tobaccotaxation
Economic Research Informing
Tobacco Taxation Policy

Distributional Impacts of Tobacco Tax in Montenegro

ISEA
INSTITUT ZA SOCIO-EKONOMSKE ANALIZE

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Executive Summary

This study estimates the impact of a tobacco tax increase on cumulative income gains, due to a reduction in tobacco consumption and medical expenses related to tobacco-attributable diseases, as well from years of working life saved. An extended cost-benefit analysis (ECBA) is applied to estimate the distributional impacts of tobacco taxes in Montenegro.

To the authors' knowledge, this is the first study on its kind in Montenegro, and its findings contribute to building a local evidence base for accelerating the progress of effective tobacco taxation and control policies. The absence of this type of research has potentially undermined efforts at more systematic monitoring of tobacco control measures' efficient implementation. Even though the Government of Montenegro has adopted all relevant regulatory frameworks for tobacco control, there still remains a lot to be done to ensure the legislation is effective. The evidence shows a very high prevalence of tobacco use among adults at 40.7 percent (STC-SEE, 2020)[1], with disparities along socioeconomic lines, especially among marginalized groups (ISEA, 2019).[2] Moreover, according to the Institute of Public Health (IPH) of Montenegro (2018),[3] the prevalence of smoking-related diseases, such as different types of cancer is also high (52.5 percent for males and 47.5 percent for females).[4] It is important to note that 95 percent of patients diagnosed with lung cancer are smokers.[5] Compared to countries that have a high Human Development Index score, on average 29.1 percent more men die in Montenegro due to tobacco use (Tobacco Atlas, 2018).[6]

The main aim of this study is to provide evidence to policy makers on the overall high levels of economic, medical, and productivity costs of tobacco use, as well the significance of tobacco

[1] Survey on Tobacco Consumption in SEE Countries. *STC-SEE 2020 for Montenegro* (Adult Tobacco Use in Montenegro). https://tobaccotaxation.org/research.php?pID=221&lng=srb

[2]Mugoša, A., Čizmović, M, Laković, T. & Popović, M. (2019). Impacts of Tobacco Excise Increases on Cigarette Consumption and Government Revenues in Southeastern European Countries; Chapter 7 in Regional Study. https://tobacconomics.org/research/impacts-of-tobacco-excise-increases-on-cigarette-consumption-and-government-revenues-in-southeastern-european-countries/

[3] Institute of Public Health of Montenegro. (2013). Malignant Neoplasms of Montenegro. Center for Control and Prevention of Non-communicable Diseases, Registry of Malignant Neoplasms of Montenegro. https://s3.eu-central-1.amazonaws.com/web.fabrika/ijzcg-media-fabrika/files/1573571155-maligne-neoplazme-u-crnoj-gori-2013.pdf

[4] Males are diagnosed primarily with lung cancer, and females with breast cancer, although there is an increasing trend of lung cancer incidence among females.

[5] https://www.rtcg.me/vijesti/drustvo/322993/raste-broj-pusaca-narocito-medju-mladima-u-cg.html
Ljajević, A., Zvrko, E., & Crnogorac, N. (2009). Smoking cessation manual, Institute for Public Health, Montenegro.https://s3.eu-central-1.amazonaws.com/web.repository/ijzcg-media/files/1574192955-vodic-za-odvikavanje-od-pusenja.pdf

[6] Tobacco Atlas (2016). Montenegro. https://tobaccoatlas.org/country/montenegro/

taxes' progressivity. The study uses data from the Household Budget Survey (2006–2017) and the Survey on Tobacco Consumption in Southeastern European countries (STC-SEE)[7] 2019 for Montenegro. Additionally, this study uses data on health costs from the Ministry of Health (MOH), IPH, and National Health Insurance Fund (NHIF) and data on the number of deaths related to smoking attributable diseases from the Global Burden of Disease (GBD) database.[8]

This study demonstrates that tobacco tax in Montenegro is progressive and that the poorest population would benefit the most from a tobacco tax increase. As a result of increased tobacco taxes, cost reductions from lower spending on cigarettes and medical services, as well as those related to premature deaths due to tobacco use, would result in improvements in total population welfare. An ECBA decomposition shows that the benefits of higher taxes outweigh the costs and that the whole net income effect is positive across all income groups.

Key messages of the study

FA policy that increases the cigarette excise tax by 50 percent would:

- have a progressive effect on the distribution of income, as the increase in available income of the low-income group would be between 1.6 and 1.8 percent, while for the high-income group it would be approximately 0.2 percent.
- reduce spending on tobacco among the low-income group. The available income of the poorest group for other non-tobacco-related spending would increase by 0.8 percent, while the high-income group would experience a loss of 0.2 percent.
- increase disposable income due to the reduction in medical costs. For the low-income group, available income would increase between 0.4 and 0.6 percent, while the wealthiest group would see an increase of around 0.1 percent.
- increase earnings by reducing the number of productive years of life lost due to tobacco-attributable diseases. The estimated impact is similar among all groups, as available income would increase between 0.4 percent and 0.6 percent.
- reduce the number of premature deaths caused by smoking between 7.9 percent and 11.6 percent.

[7] Survey on Tobacco Consumption in SEE Countries. *STC-SEE 2020 for Montenegro* (Adult Tobacco Use in Montenegro). https://tobaccotaxation.org/research.php?pID=221&lng=srb

[8] Institute for Health Metrics and Evaluation. (2021). Global Burden Diseases Data. http://www.healthdata.org/gbd/data

In absolute terms, a 50-percent increase in the specific excise tax would cause an increase in available income from €9.9 million[9] to €11.2 million, due to a reduction in tobacco and medical expenditures, as well as in years of productive life lost. The progressive excise tax policy would save from 188 to 198 lives, depending on the assumed smoking attributable fraction (SAF).

The poorest segment of the population would benefit from a €4.3 million to €4.9 million increase in income, due to a decrease in tobacco consumption amounting to €1.7 million, medical costs reduction between €1.1 million and €1.6 million, and €1.5 million in earnings from productive years of life saved.

Based on the summary of findings, it can be concluded that a tobacco tax increase would be hugely beneficial, especially for the lowest-income group in Montenegro. It is evident that poorer people would benefit the most from the excise tax increase, with higher income gains from reductions in consumption and medical costs, as well as from saved years of working life (YWLL).

It is therefore strongly recommended to raise tobacco taxes in Montenegro in line with the EU Tax Directive to effectively reduce consumption and high prevalence of tobacco use. This recommendation is especially important in the context of poverty and growing disparities in health. Policy makers should seriously consider the increase in excise taxes due to their progressivity. The implementation of a higher cigarette tax would have a progressive effect on the distribution of income, since it would allow the poorest population to benefit the most from this taxation policy.

Moreover, it is recommended to adopt comprehensive public awareness programs on the health risks of tobacco use. Some of the new revenues collected from excise taxes should be earmarked for health promotion, cessation, and tobacco prevention programs especially for the most marginalized groups.

Workplace cessation programs should be promoted, encouraged, and implemented to increase work productivity and performance.

Stronger tax administration can help to assure the full benefits of the tax reform for the population.

[9] Simulation based on SAF 1 and SAF 2, calculated from Russian and the US Relative Risk (US RR), respectively.

1. Introduction

The most effective way to reduce tobacco use is to increase tobacco excise taxes so that prices rise significantly (WHO FCTC, Article 6).[10] Effective taxation policies can discourage tobacco consumption thereby improving population health and productivity. On the other hand, the greater affordability of tobacco products can hinder economic growth by increasing prevalence, poverty, and health disparities and contributing to lost productivity.

Tobacco use is a major preventable cause of premature death and disease worldwide. Estimates by the World Health Organization (WHO)[11] show that tobacco kills more than eight million people globally each year. Diseases related to tobacco use predominantly include cancer and cardiovascular diseases, which lead to widespread premature death and high levels of morbidity. Moreover, numerous non-smokers have died due to health complications caused by exposure to secondhand smoke. The WHO (2016)[12] recently projected that implementation of a stronger set of tobacco control polices in accordance with the WHO FCTC could avert almost 24,390 deaths within 40 years in Montenegro (13,573 males and 10,817 females).

Most of the adverse health effects and deaths related to tobacco use occur in low- and middle-income countries. According to ISEA research (2018, 2020)[13], tobacco products are affordable and smokers in Montenegro have a low awareness of the health risks of smoking tobacco. The overall prevalence for all tobacco products among adults in Montenegro is high (40.7 percent), in fact one of the highest in the European region.

This study uses the ECBA to estimate the distributional net effect of a tobacco tax increase, which includes the sum of the population income gains derived from the changes in consumption, medical expenditures, and working years. To the authors' knowledge, this study is the first of its kind in Montenegro. The aim of this report is to provide the evidence on taxation policies' distributional effects in Montenegro in order to inform tobacco tax policy discussions and reforms. The results will contribute to the evidence-based policy making of many important stakeholders in Montenegro, including the MoF and the MoH.

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[10] World Health Organization. (2003). *Framework Convention on Tobacco Control*. http://apps.who.int/iris/bitstream/handle/10665/42811/9241591013.pdf;jsessionid=6BE3093ACCBEF7E84498A826D2B2826B?sequence=1

[11] World Health Organization. (2021). Tobacco. https://www.who.int/news-room/fact-sheets/detail/tobacco

[12] World Health Organization. (2016). Tobacco Control Fact Sheet Montenegro. https://www.euro.who.int/__data/assets/pdf_file/0005/312593/Tobacco-control-fact-sheet-Montenegro.pdf?ua=1

[13] Mugoša, A., Popović, M., Laković, T., & Čizmović, M. (2018). *Accelerating progress on effective tobacco tax policies in Montenegro*. ISEA.

The study is organized as follows: Chapter two focuses on the background of tobacco use in Montenegro, Chapters three and four provide information on the data and methodology used, Chapter five presents the results, and Chaper six discusses the findings and policy recommendations.

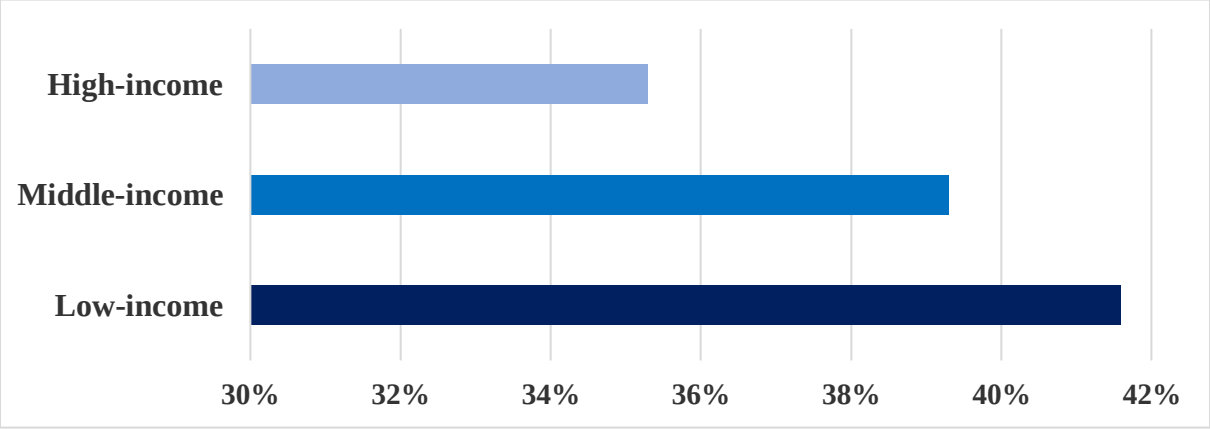
2. Background

Tobacco use in Montenegro

Montenegro has the highest prevalence of adult tobacco smoking of all countries in the Southeastern European (SEE) region, according to WHO estimates[14]. There was a marked increase in smoking prevalence in Montenegro in 2017 compared to 2012, which is mainly attributable to an increase in smoking among women. The same pattern is visible across all age groups, specifically among youth (GYTS 2018).[15]

Moreover, the STC-SEE data for Montenegro show in 2019 a very high smoking prevalence of all tobacco products among both male and female adults (40.2 percent of males, 40.7 percent of females) and in the lowest-income group (Figure 1).

Figure 1. Prevalence of tobacco use among income groups in Montenegro, 2019



Source: STC-SEE data for Montenegro; Mugosa et al. (2020)

An additional problem is smoking initiation at an early age, as one in five current smokers tried their first cigarette before age 15. Moreover, the intensity of smoking is very high since the

[14] World Health Organization. (2018). *Age-standardized prevalence of tobacco smoking among persons 15 years and older, by WHO region, 2016.* Available at: http://apps.who.int/gho/data/node.sdg.3-a-viz?lang=en
[15] Institute of Public Health. (2018). *Global youth tobacco survey – GYTS*; available at: https://nccd.cdc.gov/GTSSDataSurveyResources/Ancillary/DataReports.aspx?CAID=1

average number of cigarettes (manufactured and hand-rolled) smoked per day was 19.7 in 2019. Montenegro also has a lack of successful smoking cessation programs and a low level of awareness of the harmful impacts of smoking and secondhand smoke exposure. Results[16] show that only 10.0 percent of smokers tried to quit in the past 12 months, and most of them relapsed after only one month or less. Even though tobacco consumption is related to numerous diseases and high medical costs for their treatment, a very high proportion of smokers do not quit or try to smoke less. Because of low prices, cigarettes in Montenegro are affordable, and smokers spend a large share of their budget on these products (11.4 percent of average household monthly income). Therefore, preventive actions are needed through changes to current tobacco control policies, especially taxation policies.

Tobacco control legislation in Montenegro

Montenegro has begun the creation of an institutional and legal framework for tobacco policies by adopting key laws and strategies beginning in 2004. The country became a Party to the WHO Framework Convention on Tobacco Control (WHO FCTC)[17] on 9 May 2006 and ratified the Protocol to Eliminate Illicit Trade in Tobacco Products in 2018.[18] The key legislation[19] includes the Law on Tobacco, the Law on Limiting Use of Tobacco Products, and the Law on Excise Taxes. These laws were amended several times, with most progressive changes introduced in 2019, with the adoption of the new tobacco control law. The latest update is a complete smoking ban in work and public places. Additionally, new measures were introduced that are in line with the Protocol to Eliminate Illicit Trade in Tobacco Products (including tracking and tracing, articles 50–52). This brought Montenegro closer to alignment with the requirements of the FCTC and European Union (EU) directives.

[16] Survey on Tobacco Consumption in SEE Countries. STC-SEE 2020 for Montenegro (Adult Tobacco Use in Montenegro). https://tobaccotaxation.org/research.php?pID=221&lng=srb

[17] World Health Organization. (2003). *Framework Convention on Tobacco Control*. http://apps.who.int/iris/bitstream/handle/10665/42811/9241591013.pdf;jsessionid=6BE3093ACCBEF7E84498A826D2B2826B?sequence=1

[18] World Health Organization. (2013). *Protocol to Eliminate Illicit Trade in Tobacco Products*. https://www.who.int/fctc/protocol/illicit_trade/protocol-publication/en/

[19] *Law on Tobacco* (Official Gazette of Montenegro No. 48/08, 76/08, 40/11, 42/15); *The Law on Limiting Use of Tobacco Products* (Official Gazette of Montenegro, No. 46/19 and 48/19); *Law on Excise Taxes* (Official Gazette of Republic Montenegro No. 65/01, 12/02, 76/05 and Official Gazette of Montenegro 76/08, 50/09, 78/10, 40/11, 61/11, 28/12, 38/13, 45/14, 8/15, 1/17, 50/17, 55/18, 76/20)

Table 1. Current status of tobacco control policies compared to WHO FCTC

Convention articles	Status of policy in Montenegro
Raise cigarette taxes (Article 6. FCTC)	Overall excise rate of €67.5 per 1,000 cigarettes (new proposal: €85.25 per 1,000 cigarettes)
Smoke-free policies (Article 8. FCTC)	Complete smoking ban in work and public places
Advertisement ban (Article 11. FCTC)	Ban of all forms of tobacco promotion
Labelling and packaging (Article 13. FCTC)	65% combined warning prescribed (text plus picture warnings) on both sides, front and back, to be implemented in 2022

Source: WHO FCTC and Law on Limiting the Use of Tobacco Products

Montenegro has adopted various strategies[20] that directly and indirectly address key aspects of tobacco control:

- Tobacco Control Strategy (2005), which expired in 2008
- Strategy for Health Care Development (2003–2020)
- Strategy for Prevention and Control of Chronic Non-communicable Diseases (2008–2020)
- National Strategy for Sustainable Development until 2030, nationalizing the targets on tobacco control.

Montenegro also applies excise taxes to cigarettes using a mixed excise tax system with an ad valorem excise tax (based on retail prices) and a specific excise tax. The weighted average price of cigarettes (WAPC) amounted to €2.1 per pack of 20 cigarette sticks in 2019 and 2020, and it increased to €2.5 in 2021. The most-sold brand in the last three years (2019–2021) was Winston X Style long blue, with no significant increase in price, which ranges from €2.3 to €2.5 (Table 2). The data confirm lower prices and excise duties compared to the EU Tax Directive.[21]

[20]Ministry of Health (2005). *National strategy for tobacco control*.
Ministry of Health (2003). Strategy for Health Care Development in Montenegro.
Ministry of Health (2008). Strategy for Prevention and Control of Chronic Non-communicable Diseases. https://www.iccp-portal.org/system/files/plans/MNE_B3_nezarazne%20novembar%202008.pdf
Ministry of Ecology, Spatial Planning and Urbanism. (2016). *Strategy for Sustainable Development until 2030.* http://www.nssd2030.gov.me/

[21] Council of the European Union. (2011). *Council Directive 2011/64/EU, Official Journal of the European Union*. https://eur-lex.europa.eu/legal-content/en/ALL/?uri=CELEX%3A32011L0064

Table 2. Most-sold brands and prices, 2019–2021

2019		2020		2021	
Brand	**Price**	**Brand**	**Price**	**Brand**	**Price**
Winston X Style long blue	€2.3	Winston X Style long blue	€2.4	Winston X Style long blue	€2.5
Winston X Style long silver blue	€2.3	Eva slims yellow	€2.1	Eva slims yellow	€2.2
Eva slims yellow	€2.0	Winston X Style long silver blue	€2.4	L&M loft blue	€2.4

Source: Tobacco Agency, Ministry of Finance

Low prices and high levels of tobacco use strongly suggest that tobacco taxes could still be increased significantly. Currently, the specific excise tax is €37 per 1,000 sticks, which combined with the ad valorem tax leads to an overall excise rate of €67.5 per 1,000 cigarettes. Thus, Montenegro is still far from the EU Tax Directive minimum threshold of €90 per 1,000 cigarettes. To combat the negative effects that the use of tobacco products have on the health of citizens, further harmonization of excise duties on cigarettes with the requirements of Directive 2011/64/EU is needed. The new proposal of the Law on Excise Taxes in 2021 would increase the specific excise tax to €47 per 1,000 sticks, while the ad valorem rate would remain unchanged at 29 percent of retail price. Still, this proposal has not yet been adopted.

Literature review

Various studies have applied ECBA to estimate the effects of tobacco price increases on consumption, medical expenses, and years of working life lost (YWLL). For example, a study by Verguet et al.[22] (2015) in China shows that policy changes had a significant public health impact, as a 50-percent increase in prices resulted in 231 million years of life saved over 50 years. These benefits are particularly concentrated among lower-income individuals and households. Moreover, the study estimates that the government could receive additional tax revenues in the amount of US$ 703 billion, due to the price increase. In addition to decreasing tobacco consumption, spending on tobacco-related diseases would also be significantly reduced.

In the case of Russia, Maslennikova et al.[23] (2013) estimated a decrease of 3.7 million tobacco-related deaths over the period 2015–2055 (2,684,994 males and 1,011,985 females) in a

[22]Stéphane Verguet, C. L. (2015). The consequences of tobacco tax on household health and finances in rich and poor smokers in China: An extended cost-effectiveness analysis. *Lancet Global Health*, 206-216. doi: 10.1016/S2214-109X(15)70095-1

[23] Maslennikova, G. Y., Oganov, R. G., Boytsov S. A., Ross H., Huang, A. T., Near A., et al. (2014). Russia SimSmoke: The long-term effects of tobacco control policies on smoking prevalence and smoking-attributable deaths in Russia. *Tobacco Control, 23*(6), 484–490. http://doi.org/10.1136/tobaccocontrol-2013-051011

scenario of a 70-percent increase in tobacco taxes, along with other tobacco control policy adjustments. A study from Brazil[24] (2020) shows that a 10-percent increase in price leads to a significant decrease in tobacco spending and medical expenses on tobacco-related diseases, while increasing future years of life and net income. In the overwhelming majority of studies in this area, the effects are much greater for the lowest income quantile compared to the highest. Individuals in low-income groups benefit the most, with a 2.4-percent decline in medical expenses and a 2.6-percent reduction in years of life lost.

Research from Mexico[25] (2020) finds that the impact from changes in tobacco taxation policies is greater among poorer households where, due to the reduction in medical expenses, gains in income for these groups are between 2.8 percent to 4.1 percent of their income. Fuchs et al. (2019)[26] applied ECBA to estimate net distributional costs of smoking in Bosnia and Herzegovina. The results indicate, as expected, the positive impact of tobacco price increases among poorer households—increased available income through decreased tobacco consumption and YWLL. Among the general population, these effects are positive but negligible. The overall results confirm the pro-poor, or progressive, effect of tobacco taxation.

Research from Georgia[27] (2020) shows that increasing tobacco taxes by 12 percent could save more than 3.6 billion Georgian lari and 53,000 lives over a 15-year period. Consumption would be significantly reduced in the case of higher tobacco prices. The analysis, conducted using household survey data, shows the progressivity of tobacco taxation in Georgia, meaning that poorer smokers see higher benefits, relative to their income. Indirect benefits of tobacco use, reflected in reduced healthcare costs and premature deaths, are small but positive and most pronounced among lower-income households.

A similar study in Peru[28] (2020) estimates that increasing the special consumption tax on tobacco products reduces spending on cigarettes among low-income smokers. Due to tobacco tax increases, an increase in price by 10 percent would benefit low- and middle-income groups for a total of 3.3 million Peruvian soles per year through reduced tobacco consumption. The

[24] Costa do Amor Divino, J. A., Ehrl, P., Candido, O., & Valadão, M. (2020). *An extended cost-benefit analysis of tobacco taxation in Brazil*. Universidade Católica de Brasília (UCB) in Brazil. https://tobacconomics.org/research/an-extended-cost-benefit-analysis-of-tobacco-taxation-in-brazil-report/

[25] Macías, A., Villarreal, H. P., Méndez, J., & Gómez, A. G. (2020). *Extended cost-benefit analysis of tobacco consumption in Mexico*. Centro de Investigación Económica y Presupuestaria A.C. (CIEP) in Mexico. https://tobacconomics.org/research/extended-cost-benefit-analysis-of-tobacco-consumption-in-mexico/

[26] Tarlovsky, A.F., Orlic, E., Cancho, C. (2019). Time to Quit: The Tobacco Tax Increase and Household Welfare in Bosnia and Herzegovina. World Bank, Washington, DC. http://hdl.handle.net/10986/31249

[27] Tarlovsky, A. F., & Gonzales Icaza, M. F. (2020). *Taxing tobacco in Georgia - welfare and distributional gains of smoking cessation*. http://hdl.handle.net/10986/33266

[28] De los Ríos, C., Medina, D., & Aguilar, J. (2020), *Cost-benefit analysis of tobacco consumption in Peru*. IEP. https://repositorio.iep.org.pe/bitstream/handle/IEP/1175/De-los-Rios_Medina_Aguilar_Cost-benefit-analysis-tobacco-Peru.pdf?sequence=1&isAllowed=y

impact of taxation policy changes on poorer households would be more than three times greater compared to the wealthiest households (2.3 percent compared to 0.6 percent of income gain).

Similarly, in Vietnam (2019)[29] a study estimated that 170,000 Vietnamese individuals could overcome poverty every year if cigarette prices increased by 80 percent. Moreover, 20,000 Vietnamese would be saved from impoverishment due to reductions in the related out-of-pocket medical costs, and 30,000 people could be saved from premature death caused by smoking.

Finally, Goodchild et al. (2018)[30] found that the total economic cost of smoking is equivalent to 1.8 percent of the world's annual gross domestic product (GDP). It is important to note that 40 percent of these costs are from low- and middle-income countries. The study uses a sample of 152 countries, which represents 97 percent of smokers globally.

There is a lack of scientific research on this topic in Montenegro. Evidence on the distributional impacts of tobacco tax policies would be a useful resource for policy makers and tobacco control proponents as they consider establishing sustainable funding through increased excise taxes for health generally or for tobacco control programs specifically.

3. Data and Methodology

ECBA simulates the distributional effect of tobacco tax increases and consists of the following three parts:

1. impact on change in tobacco consumption and expenditures
2. impact on change in medical expenditures
3. impact on change in earnings.

3.1 Change in tobacco consumption and expenditures

The first part of the analysis consists of estimating the impact of a hypothetical tax and price increase on tobacco consumption. This study employs the total price elasticity by income group (which is a sum of the prevalence and the conditional elasticity) estimated using the two-part model[31] with 2006–2017 Household Budget Survey (HBS) data (Table 3).

[29] Tarlovsky, A. F., & Gonzalez Icaza, F. (2019). *The welfare and distributional effects of increasing taxes on tobacco in Vietnam.* World Bank, Washington, https://openknowledge.worldbank.org/handle/10986/32062

[30] Goodchild, M., Nargis, N., & Tursan d'Espaignet, E. (2018). Global economic cost of smoking attributable diseases. *Tobacco Control, 27*(1), 58–64. doi: 10.1136/tobaccocontrol-2016-053305

[31] Mugoša, A., Čizmović, M, Laković, T. & Popović, M. (2019). Impacts of Tobacco Excise Increases on Cigarette Consumption and Government Revenues in Southeastern European Countries; Chapter 7 in Regional Study.

Table 3. Prevalence and intensity elasticities by income group

	Low-income		Middle-income		High-income	
Prevalence elasticity (logit model)						
Price	-0.61***	(0.07)	-0.58***	(0.06)	-0.33***	(0.07)
Conditional demand (intensity) elasticity (Deaton model)						
Price	-0.41***	(0.05)	-0.34***	(0.07)	-0.28**	(0.14)
Total	**-1.02**		**-0.92**		**-0.61**	

Notes: *** p<0.01, ** p<0.05, * p<0.1
Source: Authors' calculations

To demonstrate the positive impact of excise tax changes, the study simulates these effects on cigarette consumption. This simulation uses the structure of price of the most-sold brand and cigarette consumption in 2019 (obtained for each individual from STC-SEE data). To show the effect of different scenarios, the study applies a lower and an upper bound of price elasticities, which are determined as -/+ 20 percent of estimated elasticities by income groups (Table 4).

Table 4. Lower- and upper-bound price elasticity

	Low-income	Middle-income	High-income
Lower bound	-0.82	-0.73	-0.49
Medium bound	-1.02	-0.92	-0.61
Upper bound	-1.23	-1.10	-0.73

Source: Authors' calculations

The assumptions on the tax increase that are used in the simulations are shown in Table 5. The baseline scenario is for the year 2019, for which the most recent data on individual cigarette expenditures, smoking prevalence, and other socioeconomic characteristics are available from the STC-SEE. According to the excise tax calendar, the specific tax was €30 per 1,000 sticks in 2019, with a planned increase of €3.5 annually, which would lead to a specific excise tax of €37 per 1,000 sticks in 2021. Nevertheless, the two simulation scenarios assume higher tax increases to €40 and €45 per 1,000 sticks, respectively (Table 5).

https://tobacconomics.org/research/impacts-of-tobacco-excise-increases-on-cigarette-consumption-and-government-revenues-in-southeastern-european-countries/

Table 5. Scenarios for tax increases

	Specific excise tax (€)	Percent of specific tax increase	Percent of ad valorem excise tax (no changes)
Baseline scenario	30	-	32
Scenario I	40	32.4	32
Scenario II	45	50	32

Source: Authors' calculations

The price structure of the most-sold brand (Table 6) includes a specific excise tax of €0.6 per pack, an ad valorem tax of 32 percent of retail price, and value added tax (VAT) of 17.4 percent share in retail price (VAT rate in Montenegro is 21 percent). In case of a full pass-through, a 32.4-percent increase in specific excise tax, the price would increase by 16.7 percent, while a 50-percent increase in specific tax would lead to 25.7 percent increase in price.

Table 6. Price structure of the most-sold brand in 2021

	2019 (€)	**Increase of specific tax by 32.4% (€)**	**Change (%)**	**Increase of specific tax by 50% (€)**	**Change (%)**
Price	2.30	2.68	16.7%	2.89	25.8%
Specific tax	0.60	0.79	32.4%	0.90	50.0%
Ad valorem (32%)	0.74	0.86	16.7%	0.93	25.8%
VAT (21%)	0.39	0.47	16.7%	0.51	25.8%
Net-of-tax price	0.56	0.56	0.0%	0.56	0.0%
Tax burden (%)	75.4%	79.0%	4.7%	80.47%	6.7%
Total excise tax (%)	58.1%	61.6%	6.1%	63.12%	8.7%

Source: Authors' calculations and Ministry of Finance

The progressivity of tobacco taxes, analyzed through comparison of the tax burden before and after the tax change, is presented in the Appendix (Part B). Results show that even before a tax increase and before accounting for the impact on medical spending and productivity, the tax system is already progressive.

The simulation of an impact of a change in expenditures on cigarettes, applying two scenarios, is based on the assumption that the whole tax burden is on consumers (i.e., perfect elasticity of supply function). The calculation of a change in available expenditure for income group i $Expenditures_i$ as a consequence of the cigarette price increase and reduction in cigarette spending can be defined as follows:

$$\Delta Expenditures_i = \left((1 + \%\Delta p)\left(1 + \varepsilon_p \%\Delta p\right) - 1\right)\frac{E_{Co}}{E_{To}} \quad (1)$$

where E_{Co} represents the spending on cigarettes in year 0, E_{To} represents total spending in year 0, ε_p is price elasticity and Δp represents changes in price. Change in expenditures for each individual in each income group is presented as a share of total expenditure and averaged by income group to quantify the overall impact of price. In other words, by reducing the consumption and spending on tobacco due to a price increase, the income available for non-tobacco spending increases by the amount in Equation (1).

To estimate the change in tobacco expenditures across income groups due to a price increase, the following steps are applied:

1. estimation of the price increase for the most sold brand, assuming a unified[32] price increase under two scenarios (32.4 percent and 50 percent specific tax increase) (Table 6);
2. estimation of consumption change for each individual separately using Equation (1), with lower-, middle-, and upper-bound elasticities shown in Table 4; and
3. calculation of the average change in individuals' budget share across income groups.

3.2 Change in medical expenditures

The second part of ECBA consists of estimating the impact of a hypothetical tax increase described in Step 1 on the individuals' medical costs. Data on medical expenditures of tobacco-related diseases are obtained from the Ministry of Health, Institute of Public Health, and National Health Insurance Fund (Table 7)[33]. The list of tobacco-related diseases is obtained from the Report of the Surgeon General (2014),[34] and lung cancer and cardiovascular diseases are selected as the most prevalent.

Table 7. Medical expenditures of tobacco-related diseases

Disease	Costs in € (2019)
Tracheal, bronchus, and lung cancer*	6,805,833
Stomach cancer	406,627
Pancreatic cancer	405,621
Leukemia	2,205,416

[32] Distributional impact of tobacco taxes can be also assessed through simulations that do not imply most-sold brand price as a basis, instead using the self-reported price by the individuals from STC-SEE. This analysis is presented in the Appendix, Part C.

[33] Total Government budget allocations to total health spending in 2019, amounted to €258.6 million.

[34] U.S. Department of Health and Human Services. (2014). *The health consequences of smoking: 50 years of progress. A report of the Surgeon General*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health. https://pubmed.ncbi.nlm.nih.gov/24455788/

Liver cancer	174,802
Kidney cancer	743,039
Lip and oral cavity cancer	27,867
Esophagus cancer	84,236
Cervix cancer	593,694
Cerebral infraction	827,093
Ischemic heart disease	3,998,821
Other cardiovascular diseases	5,154,763
Medical expenses (abroad)	3,584,309
Out of pocket	16,478,749
Total	**41,490,870**

Note: *The costs include lung cancer and other pulmonary diseases. Those costs are taken from a financial statement from the hospital Brezovik. Due to the lack of data, the out-of-pocket costs are estimated as 40 percent from the total medical expenditures based on WHO estimates.[35]
Source: MOH, IPH, NHIF for all diseases, except for lung cancer

The focus of this part of the analysis is the estimation of the change in smoking-attributable health expenditures (SAHE) across income groups due to the price increase. The following steps are taken to perform the estimation:

1. **Calculating the smoking-attributable fraction (SAF)** – To estimate smoking-attributable health expenditures, it is necessary to determine the SAF based on the estimate of the relative risk (RR) and smoking prevalence. RR estimates the likelihood of mortality among ever smokers versus never smokers. Since RR estimates for Montenegro are not available, the authors have adopted the estimates from other related studies. Moreover, the data on medical expenditures of tobacco-related diseases is only given in total amounts due to the lack of information on gender, age, and smoking status. For this reason it is not possible to apply separate RR for each disease.

Ideally, in estimating the tobacco-attributed health costs the morbidity RR should be used. However, because the morbitiy RR estimates are very limited, studies commonly use the RR of mortality for all costs of tobacco use, including the health costs, even though this potentially underestimates the costs.[36]

[35] World Health Organization (2018). Global Health Expenditure Database. https://apps.who.int/nha/database/ViewData/Indicators/en
[36] Rice, D., Hodgson, T.A., Sinsheimer, P., Browner, W. and Kopstein AN (1986). The Economic Costs of the Health Effects of Smoking, 1984. Milbank Quarterly, 64(4):489-547.

The current study uses the mortality RR for the United States of America (USA) from the Surgeon General's report (2014),[37] which is commonly used in the literature when local estimates are not available. Based on RR for all causes given by age group and gender, a composite RR for Montenegro is derived. Additionally, for the robustness check, this study also uses the mortality RR for Russia (Stefler et al., 2017),[38] which is disaggregated only by gender and estimated for all causes of death.

The SAF is calculated by the following formula for two levels of exposure (current and former smokers): [39]

$$SAF = \frac{Pc(RRc-1)+Pf(RRf-1)}{Pc(RRc-1)+Pf(RRf-1)+1} \times 100\% \quad (2)$$

where Pc = prevalence of current smokers, Pf = prevalence of former smokers, RR_c = relative risk of developing tobacco-related diseases for current smokers compared to never smokers, and RR_f = relative risk of developing tobacco-related diseases for former smokers compared to never smokers.

The estimated SAFs are given in Table A1 and A2 in the Appendix (Part A). SAF 1 equals 25 percent using the RR for Russia and SAF 2 is 38.6 percent using the RR for the USA (hereafter SAF1 and SAF2). SAF1 and SAF2 are calculated for the population aged 35 and older, as it is expected that the negative health impacts of smoking start becoming prominent around 10 years after smoking initiation.[40] Since 80 percent of ever daily smokers start smoking daily before the age of 24, and 55.7 percent start smoking daily between age 18 and 24, the population aged 35 and older is the appropriate target population for the study (Mugoša et al. 2020).

2. **Calculating SAHE** – To calculate SAHE, SAF is applied on the total amount of health expenditures (THE) of tobacco-related diseases:

$$SAHE=SAF*THE \quad (3)$$

[37] U.S. Department of Health and Human Services. (2014). *The health consequences of smoking: 50 years of progress. A report of the Surgeon General*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health. https://pubmed.ncbi.nlm.nih.gov/24455788/

[38] Stefler, D., Murphy, M.J., Irdam, D., Horvat, P., Jarvis, M., King, L., McKee, M. & Bobak, M. (2017). *Smoking and mortality in Eastern Europe: Results from the PrivMort retrospective cohort study of 177,376 individuals*. Oxford University Press. http://dx.doi.org/10.1093/ntr/ntx122

[39] In the case of Russia, since RR for former or ever smokers is not available, it is approximated using the ratio between RRs for current and former smokers from the USA study.

[40] This assumption is also used in estimation of RR in studies related to the USA and Russia.

where THE are medical expenditures of tobacco related diseases given in Table 7.

3. **Allocating SAHE across income groups** – The allocation is done based on the ratio of the number of smokers in each income group and the total number of smokers. This ratio is used as a weight to allocate the SAHE by income groups.

4. **Calculating the change in SAHE** – Using estimated price elasticities (Table 4) the change in SAHE by income group (*SAHEi)* is estimated as follows:

$$\Delta SAHE_i = \varepsilon_p * \%\Delta p * \frac{E_{MT_{0i}}}{E_{T_{0i}}} \quad (4)$$

where: E_{MTOi} represents smoking-attributable medical spending on treating tobacco-related diseases by income group *i*, and E_{Toi} represents total spending by income group *i.*

In other words, Equation (4) shows a change in income available to non-tobacco-related spending resulting from a reduction in tobacco-related medical spending, stemming from an increase in tobacco price and consequent reduction in tobacco consumption.

3.3 Change in earnings

The final phase of the analysis includes the calculation of income gains associated with the reduction in YWLL due to reduced tobacco consumption over the long term. The productivity cost is assessed using the data on the number of deaths related to smoking-attributable diseases for the population in productive ages of 35 and older (Table 8). The data are obtained from the GBD database[41].

YWLL is estimated by multiplying the distance between the age at premature death and 69 years with the number of smoking-related deaths for that age and gender group (Table 9). Retirement age in Montenegro is 67 (defined by the Law on Labour)[42] which is why 65-69 is used for the final age group interval. Even though this group includes retired individuals (67-69), more disaggregated data are not available to precisely include only the age group up to 67. Excluding the whole interval would underestimate the value of YWLL and smoking-related death events. Moreover, in Montenegro, a majority of retired individuals continue to work at least one to two years after retirement (part-time). The years of productive life lost at the national level are estimated to be 7,357 (Table 9).

[41] Institute for Health Metrics and Evaluation. (2021). Global Burden Diseases Data. http://www.healthdata.org/gbd/data

[42] Law on Labour, Official Gazette of the Republic of Montenegro, P. L. No. 74/2019 i 8/2021

Table 8. Death events attributable to risk of smoking in 2019

Disease	Male	Female	Both
Tracheal, bronchus, and lung cancer	393	112	505
Stomach cancer	16	5	21
Pancreatic cancer	22	17	39
Leukemia	3	2	5
Liver cancer	12	5	17
Kidney cancer	7	2	9
Lip and oral cavity cancer	9	2	11
Esophageal cancer	12	1	13
Cervical cancer	-	9	9
Cerebral infraction	200	204	404
Ischemic heart disease	307	166	473
Other cardiovascular diseases	34	10	44
Other attributable	90	28	118
Total	**1,105**	**563**	**1,668**

Source: Global Burden of Disease database;
Note: Data is disaggregated by age group (5-year cohorts) and gender and with smoking as a risk factor.

Table 9. YWLL by age group and gender

Age group	Average years until retirement	Smoking-related death events			YWLL		
		Male	Female	All	Male	Female	All
35 to 39	32	5	2	7	160	64	224
40 to 44	27	12	7	19	324	189	513
45 to 49	22	29	12	41	638	264	902
50 to 54	17	65	25	90	1105	425	1530
55 to 59	12	115	44	159	1380	528	1908
60 to 64	7	168	70	238	1176	490	1666
65 to 69	2	214	93	307	428	186	614
All before retirement		**608**	**253**	**861**	**5,211**	**2,146**	**7,357**
All after retirement		**497**	**310**	**807**			
Total		**1105**	**563**	**1668**	**5,211**	**2,146**	**7,357**

Source: Authors' calculations and Global Burden of Disease database

To assess the income gains, YWLL is first used to estimate the effect on earnings by income groups *i* from reducing YWLL:

$$\Delta earnings_i = \left(\varepsilon_p * \%\Delta p * YWLL_i\right) * \frac{Ii}{E_{T_0}} \quad (5)$$

Where ε_p represents price elasticity and Δp price change, I_i represents the income of individuals by income groups *I,* and E_{To} represents total spending in year 0.

These changes are estimated using upper-, middle-, and lower-bound elasticities from Table 4. Afterwards, the average change in income gains associated with the reduction in YWLL is calculated across income groups.

Therefore, Equation (5) represents a change in available income that results from an increase in productivity and earnings attributed to improved health outcomes, resulting from a tobacco price increase and consequent reduced tobacco consumption.

3.4 Net income effects (total distributional impact)

The total income gains in each income group *i* are estimated by adding up the results of the decrease in tobacco expenditure, medical expenses, and increase in earnings associated with saved productive years (Equation 6).

Net impact_i = Change in tobacco consumption and expenditures_i + Change in medical expenditures_i + Change in earnings_i (6)

In other words, Equation (6) shows a change in available income resulting from a reduction in tobacco consumption and tobacco-attributed medical spending, as well as an increase in earnings attributed to increased productivity from improved health outcomes due to a reduction in tobacco consumption.

Net impact is calculated for all elasticity bounds. Summing up these changes, total income effect by income groups is obtained, comprising the direct and indirect effects of taxes.

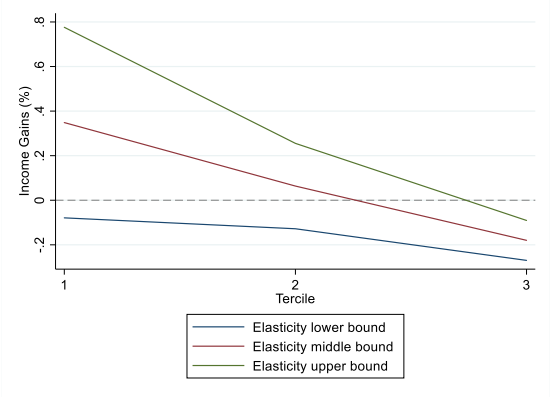
4. Results

4.1 Change in tobacco consumption and expenditures

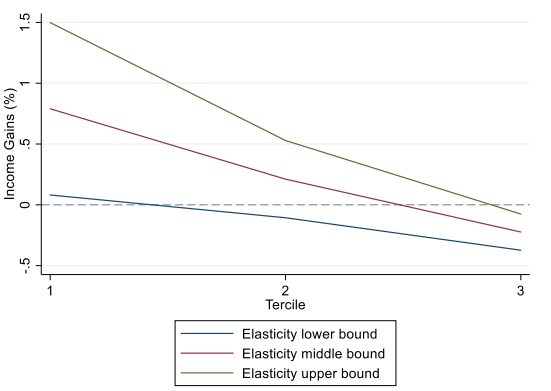
The impact of a tax increase on cigarette consumption and expenditures is assessed through an interaction of price increases, price elasticities for each income group, and household budget share on cigarettes. Income changes are determined for each income group based on the low-, middle-, and upper-bound elasticities. Using the assumption from both scenarios in Table 5, a price increase of 16.7 and 25.7 percent leads to generally positive effects for the low- and middle-income groups who would have the highest gains in available income (Figure 2). On the other hand, the high-income group experiences a small loss under all assumptions.

Figure 2. Change in tobacco expenditures by income groups after tax increase

Panel A: Price increase of 16.7 percent



Panel B: Price increase of 25.7 percent



Source: Authors' calculations

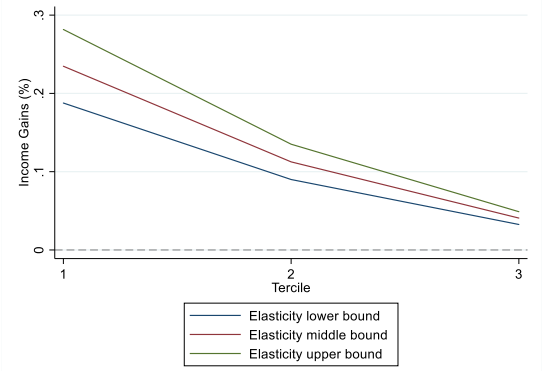
If prices of cigarettes rise by 25.7 percent, the expected increase in available income for low-income group would be 0.8 percent, given the middle-bound elasticity. In the wealthiest group the simulations show income losses of 0.2 percent (Figure 2, Panel B). The implementation of a higher cigarette tax would have a progressive effect, meaning lower consumption and affordability and more resources for other beneficial spending, with the positive effects mostly pronounced among the poorest individuals, as their available disposable income becomes higher after the price increase. For more details see Table A3 in the Appendix (Part A).

4.2 Change in medical expenditures

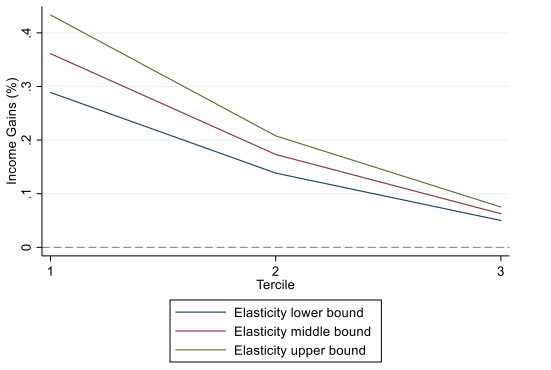
The increase in tobacco taxes could impact the progressive effect the reduction of tobacco-related medical expenditures would have on income. Figure 3 shows the positive impact of health expenses reduction on income gains, using both SAFs and price increases.

Figure 3. Change in medical expenditures by income groups after tax increase

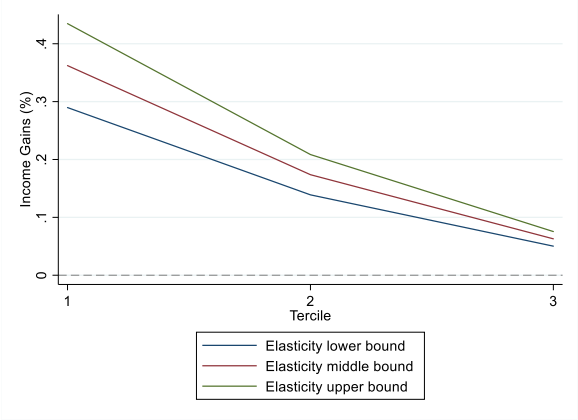
Panel A: Price increase of 16.7 percent (SAF1)



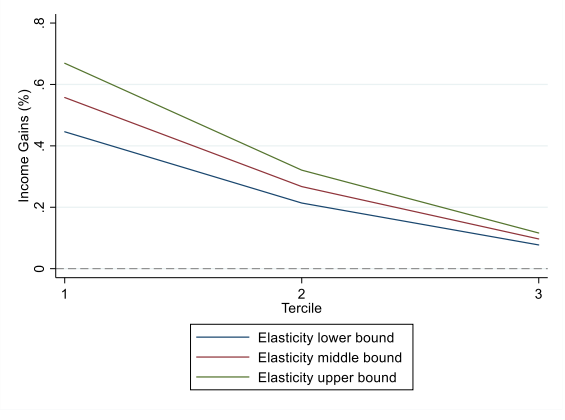
Panel B: Price increase of 25.7 percent (SAF1)



Panel C: Price increase of 16.7 percent (SAF2)



Panel D: Price increase of 25.7 percent (SAF2)



Source: Authors' calculations

The panels presented in Figure 3 show the positive effects of price increases on medical expenditures reduction. Positive income gains are obtained in each scenario, and specifically in the low-income group, which confirms the progressive effect of tax increases regardless of the elasticity and SAF assumption. The higher benefits in the poorest group are derived from higher responsiveness to price changes and a lower income base. The more economically vulnerable population will have greater resources after the tax increase, as the reduced prevalence and quantity consumed would lower the incidence of smoking-related diseases and the spending to treat them. The greatest income gains resulting from decreased medical costs would be obtained in the case of the higher price increase in all income groups (Panel D).

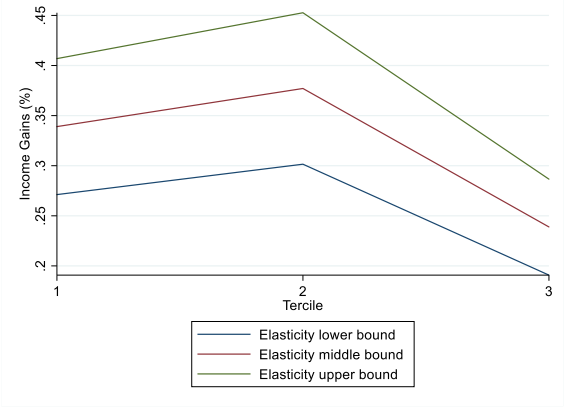
Under the assumption of a 25.7 percent price increase, the simulated income gain in the poorest population would range from 0.4 to 0.6 percent, depending on the SAF used (panels B and D, middle-bound elasticity). The positive income effects obtained through the tax increases are in line to the ones calculated in other studies using a similar approach.

4.3 Change in earnings

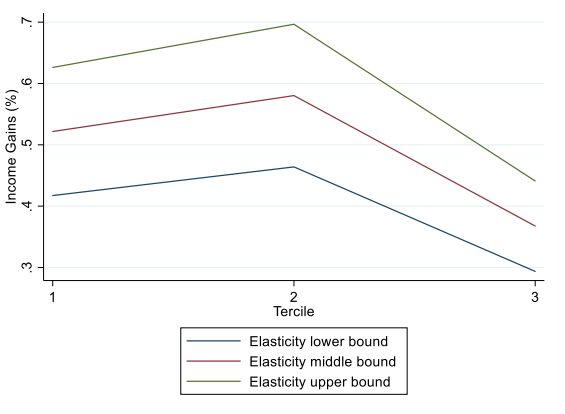
The increase in tobacco taxes could decrease the number of smoking-attributable deaths and disease and therefore produce a more productive population. The positive effects are obtained through higher earnings associated with the lower number of YWLL.

Figure 4. Effect of reducing YWLL by income group after tax increase

Panel A: Price increase of 16.7 percent



Panel B: Price increase of 25.7 percent



Source: Authors' calculations

Figure 4 shows small but positive income gains for all income groups in both scenarios. The results confirm that all three income groups would gain additional income, due to the lower number of YWLL. Different from consumption and medical costs, in this case the middle-income group benefits the most from price increases. Assuming the second scenario (25.7 percent price increase), due to the reduced number of YWLL, middle-income groups experience an increase in income gain by 0.6 percent. The wealthiest group has a somewhat lower, but still positive, increase in income by 0.4 percent.

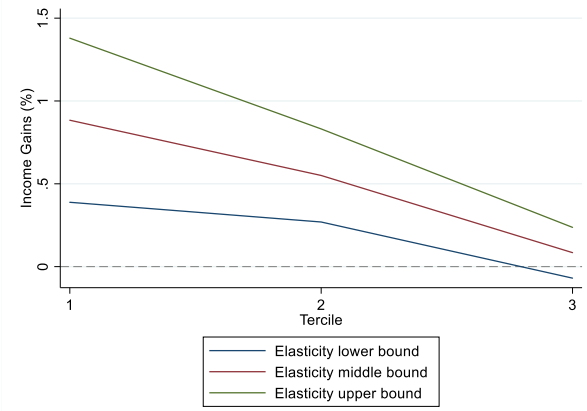
For more details see Table A5 in the Appendix (Part A).

4.4 Net impact

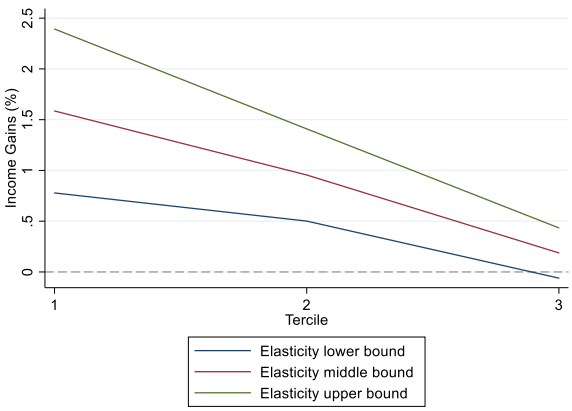
The total net income gains in each income group are estimated by summing up the changes in consumption, medical costs, and years of working life lost (Figure 5). Under all assumptions designed in the two scenarios the income gains are positive, outweighing the costs, and tax progressivity is confirmed.

Figure 5. Net income effect

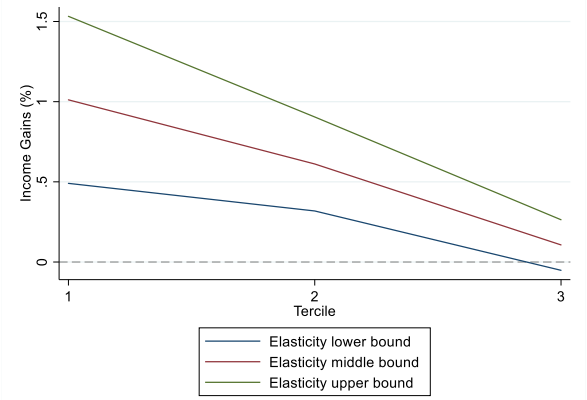
Panel A: Price increase of 16.7 percent (SAF1)



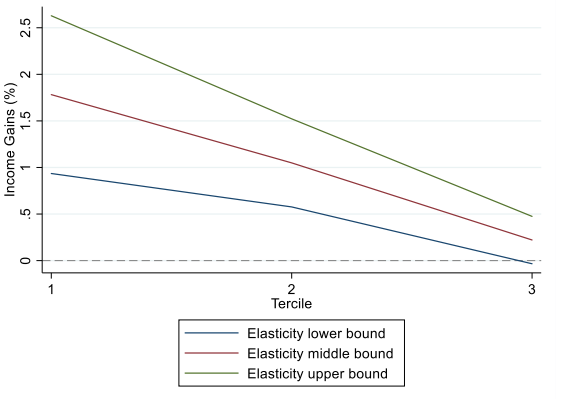
Panel B: Price increase of 25.7 percent (SAF1)



Panel C: Price increase of 16.7 percent (SAF2)



Panel D: Price increase of 25.7 percent (SAF2)



Source: Authors' calculations

As expected, the highest gains in available income are estimated for the low-income group, especially in the case of the higher price increase, relative to their wealthier peers. Under the assumption of a 25.7 percent price increase, the simulated net income gain magnitude ranges from 1.6 to 1.8 percent in this group, depending on the assumed SAF. On the other hand, income gains for high-income groups are negligible, amounting approximately 0.2 percent (Panel B and D, middle-bound elasticity). For more details see Table A6 in the Appendix (Part A).

From the results it can be concluded that significant tax increases would generate income gains for the whole population. Such a policy would have a progressive effect on the distribution of income, since it would allow the population to increase their income through reduction of cigarette and medical expenses and increased productivity and earnings.

5. Discussion and Policy Recommendations

This study estimates the distributional impacts of tobacco taxes in Montenegro using an extended cost-benefit analysis. The main aim of the research is to determine the cumulative gains for the population that could be obtained from the reduction in tobacco consumption, leading to a decline in spending on cigarettes, medical costs related to smoking-attributable diseases, and years of working life lost. These gains are obtained through a significant increase of tobacco taxes and accelerated tobacco taxation policy.

The estimated income gains are positive for all income groups, with the highest increase in available income estimated for the low-income group. Assuming a price increase of 25.7 percent, the total increase in available income would be between €9.9 million and €11.2 million,[43] depending on the assumed SAF, consisting of:

- reduction of cigarette expenditures by €0.95 million;
- reduction of smoking-attributable medical expenses between €2.4 million and €3.7 million; and
- saved earnings of €6.5 million due to avoided premature mortality in productive years of life.

The poorest segment of the population would benefit between €4.3 million and €4.9 million in income through a decrease in tobacco consumption of €1.7 million, reduction in medical costs between €1.1 million and €1.6 million, and saved earnings in the amount of €1.5 million due to saved productive years of life.

According to obtained medical data, the highest shares of smoking-attributable diseases are related to lung cancer and cardiovascular diseases. The progressive excise tax policy (50 percent specific tax increase) would save between 188 and 198 lives, depending on SAF used.

Results also show that between 4.0 percent to 6.2 percent of the national health care expenditures, were spent on treating smoking-related diseases.

The negative health consequences of smoking impact the economy through high levels of health care expenses representing a high social burden. To reduce the adverse effects of tobacco use, increasing tobacco taxes is an effective way to combat high prevalence and accessibility of tobacco products. The benefits accrue mainly to the low-income group, who spend the largest share of their budget on cigarettes, therefore reducing health and social inequalities.

[43] The base for the calculation of income gains is disposable income per capita and population number (SILC database and Census - Monstat), medical expenses obtained (NHIF official data), and total cigarette expenditures (Ministry of Finance official data).

Recommendations:

- **Raise tobacco taxes in Montenegro by at least 50 percent and continue with the increase to reach the level of overall excise rate of at least EUR 90 per 1,000 cigarettes, to effectively reduce consumption and the high prevalence of tobacco use.**
  Policy makers should seriously consider an increase in tobacco excise taxes because of their inherent progressivity: a higher cigarette tax would have a progressive effect on the overall distribution of income because the poorest population would benefit the most from this tax policy.

- **Adopt comprehensive public awareness programs on the health risks of tobacco use.**
  Revenues collected from excise taxes should be broadly earmarked for health promotion, cessation, and smoking prevention programs, especially for the most marginalized groups.

- **Implement workplace cessation programs to increase work productivity and performance.**
  Smoking is associated with significant work productivity loss in all relevant studies. The results suggest that the benefits of quitting extend to work productivity soon after cessation, justifying the implementation of strong workplace cessation programs.

- **Ensure strong tax administration to achieve the full benefits of the tax reform to the population.**
  Strong tax administration is critical to efficiently collect taxes and minimize tax avoidance and evasion. This will lead to achievement of full benefits related tax increases, such as reduction in tobacco use and its negative consequences on health and productivity.

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Appendix

Part A. Extended Cost-Benefit Analysis supplementary tables

Table A1. SAF using Russian study (SAF1)

	Share in population		RR current smokers		RR former smokers
	Male	Female	Male	Female	
	47.5%	52.5%	1.97	1.71	
Composite RR			**1.83**		**1.02**
Smoking prevalence (35–85)			**39.90%**		**16.10%**
SAF1			**25.00%**		

Note: In the case of Russia, since RR for former or ever smokers is not available, it is approximated using the ratio between RRs for current and former smokers from the USA study.

Table A2. SAF using US study (SAF2)

	Share in population		**Current smoker**		**Former smoker**	
Age group	Male	Female	RR male	RR female	RR male	RR female
35–54	25.77%	26.38%	2.55	1.79	1.33	1.22
55–64	11.45%	12.13%	2.97	2.63	1.47	1.34
65–74	6.20%	8.44%	3.02	2.87	1.57	1.53
75–85	3.82%	5.80%	2.40	2.47	1.41	1.43
Composite RR			**2.45**		**1.36**	
Smoking prevalence (35–85)			**39.30%**		**16.10%**	
SAF2			**38.59%**			

Table A3. Change in tobacco expenditures by income groups after tax increase

Income group	Price increase of 16.7%				Price increase of 25.7%			
	Mean	Std. Err.	95% CI		Mean	Std. Err.	95% CI	
	Lower-bound elasticity				**Lower-bound elasticity**			
Low	-0.1	0.0	-0.1	-0.1	0.1	0.0	0.1	0.1
Middle	-0.1	0.0	-0.1	-0.1	-0.1	0.0	-0.1	-0.1
High	-0.3	0.0	-0.3	-0.3	-0.4	0.0	-0.4	-0.4
	Middle-bound elasticity				**Middle-bound elasticity**			
Low	0.3	0.0	0.3	0.4	0.8	0.0	0.8	0.8
Middle	0.1	0.0	0.1	0.1	0.2	0.0	0.2	0.2
High	-0.2	0.0	-0.2	-0.2	-0.2	0.0	-0.2	-0.2
	Upper-bound elasticity				**Upper-bound elasticity**			

Low	0.8	0.0	0.8	0.8	1.5	0.0	1.5	1.5
Middle	0.3	0.0	0.3	0.3	0.5	0.0	0.5	0.5
High	-0.1	0.0	-0.1	-0.1	-0.1	0.0	-0.1	-0.1

Note: The values are in percentages

Table A4. Change in medical expenditures by income groups after tax increase

SAF 1 (25.0%)			
Income groups	Lower-bound elast	Middle-bound elast.	Upper-bound elast.
Price increase of 16.7%			
Low	0.2	0.2	0.3
Middle	0.1	0.1	0.1
High	0.0	0.0	0.1
Price increase of 25.7%			
Low	0.3	0.4	0.4
Middle	0.1	0.2	0.2
High	0.1	0.1	0.1
SAF 2 (38.6%)			
Income groups	Lower-bound elast.	Middle-bound elast.	Upper-bound elast.
Price increase of 16.7%			
Low	0.3	0.4	0.4
Middle	0.1	0.2	0.2
High	0.1	0.1	0.1
Price increase of 25.7%			
Low	0.5	0.6	0.7
Middle	0.2	0.3	0.3
High	0.1	0.1	0.1

Note: The values are in percentages

Table A5. Effect of reducing the years of productive life lost by income groups after tax increase

Income groups	Lower-bound elast.	Middle-bound elast.	Upper-bound elast.
Price increase of 16.7%			
Low	0.3	0.3	0.4
Middle	0.3	0.4	0.5
High	0.2	0.2	0.3
Price increase of 25.7%			
Low	0.4	0.5	0.6
Middle	0.5	0.6	0.7
High	0.3	0.4	0.4

Note: The values are in percentages

Table A6. Net income effect

SAF1 (25.0%)			
Income groups	Lower-bound elast.	Middle-bound elast.	Upper-bound elast.
Price increase of 16.7%			
Low	0.4	0.9	1.4
Middle	0.3	0.6	0.8
High	-0.1	0.1	0.2
Price increase of 25.7%			
Low	0.8	1.6	2.4
Middle	0.5	1.0	1.4
High	-0.1	0.2	0.4
SAF2 (38.6%)			
Income groups	Lower-bound elast.	Middle-bound elast.	Upper-bound elast.
Price increase of 16.7%			
Low	0.5	1.0	1.5
Middle	0.3	0.6	0.9
High	-0.1	0.1	0.3
Price increase of 25.7%			
Low	0.9	1.8	2.6
Middle	0.6	1.1	1.5
High	0.0	0.2	0.5

Note: The values are in percentages

Table A7. Heterogeneous effect of increasing the specific excise tax – expenditures on cigarettes

Income group	Price increase of 16.7%			
	Mean	Std. Err.	95% CI	
	Lower-bound elasticity			
Low	0.1	0.0	0.1	0.2
Middle	-0.3	0.0	-0.3	-0.3
High	-0.7	0.0	-0.7	-0.7
	Middle-bound elasticity			
Low	1.8	0.0	1.8	1.8
Middle	0.3	0.0	0.3	0.3
High	-0.5	0.0	-0.5	-0.5
	Upper-bound elasticity			
Low	3.5	0.0	3.5	3.5
Middle	1.0	0.0	0.9	1.0
High	-0.2	0.0	-0.2	-0.2

Note: The values are in percentages

Table A7a. Heterogeneous effect of increasing the specific excise tax – medical expenditures, YWLL, and net effect

Medical expenditures (SAF1)			
Income groups	Lower-bound elast.	Middle-bound elast.	Upper-bound elast.
Low	0.3	0.4	0.4
Middle	0.1	0.2	0.2
High	0.0	0.1	0.1
YWLL			
Low	0.4	0.5	0.6
Middle	0.4	0.5	0.6
High	0.2	0.3	0.4
Net effect (SAF1)			
Income groups	Lower-bound elast.	Middle-bound elast.	Upper-bound elast.
Low	1.0	3.0	5.1
Middle	0.3	1.1	1.8
High	-0.5	-1.2	0.2

Note: The values are in percentages

Part B. Microsimulation – Estimated tobacco tax burden by income group

It is possible to estimate the progressivity of the cigarette excise tax burden according to income groups by applying the following procedure:

1. The tax change must be expressed in terms of price change. For simplicity, the change in price is calculated using the price of the most-sold brand in 2019 (€2.3). As a result, in 2019 (Table 6) the share of excise tax in retail price was 58.1 percent, while the share of total tax (including VAT) was 75.4 percent. In the first scenario, a specific excise tax increase of 32.4 percent results in a price increase of 16.7 percent. The share of excise tax in retail price is increased and amounts to 61.6 percent, while the total tax represents 79 percent of the retail price.
2. By multiplying excise tax share in retail price before the tax increase (assuming the first scenario) with expenditures on cigarettes by each individual, pre-tax payment on cigarettes is estimated.
3. The post-tax increase of quantity demanded (new quantity) is estimated using total price elasticities by income groups and the price increase from the first scenario.
4. The new cigarette quantity consumed estimate is used to determine post-tax cigarette expenditures and tax payment for each individual by income groups.

5. The tax burden is calculated in the case of pre- and post-tax increases, using previously generated results of tax payment on cigarette expenditures.
6. Finally, average tax burden by income group is calculated from the household-level tax burden.

Table B1. Estimated tobacco tax burden by income group: Pre- and post-tax increase

	Pre-tax increase	Post-tax increase		
		Lower bound	Middle bound	Upper bound
Low income	2.01	2.29	2.24	2.18
Middle income	3.02	3.27	3.16	3.05
High income	6.36	6.78	6.51	6.25

Note: No change in income is assumed.
Source: Authors' calculations

As demonstrated in Table B1, the progressivity of tobacco tax is evident in both the pre- and post-tax increase calculations, since after the tax increase the difference in tax burden is still present between low- and high-income groups. This means that the wealthier respondents are paying more compared to the poorest, who are going to be more responsive to price and tax increases.

Part C. Heterogeneous effect of increasing the specific excise tax

The distributional impacts of tobacco taxes can be also assessed through simulations that do not use the price of the most-sold brand as a base, instead using the self-reported price by individuals from the STC-SEE. The information on price is related to the last-purchased pack of cigarettes for each respondent. This scenario could potentially be more realistic, as the impact on the price increase resulting from a change in tobacco taxation policies may be better reflected. This is because different retail prices used as a basis for simulations will result in different tax burdens among smokers. So if a smoker consumes lower-priced cigarettes, the increase in specific excise would lead to higher price increases for poorer smokers. The wealthier smokers, on the other hand, would experience lower price increases as they are already spending more on more expensive cigarettes.

According to the available data on prices from STC-SEE, it is possible to calculate net-of-tax price, and consequently price changes or increases (Equation 7 and 8):

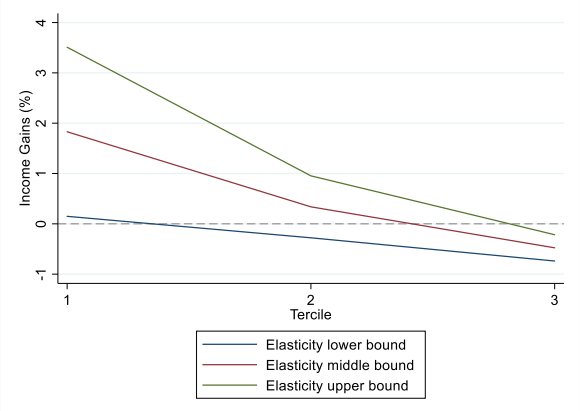
$$\text{Net-of-tax price} = \text{retail price}_{cig}*(1-T_{adv}-T_{vat})-T_{specific} \quad (7)$$

$$\text{Price change} = T_{specific} *\Delta\, T_{specific} /(\text{net of tax price} + T_{specific}) \quad (8)$$

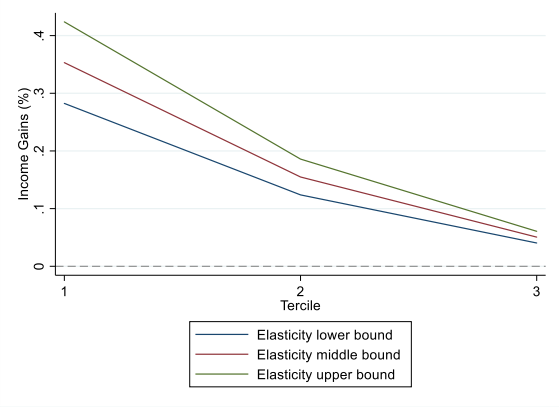
The assumptions for the simulation of income gain changes were the first scenario price increase (32.4-percent tax increase) and SAF1 (25 percent). The heterogeneous effect induced by taxes increases is shown in Figure A1.

Figure A1. Heterogeneous effect of increasing the specific excise tax

Panel A: Price increase of 16.7 percent

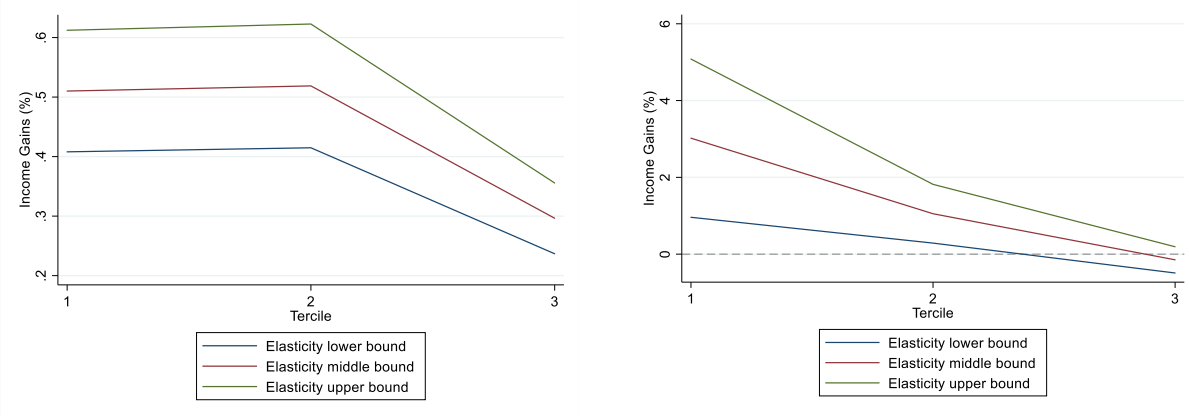


Panel B: Price increase of 16.7 percent (SAF1)



Panel C: Price increase of 16.7 percent

Panel D: Price increase of 16.7 percent (SAF1)



Source: Authors' calculations

Augmenting the specific tax results in a much more progressive distribution of the benefits of tobacco taxes in Montenegro, when applying self-reported price compared to the scenario that assumes uniform price changes. The increased progressivity is visible in all segments of the ECBA, but mostly in context of the changes in tobacco expenditures, where the income gains vary from -0.5 (high-income group, middle-bound elasticity) to almost 2 percent (low-income group, middle-bound elasticity). For more details see Table A7 and A7a in Part A in the Appendix.