 2016, 14,709.5 ALL[20] and 13,382.3 ALL respectively, though in 2017 the average real household expenditure on cigarettes increased significantly to 15,212.1 ALL.

Table 3.1: Cigarette consumption in Albania

Year	Smoking prevalence (% of households)	Average number of cigarettes smoked (pack per household)[1]	Average real household expenditure on cigarettes [1, 2]	Average price[3, 4]
2014	38.7	17.38	14,726.38	2,249.86
2015	31.6	18.95	13,843.73	2,270.08
2016	31.3	18.39	13,380.41	2,312.57
2017	31.7	19.46	15,212.12	2,350.65

Source: Institute of Statistics in Albania, HBS data, 2014-2017.
[1] Conditional on having positive expenditure on cigarettes.
[2] Variables are deflated by dividing the household expenditure by the CPI of the respective year
[3] Prices are expressed in old Albanian Leks, same as in HBS; 1 old Albanian Leks= 0.1 Albanian Leks.
[4] Prices are proxied by average ratio of reported household expenditure of cigarettes and purchased quantity.

3.2 Two-part model

In addition to other factors that may explain a household's cigarette quantity consumed, this study also takes into account policy changes in Albania during 2014-2017, such as Law No. 76/2014, one of the most significant tobacco control laws in Albania, which limited smoking in public places. The following section discusses the prevalence and conditional elasticity results from the empirical analysis.

3.2.1 Prevalence elasticity

Following the traditional approach of the two-part model, this study separately models the propensity of smoking, or smoking prevalence (participation elasticity) and the intensity of

[19] Tobacco Taxation (2019) National Studies. http://tobaccotaxation.org/research.php?cID=26&lng=srb
[20] ALL denotes Albanian Leks.

smoking, or the quantity of cigarettes consumed by those who smoke (intensity elasticity). Using diagnostics through various tests (see the online appendix for details), specifications 4 and 6 have been selected for the analysis and presented in this chapter, but the discussion of the results is focused only on specification 6.

As shown in Table 3.2 below, the prevalence price elasticity is estimated at -0.165, and income elasticity at 0.781. This means that a 10 percent price increase would reduce smoking prevalence by 1.65 percent, while a 10 percent increase in income would increase it by 7.81 percent.

In terms of determinants of smoking prevalence, larger households and households with larger shares of men, adults, and self-employed members have a relatively higher smoking prevalence. On the other hand, households in the south of the country and those with secondary education tend to have lower smoking prevalence.

Table 3.2: Price and income elasticity of smoking prevalence

Indicators	Model 4		Model 6	
Price	-0.103	(0.110)	-0.165*	(0.089)
Income	0.544***	(0.019)	0.781***	(0.030)

Cluster robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1
Source: Authors' calculation based on data from the Institute of Statistics in Albania, HBS data, 2014-2017.

3.2.2 Conditional intensity elasticity

Despite the superiority of the Deaton method (see Chapter 2 for more details), this chapter reports results from the generalized linear model (GLM) because of the stronger statistical significance, both by income group and overall elasticity. The estimated results, presented in Table 3.3, indicate that a 10 percent price increase decreases the quantity of cigarettes consumed by 2.7 percent. However, a 10 percent increase in income would lead to a 3.3 percent increase in smoking intensity among those who smoke.

Table 3.3: Price and income elasticity of smoking intensity

Indicators	Model 4		Model 6	
Price	-0.369	(0.145)	-0.268***	(0.101)
Income	0.332***	(0.029)	0.330***	(0.0293)

Cluster robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1
Source: Authors' calculation based on data from the Institute of Statistics in Albania, HBS data, 2014-2017.

3.2.3 Total price and income demand elasticity

The total price elasticity is a composite elasticity of participation and conditional elasticity. The results in Table 3.4 below show a total price elasticity of -0.432, falling within the range of estimated price elasticity in low- and middle-income countries. This means that a 10 percent increase in the price of cigarettes would decrease the total demand for cigarettes by 4.3

percent. Conditional price elasticity (-0.267) contributes the most to the total demand elasticity, whereas participation price elasticity (-0.165) contributes relatively less. In other words, a reduction in consumption due to a price increase would happen relatively more through a reduction in smoking intensity than through a reduction in the number of smokers.

Similarly, the total income elasticity of 1.113 means that as income increases by 10 percent, total cigarette consumption increases by 10.1 percent. Because participation elasticity contributes the most to total income elasticity, an increase in income by 10 percent causes more people to start smoking (7.8 percent) relative to an increase in the amount of cigarettes consumed (3.2 percent).

Table 3.4: Total demand elasticity

Elasticity	Indicators	Model 6	
Total Demand Elasticity	Price	-0.432***	(0.1106)
	Income	1.113***	(0.0367)
Prevalence Elasticity	Price	-0.165*	(0.0893)
	Income	0.781***	(0.0300)
Conditional Intensity Elasticity	Price	-0.267***	(0.1007)
	Income	0.329***	(0.0292)

Cluster robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.
Source: Authors' calculation based on data from the Institute of Statistics in Albania, HBS data, 2014-2017.

3.3 Price elasticity by income group

Taking into account the distinction among households by income level, price and income elasticities are also estimated by three income groups: low-, middle-, and high-income groups are formed based on total household expenditure per capita, used as a proxy for household income.

3.3.1 Demand trends by income group

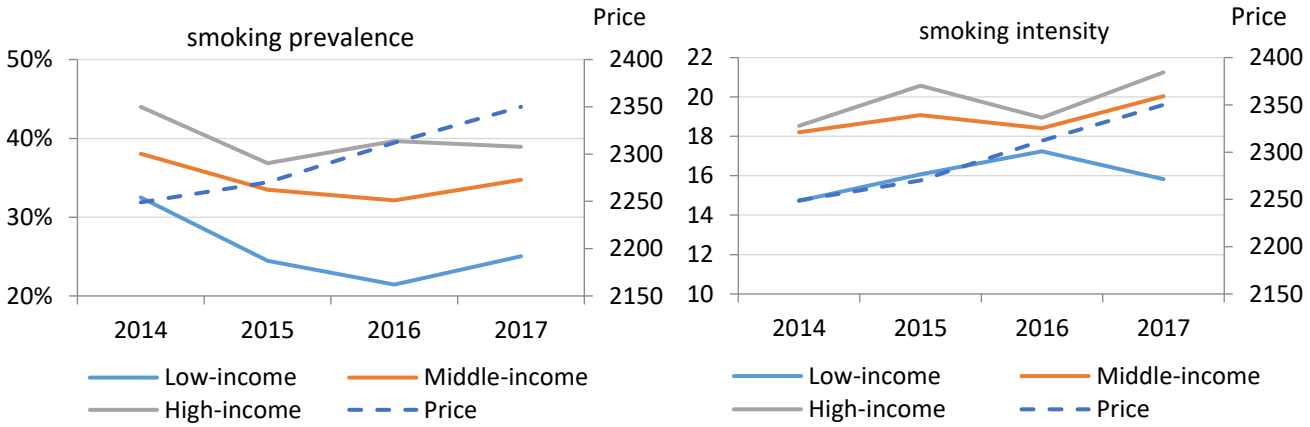
Smoking prevalence and smoking intensity trends by income group are presented in Figure 3.1. The low-income group has the lowest smoking prevalence and intensity compared to the other two groups. With the constantly increasing price of cigarettes, smoking prevalence in low- and middle-income groups show a decreasing trend until 2016 and then an increase in 2017. While in 2017, smoking prevalence among the low-income group slightly decreased.

In terms of smoking intensity, the low-income group shows an increase until 2016, after which it declines, while the middle- and high-income groups show an overall increase in smoking intensity.

As to the structure of HBS for 2017, the high-income group has the largest share in the 2017 HBS (39.8 percent), whereas low-and middle-income groups occupy 25.1 percent and 35.1 percent of the total households, respectively. The average monthly total household expendi-

ture for the low-, middle-, and the high-income group was is 4,920 ALL, 7,204 ALL, and 10,830 ALL, respectively. The low-income group has the highest share of spending on cigarettes (7.6 percent), in comparison to middle- and high-income groups with 6.7 percent and 5.4 percent, respectively.

Figure 3.1: Smoking prevalence and smoking intensity trends by income group



Source: Authors' calculation based on data from the Institute of Statistics in Albania, HBS data, 2014-2017.

Notes: Smoking prevalence is defined as the share of the households with positive tobacco consumption while smoking intensity represents the number of cigarettes packs a household with positive expenditures on cigarettes smoked per month. Cigarette prices are defined as municipality/year average cigarettes' unit values (ratio between total expenditure and quantity) and expressed in real terms.

3.3.2 Prevalence elasticity

Smoking prevalence among the low-income group seems to be the most responsive to changes in price and income (Table 3.5). For these households, a 10 percent price increase results in a 9.2 percent decrease in smoking prevalence, while a 10 percent increase in income results in a 10.7 percent increase in smoking prevalence. The high-income group shows lower responsiveness to changes in price than the low-income group, while the middle-income group does not seem to be responsive to price. Increases in income have the highest impact on the low-income group and the lowest impact on the high-income group.

Table 3.5: Prevalence and conditional elasticities by income group

Indicators	Low-income Households		Middle-income households		High-income households		All households	
Prevalence elasticity								
Price	-0.920***	(0.243)	-0.232	(0.149)	-0.352**	(0.170)	-0.165*	(0.0893)
Income	1.070***	(0.072)	0.758***	(0.089)	0.307***	(0.043)	0.781***	(0.0300)
Conditional demand (intensity) elasticity								
Price	-0.281**	(0.138)	-0.147	(0.123)	-0.358***	(0.134)	-0.267***	(0.1007)
Income	0.651***	(0.071)	0.380***	(0.077)	0.209***	(0.026)	0.329***	(0.0292)

Cluster robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.
Source: Authors' calculation based on data from the Institute of Statistics in Albania, HBS data, 2014-2017.

3.3.3 Conditional intensity elasticity

With regard to conditional intensity elasticity, low- and high-income households have inelastic demand for tobacco, with price elasticities of -0.281 and -0.358, respectively (Table 3.5). This means that when faced with a 10 percent price increase, low-income households will decrease the quantity of cigarettes consumed by 2.8 percent, while high-income households respond with a 3.5 percent lower consumption. The analysis finds no evidence that the cigarette consumption of the middle-income households responds to price, but there is evidence that it does respond to changes in income. Similar to smoking prevalence, a 10 percent income increase has the highest impact on cigarette consumption in the low-income group (6.5 percent), and the lowest in the high-income group (2.1 percent).

3.3.4 Total price and income elasticity

Once both prevalence and conditional elasticities are taken into account, Figure 3.2 shows the total price and income elasticity by income group. This figure shows that low-income households are by far the most responsive to price and income increases. A 10 percent increase in price reduces cigarette consumption in these households by 12 percent, while a 10 percent increase in income increases it by 17.3 percent.

Figure 3.2: Total, prevalence, and conditional elasticities by income group

Source: Authors' calculations based on data from the Institute of Statistics in Albania, HBS data, 2014-2017

3.4 Impact of price increase on consumption and government budget

Albania levies a specific excise tax on tobacco at 49 euros per 1000 sticks (2019),[21] far below the minimum excise tax required by EU regulation. The government revenue from tobacco (including excises and value-added tax (VAT)) in 2018 was estimated at 167.2 million euros, based on the 2017 baseline scenario when the specific excise tax was 44 euros per 1000 cigarette sticks. Table 1 shows that a 25 percent price increase, which would result from a 43.6 percent increase in the specific excise, would have a considerable impact on both reducing tobacco consumption and generating additional government revenue.

Table 3.6. Impact of a 25 percent cigarette price increase on consumption and government revenue

Income group	Consumption			Revenues		
	Baseline (2018)[1]	Scenario (2019)[1]	Change (%)	Baseline (2018)[2]	Scenario (2019)[2]	Change (%)
Low	35.8	26.1	-27.1%	41.9	42.3	1.1%
Middle	50.1	47.7	-4.8%	58.6	77.3	32.1%
High	57.0	47.6	-16.4%	66.7	77.2	15.9%
Total	**142.9**	**121.4**	**-15.0%**	**167.2**	**196.7**	**17.9%**

[1] In million packs; [2] In million euros

Source: Authors' own calculations based on data from the Ministry of Finance and Economy (2018)

Based on the simulations detailed in Table 3.6 above, a price increase of 25 percent would lead to a decrease in consumption by 15.0 percent, and an increase in government revenues by 17.9 percent or 29.7 million euros. The expected additional amount is more than one-third of the current revenue collected from the tobacco excises.

Breaking down this effect by different income groups, the results suggest that the low-income group would experience the highest reduction in consumption (27.1 percent), while the government would still collect 1.1 percent of additional revenues (around 0.5 million Euros). The reduction in consumption of the middle- and the high-income group is 4.8 percent and 16.4 percent, respectively, and the corresponding increase in government revenues would be 32.1 percent and 15.9 percent, respectively, or around 29.3 million euros from both groups together. While tobacco taxes are usually criticized for being regressive for low-income households, the results show that the additional tax burden on the low-income group would be the lowest and it would rather shift to the middle- and high-income group, increasing the progressivity of the tax system.

[21] 6,000 ALL per 1000 sticks: Law No. 98/2018 dated 3 December 2018 on Additions to Law No. 61/2012 on Excise Taxes is published on Official Gazette No. 187 dated 28 December 2018 and becomes effective from 1 January 2019 (https://qbz.gov.al).

9 Summary and Conclusions

The results of the research provide a unique comparative analysis for all the countries. This chapter summarizes the results presented in country chapters 3 to 8 and offers conclusions and recommendations based on the collected evidence.

In all the analyses, microdata from HBS was used to estimate the price and income elasticities of cigarettes use. Descriptive data from HBS is presented in tables 9.1-9.3.

9.1 Average cigarette prices in six SEE countries (€, in 2015 values)

	ALB	B&H	KSV	MNE	NMK	SRB
2006				0.98		0.78
2007		0.81	1.28	0.95		0.89
2008			1.22	0.95		0.89
2009			1.52	1.07		0.95
2010			1.40	1.13		1.00
2011		1.21	1.40	1.34		1.04
2012			1.56	1.52		1.15
2013			1.51	1.64		1.41
2014	1.63		1.52	1.74	1.50	1.59
2015	1.65	1.87	1.66	1.70	1.65	1.56
2016	1.68		1.77		1.86	1.66
2017	1.71		1.89	1.68		1.78

The price of cigarettes, as a proxy of unit values, calculated from HBS is similar in all countries. The cost is deflated to 2015 values since that is the only year for which data is available from all countries. Even though the prices were significantly different in the past, recent data show that they have converged to a large extent. This leads to the conclusion that the market of six countries could be observed as one single market.

9.2 Smoking prevalence in six SEE countries (in %)

	ALB	B&H	KSV	MNE	NMK	SRB
2006				52.4		49.7
2007		57.4	48.2	52.6		47.9
2008			47.8	56.2		44.1
2009			41.1	50.4		42.0
2010			52.1	44.1		38.8
2011		48.4	50.9	44.2		38.4
2012			53.4	42.5		38.0
2013			49.0	42.1		35.1
2014	38.7		49.7	44.1		34.4
2015	31.6	33.8	46.9	40.2	40.5	36.3
2016	31.3		45.2		39.7	33.7
2017	31.7		46.3	36.5	39.5	34.2

While the average cigarette price is similar across countries, smoking prevalence[58] varies between 31 and over 56 percent over the 12 year period. However, it is important to note that, as reported in previous studies[59] in Albania, B&H, and Kosovo, there is a large disproportion in prevalence among the male and female population, while in other countries the rates are similar for both genders. It is also noticeable that prevalence rates do not follow the same trend in the region. The largest decrease is registered in B&H, Serbia, and Montenegro, while in Kosovo and North Macedonia there is practically no change observed. The decrease in prevalence rates is stagnating in the latest reported years.

9.3 Average monthly household consumption of cigarettes in six SEE countries (number of packs)

	ALB	B&H	KSV	MNE	NMK	SRB
2006				34.7		39.1
2007		37.4	41.3	34.5		39.2
2008			40.2	38.4		39.0
2009			43.1	34.2		37.9
2010			40.0	32.4		37.0
2011		32.3	40.6	31.9		36.2
2012			43.2	29.4		34.3
2013			41.6	27.6		29.6
2014	17.4		42.4	26.5		27.7
2015	19.0	22.9	42.0	28.8	30.5	28.9
2016	18.4		40.8		29.1	29.1
2017	19.5		41.9	33.4	28.2	27.2

The change in smoking intensity also varies by country. While in Albania, Kosovo, and Montenegro there has been no change in average consumption, in B&H, Serbia, and North Macedonia there is a stable decreasing trend.

The differences observed in descriptive statistics have a significant impact on the research outcomes, namely estimation of prevalence and intensity price elasticity of demand for cigarettes; estimation of price elasticity of demand by income group; and simulation of the impact of an increase in tobacco excise and price on consumption and government budget.

Table 9.4: Price elasticities of cigarette consumption in six SEE countries

	ALB	B&H	KSV	MNE	NMK	SRB
Prevalence	-0.165	-0.563	0.000	-0.636	-0.214	-0.265
Intensity	-0.267	-0.458	-0.387	-0.432	-0.232	-0.395
Total	-0.432	-1.018	-0.387	-1.065	-0.446	-0.659

[58] Smoking prevalence in this study is expressed as a share of households that report positive consumption of cigarettes in total number of households.
[59] http://www.tobaccotaxation.org/research.php?cID=26&lng=srb

Increasing excises and prices of cigarettes will result in lower cigarette consumption in all countries. Total price elasticity varies from -0.387 in Kosovo to -1.065 in Montenegro, indicating that if the cigarette prices increase by 10 percent the demand for cigarettes would decrease by 3.8-10.6 percent. This decrease would stem from both a decrease in the smoking prevalence and smoking intensity. More details about price elasticities are presented in Table 9.4.

Distribution of total price elasticity between prevalence and intensity is not even among the countries. Consumers in Albania, Kosovo and Serbia react more intensively to change in price by reducing the number of cigarettes smoked. In B&H and in Montenegro there is a stronger reaction in terms of quitting smoking. At the same time in North Macedonia, there is even distribution of the two elasticities. It is important to note that value of prevalence intensity for Kosovo equals zero due to not statistically significant causality between the price and prevalence rates.

Table 9.5: Income elasticities of cigarette consumption in six SEE countries

	ALB	B&H	KSV	MNE	NMK	SRB
Prevalence	0.781	0.374	0.212	0.308	0.411	0.609
Intensity	0.329	0.426	0.568	0.286	0.465	0.447
Total	1.113	0.802	0.779	0.595	0.874	1.058

Increasing income would result in higher cigarette consumption in all countries. Total income elasticity varies from 0.595 in Montenegro to 1.113 in Albania, indicating that if the income increases by 10 percent the demand for cigarettes would increase between 5.9 and 11.1 percent. This growth would stem from both the growth of smoking prevalence and smoking intensity. More details about income elasticities are presented in Table 9.5.

Distribution of total income elasticity between prevalence and intensity is not even among the countries. Consumers in Kosovo and North Macedonia react more intensively to changes in income by increasing the number of cigarettes smoked. In Albania and in Serbia there is a stronger reaction in smoking initiation. At the same time in B&H and Montenegro, there is even distribution of the two elasticities.

Comparison of the total price and income elasticities shows that in Albania, Kosovo, North Macedonia, and Serbia the values of income elasticities are higher than price elasticities, indicating that in those countries the growth in income could easily erase the impact of increasing prices, especially in Albania. This result indicates that when countries revise excise policies, they should account for the expected growth of income in the country. ***Therefore, increasing excises would have an inequality-reducing effect.***

Total income and prices elasticities are significantly different if compared by income groups. Prices elasticities are the highest in low-income households, and the lowest in high-income households (Table 9.6).

Table 9.6: Elasticities in six SEE countries by income group

		ALB	B&H	KSV	MNE	NMK	SRB
Price	Low	-1.198	-1.411	-0.532	-1.300	-0.446	-1.076
	Middle	0.00	-0.929	-0.630	-1.009	-0.888	-0.631
	High	-0.709	-0.708	0.00	-0.617	-0.278	-0.220
Income	Low	1.728	0.901	0.668	0.514	1.245	1.363
	Middle	1.141	0.782	0.894	0.522	1.124	1.267
	High	0.517	0.735	0.619	0.607	0.583	0.740

Such results mean that the population of smokers with the lowest income are the most sensitive to changes in income, while in the majority of countries, they are also the most sensitive group to changes in prices. Therefore, rapid growth in prices would result in the most intensive response in the low-income group in reducing their consumption. On the other hand, high-income households do not react as intensively to changes in prices and income.

Table 9.7: Impact of tax and price increase on consumption (by income group and total)

	ALB[1]	B&H[2]	KSV[1]	MNE[3]	NMK[2]	SRB[1]
Low	-27.1%	-22.1%	-16.3%	-8.7%	-11.6%	-21.6%
Middle	-4.8%	-14.0%	-18.4%	-8.3%	-17.3%	-11.8%
High	-16.4%	-10.3%	1.7%	-5.8%	2.4%	-4.0%
Total	**-15.0%**	**-14.6%**	**-11.1%**	**-7.5%**	**-8.1%**	**-11.0%**

[1] Albania, Kosovo, and Serbia simulate the impact of an excise tax increase which would result in a 25 percent price increase;
[2] B&H and North Macedonia simulate impact of a 25 percent excise tax increase;
[3] Simulation for Montenegro includes both changes in specific and ad valorem excise, resulting in 15.8 percent increase in price

An increase in cigarette prices would result in a decrease in consumption. The results indicate that a price increase would result in consumption decrease in all countries (Table 9.7). The highest impact would be on consumption in the low-income households, while the high-income households would see the lowest change.

Table 9.8: Impact of tax and price increase on government revenues (by income group and total)

	ALB[1]	B&H[2]	KSV[1]	MNE[3]	NMK[2]	SRB[1]
Low	1.1%	-6.4%	18.9%	9.9%	8.4%	3.5%
Middle	32.1%	3.3%	15.9%	10.5%	1.3%	16.3%
High	15.9%	7.7%	44.4%	13.5%	25.5%	26.7%
Total	**17.9%**	**2.5%**	**26.2%**	**11.3%**	**12.6%**	**17.4%**

[1] Albania, Kosovo, and Serbia simulate the impact of an excise tax increase which would result in a 25 percent price increase; [2] B&H and North Macedonia simulate impact of a 25 excise tax increase; [3] Simulation for Montenegro includes both changes in specific and ad valorem excise, resulting in 15.8 percent increase in price

An increase in cigarette prices would result in an increase in government revenue from tobacco taxation. The results indicate a price increase would result in government revenues in all countries (Table 9.8). The lowest tax burden would be borne by low-income house-

holds, while high-income households would contribute the most to government revenue, confirming the progressivity of increase of excise levels in all the countries.