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Size and Characteristics of Tobacco Tax Evasion in Bosnia and Herzegovina

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EXECUTIVE SUMMARY

Since 2009 tobacco tax policy in Bosnia and Herzegovina (BiH) has consisted of an ad valorem (currently set at 42 percent of retail price) and a specific excise (currently set at about 0.84 EUR per pack of 20 cigarettes). The policy assumes a gradual annual increase of the specific excise tax on cigarettes (0.077 EUR per pack per year), but these gradual increases have been insufficient to significantly reduce consumption. As of 2020, policymakers in BiH have succumbed to pressure from the tobacco industry to freeze the increase in specific excise, under the guise of preventing growth of the illicit market. The tobacco industry's argument was that higher cigarette prices are "wind at the back" of the illicit market's growth.

This research uses data from the Survey on Tobacco Consumption in Southeastern European countries (STC-SEE) conducted in 2019 to estimate the size of the illicit tobacco market in BiH and factors that influence the probability that smokers will use illicit manufactured cigarettes (MC) and hand-rolled (HR) cigarettes. STC-SEE in BiH included 1,000 adult residents (18 to 85 years of age) with a sampling frame based on the latest census in BiH from 2013. Based on the results of the STC-SEE survey in BiH, this study offers relevant recommendations to policy makers for reducing the size of the illicit tobacco market and preventing tax evasion and tax avoidance in addition to providing strong arguments for a significant increase in tobacco excise tax.

According to STC-SEE data 35.3 percent of current cigarette[1] smokers in BiH smoke cigarettes that evades taxes (18.6 percent of MC and 93.3 percent of HR cigarette smokers). Illicit packs are identified in the survey based on various characteristics including an illegal place of purchase (29.5 percent), absence of an appropriate health warning label (HWL) (30.2 percent), and absence of an appropriate tax stamp (32.8 percent). In addition, 8.3 percent of MC packs were purchased at a price lower than 70 percent of the price of the cheapest brand in BiH, and 15.3 percent of MC are illegal brands.

After accounting for differences in consumption among those who consume licit versus illicit products, 32.3 percent of all cigarettes consumed in BiH are illicit, which is mostly driven by HR cigarettes (95.4 percent of HR cigarettes consumption), while 18.1 percent of MC consumption is illicit.[2]

Econometric analysis of the common factors affecting the probability of tax evasion for MC and HR cigarette smokers shows that younger smokers, smokers with a higher level of education, and those who live in larger households are less likely to evade tobacco taxes, while unemployed smokers, pensioners, and smokers with higher smoking intensity are more likely to use illicit tobacco. Smokers who live in Brčko District or in municipalities closer to the borders with Serbia and Montenegro are more likely to evade tobacco taxes. In addition, a significant factor affecting the probability of tax evasion is the lower price of cigarettes in neighboring Serbia or Montenegro.

The following recommendations for policy makers in BiH are based on the research findings:

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[1] Cigarettes refer to both MC and HR cigarettes.
[2] Since only one case of tax avoidance was identified in the survey, tax avoidance was not analyzed in this study. See the Introduction and Chapter 2 for more details on tax evasion versus tax avoidance.

- **Ratify the Protocol to Eliminate Illicit Trade in Tobacco Products** and implement its recommended measures, which include means of countering illicit trade in tobacco products. The current analysis shows that the size of the illicit market is extremely high, as 32.3 percent of all cigarettes (18.1 percent of MC and 95.4 percent of HR tobacco) consumed in BiH are illicit.

- **Strengthen control of the supply chain and impose stricter sanctions on all actors in the supply chain.** Given that 95.4 percent of HR cigarette consumption is illicit, with almost 85 percent purchased in the open air markets, stricter measures, such as enforcing tax stamps on HR tobacco packs, should be implemented.

- **Introduce stricter controls and inspections at border crossings and more frequent and efficient inspections within the country.** This analysis has demonstrated that a significant share of illicit purchases are made on the street or open air markets[3], and tax evasion is more frequent in the municipality that is closest to Serbia or Montenegro.

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[3] Open air or green markets are very common in the Balkans. Located in a designated area (sometimes fenced) with rows or stalls where agricultural goods are sold, usually in the center of the municipality or a neighborhood, green markets are commonly characterized by the absence of strict controls, except for some aspects of trade (for example, the control of scales used to measure goods and the inspection of fresh meat). Sellers are usually required to pay a daily or monthly fee to the municipal government to be able to sell goods in these markets. Fees vary by municipality, location of the market, and location of the stalls at the market.

CHAPTER 1. INTRODUCTION

Based on Household Budget Survey data, smoking prevalence in BiH has declined continuously, from 57.5 percent in 2007 to 33.8 percent in 2015. There has also been a decline in average cigarette consumption per household (Gligorić et al., 2019). Despite these declines, smoking remains a significant health risk in the country. Previous research conducted in BiH showed that increasing the specific excise tax on tobacco reduces cigarette demand (Gligorić et al., 2020). In addition to low prices, other factors that likely contribute to the high level of smoking prevalence in BiH are easy access to tobacco products, their affordability, and different forms of illicit trade of tobacco (Petković et al., 2018).

The tobacco industry commonly uses the argument that higher tobacco taxes increase the size of the illicit trade of tobacco (Gilmore, 2016). The case in BiH is not different, as the tobacco industry often tries to sway policy makers and public opinion toward the claim that increasing tobacco taxes does not reduce tobacco consumption in BiH but instead increases the illicit tobacco market (Sladojević, 2020). This study offers evidence on the factors that may influence a smoker's decision to consume illicit tobacco.

According to the World Health Organization Framework Convention on Tobacco Control (WHO FCTC) Protocol to Eliminate Illicit Trade in Tobacco Products, illicit trade is defined as

> any practice or conduct prohibited by law and which relates to production, shipment, receipt, possession, distribution, sale or purchase, including any practice or conduct intended to facilitate such activity (WHO, 2013).

Illicit tobacco trade includes both tax avoidance and tax evasion. Tax avoidance refers to legal means to avoid paying taxes—such as purchasing tobacco products in a lower-tax jurisdiction or at a duty-free shop. Tax evasion—which refers to illegal means of circumventing tobacco taxation—commonly involves cross-border smuggling or manufacturing of counterfeit cigarettes or unbranded tobacco products. Because only one case of tax avoidance was identified in STC-SEE BiH, this report focuses on tax evasion.

For the purpose of this study, cigarettes packs are defined as illegal if they meet at least one of the following criteria: absence of appropriate tax stamp, absence of appropriate health warning label, location of purchase on the street or in open air markets, price below 70 percent of the lowest price of tobacco in the domestic market, or brands classified as illegal in BiH.

Tax evasion may occur with domestically produced as well as imported tobacco products (smuggled across state borders without paying tax in the country of intended consumption). The most common type of tax evasion identified in this study is unbranded HR tobacco that "may involve misrepresentation of the quality and origin, or failure to obtain a license to grow and produce tobacco, and/or failure to register as an importer/exporter/distributor" (Ross, 2019).

This report consists of three parts. Part 1 defines the data and methodology for determining and estimating the probability of tax evasion and avoidance. Part 2 includes results of a descriptive and econometric analysis. The report concludes with a discussion and policy recommendations.

CHAPTER 2. DATA AND METHODOLOGY

2.1. DETERMINING CASES OF EVASION AND AVOIDANCE

Out of 411 interviewed smokers, 84.1 percent of MC smokers and 76.1 percent of HR cigarette smokers agreed to show their last purchased pack.[4]

In order to identify tax evasion and tax avoidance, the first step is to review the legislation in BiH regarding the legal places of purchase, legal brands, health warning labels (HWL), price of the cheapest brand in BiH in 2019 (for determining illicit MC packs), and price of the most-sold brands in BiH and other countries in 2019 (to determine lower-tax jurisdictions).

The legal places of purchase in BiH are retail and wholesale stores and duty-free shops. There is no official list of tobacco brands that can be sold in BiH, but the Indirect Taxation Authority (ITA) of BiH regularly publishes the list of tobacco brands sold in the country and their retail prices (Oslobodjenje, 2018). Prices of the most-sold brands and the cheapest brand of cigarettes based on the sales of excise stamps is also from ITA.

A pack of MC is classified as illicit if it meets at least one of the five characteristics of illegal packs listed in Table 2.1 below.

Table 2.1 Criteria for identifying illicit packs (tax evasion) for MC and HR tobacco

	Place of purchase	Health warning label	Tax stamp
Tax-evasion criteria for MC and HR tobacco	Legal: - retail - wholesale stores - duty-free shops Illegal: - sales in open air markets (for example sale on the street)	Illegal: Lack of HWL defined by the Rulebook (text label, size of the letters, position, text label color, background color)	Illegal: Lack of tax stamp
Legislation in BiH	Law of excise of BiH (Official Gazette 49/09, 2009),	Rulebook on labeling the packaging of tobacco products (Republika Srpska), (Official Gazette of Republika Srpska. no. 124, 2011) Rulebook on labeling of tobacco products (FBiH) (Official Gazette of FBiH no. 57, 2011)	Law of excise of BiH, (Official Gazette 49/09, 2009), Rulebook about excise stamps for tobacco products, alcoholic beverages, fruit natural brandies, coffee and wine, (Official Gazette BiH, no. 50/09, 74/14, 2009) Rule book on the application of the law of excise duties in BiH

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[4] From 458 inspected photos

	Place of purchase	Health warning label	Tax stamp
			(Official Gazette no. 50/09, 80/11, 48/12, 74/14, 85/17 and 4/18, 2009)
Additional criteria to identify tax evasion for MC tobacco			
Legality of the brand		Price of the pack	
Illegal: The brand is not on the price list of the brands that are sold in the domestic market. Price lists are publicly available (Web site Oslobodjenje.ba, 2018)		Illegal: The price of the pack is lower than 70% of the lowest price of cigarettes in the country according to the ITA.	

Tax avoidance is determined based on the place of purchase: if a pack is purchased in a duty-free shop or in a foreign country with lower taxes/prices (based on the price of the most-sold brand), this constitutes tax avoidance. After applying those parameters, only one case of tax avoidance is identified in the sample (a pack of MC purchased in Montenegro). Therefore, this study focuses mainly on tax evasion.

2.1. PROBABILITY MODEL

To estimate the probability of a smoker purchasing illicit tobacco (evade tobacco tax), the following binary choice model is estimated:

$\Pr(Y_i = y_i) = f(X\beta)$,

where y_i equals 1 if the inspected pack is illicit, and 0 otherwise.

The probability of tax evasion is estimated via a logit model using weighted data from STC-SEE.

Three separate models with the following dependent variables are estimated:

- overall model, which includes both MC and HR cigarette smokers;
- MC model, which includes only MC smokers; and
- HR model, which includes only HR cigarette smokers.

2.3. INDEPENDENT VARIABLES USED IN THE ECONOMETRIC MODEL

All regression models control for determinants classified into three groups: sociodemographic characteristics, smoking behavioral characteristics, and determinants of cross-border cigarette purchases.

Several sociodemographic characteristics are used for estimating the probability of tax evasion: level of household income, level of household income per household member, level of personal income (different indicators for income level were not used all at the same time), employment status, level of education, type of residence (urban versus rural), age, gender, and region. Smoking behavioral characteristics are also used as potential determinants of tax evasion: smoking intensity (number of cigarettes smoked per day), weekly expenditure on cigarettes, price of cigarettes, and smoking status (daily versus less than daily).

This study also estimates the impact of lower-tax jurisdictions and their distance to the nearest border crossing on the prevalence of illicit purchases. BiH shares borders with two countries with lower cigarette prices: Serbia and Montenegro. The price of the most-sold cigarette brand in 2019 in BiH, Serbia, and Montenegro was 2.4, 2.1 and 2.3 EUR, respectively. To account for the impact of the distance to the border with a lower-tax jurisdiction, three measures are considered:

- a dummy variable for the municipalities bordering the country with lower prices (Serbia or Montenegro);

- driving distance from the municipality to the closest border crossing of the country with lower cigarette prices; and

- price-to-distance ratio, which is a combination of two important indicators for the probability of cross-border purchasing of cigarettes (see more in Appendix Table A20).

CHAPTER 3. RESULTS

3.1. SIZE AND CHARACTERISTICS OF TAX EVASION IN BIH

The sample includes 411 current smokers of MC and/or HR cigarettes (after applying sample weights)—339 MC smokers and 88 HR tobacco smokers. Among them, 35.3 percent are identified as tax evasion cases (Appendix Table A1).

Of these tax evasion cases 29.5 percent of packs were bought from an illegal place of purchase, 30.2 percent are packs without appropriate HWLs, and 32.8 percent of packs do not have the proper tax stamp (Appendix Table A1).

Tax evasion is higher among male smokers compared to female smokers—37.4 percent and 32.7 percent, respectively (Appendix Table A2). Additionally, tobacco tax evasion is more likely among those who are less educated (49.6 percent for primary and 43.5 percent for vocational education levels) compared to those with a higher education (14.1 percent) (Figure 3.1). Evasion is also higher among smokers from rural areas (37.3 percent) than urban areas (33.1 percent), as well as for smokers from District of Brčko (BD) (90 percent) compared to smokers from Federation of Bosnia and Herzegovina (FBiH) (35.6 percent) and Republic of Srpska (RS) (30.9 percent) (Appendix Table A2).

Figure 3.1 Less educated smokers are more likely to buy illicit cigarettes (N=411)
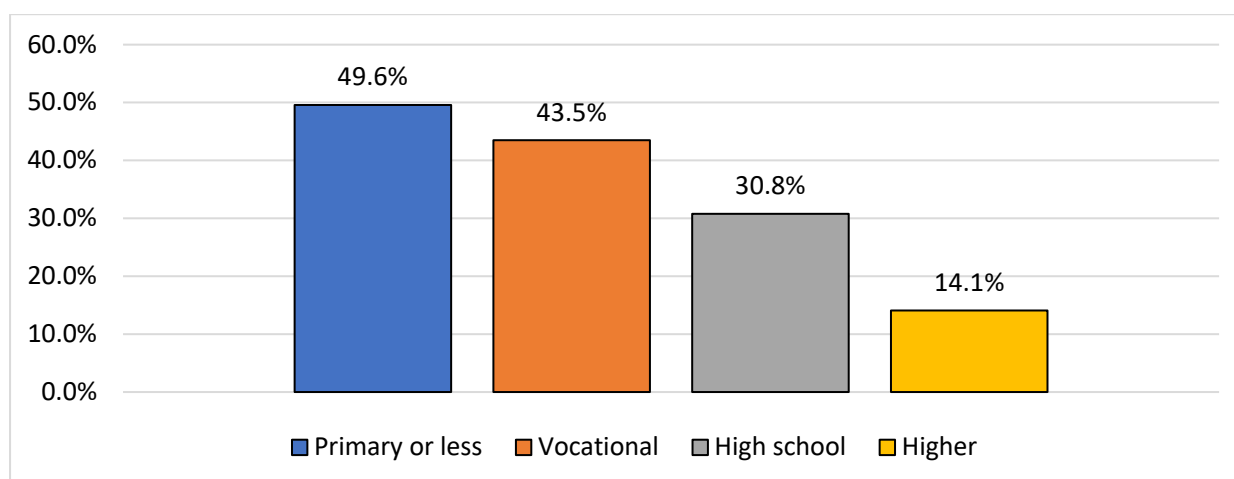
Source: Authors' calculations using STC-SEE data for BiH (Appendix Table A2)

The majority of smokers buy cigarettes in legal places of purchase (69.4 percent), packs with appropriate HWLs (68.6 percent), and packs with the proper local tax stamp (62.3 percent). Most of the packs that are illicit, met more than one criterion for tax evasion (Appendix Table A3).

There is only one observed case of tax avoidance, so tobacco tax avoidance is not present at a significant level in BiH.

3.2. MANUFACTURED CIGARETTE TAX EVASION

Among 339 smokers of MC, 18.6 percent of packs that are classified as tax evasion cases are identified as such based on at least one of the defined criteria (Appendix Table A4).

Among the defined criteria, the most common identifier of tax evasion is the absence of an appropriate tax stamp on the pack (17.6 percent), while the least common identifier of tax evasion is a pack purchased at a price lower than 70 percent of the lowest price (8.3 percent) (Figure 3.2 and Appendix tables A4 and A11).

Figure 3.2 *Almost all MC cases of tax evasion are evasion by more than one criterion (N=339)*
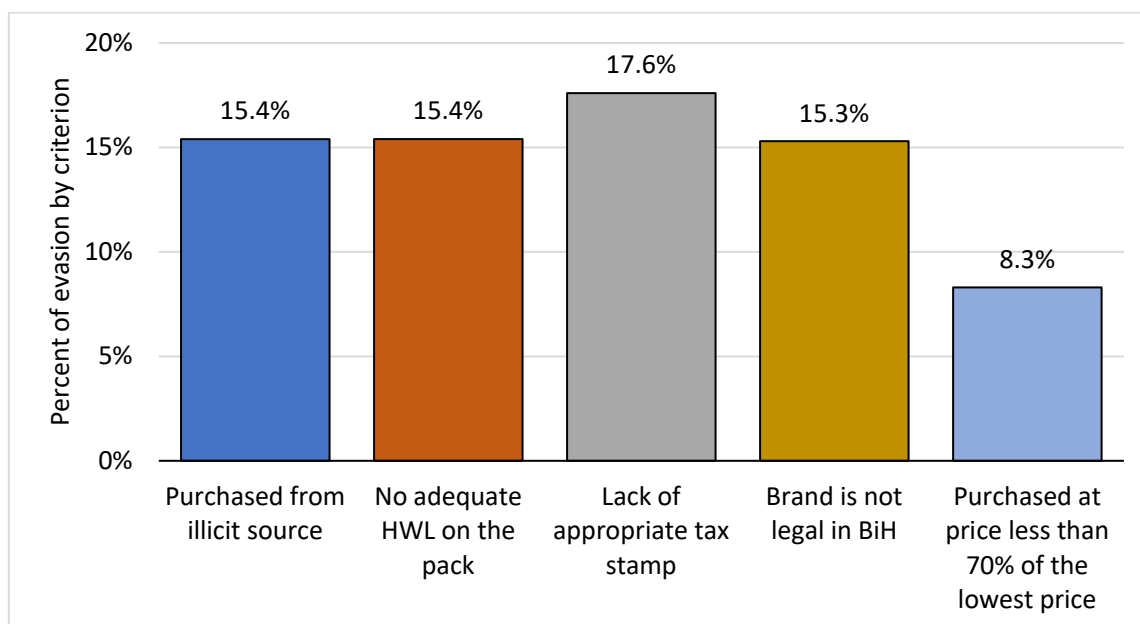
Source: Authors' calculations using STC-SEE data for BiH

Women are more likely than men to buy illicit MC packs (21.3 percent versus 16.5 percent, respectively) (Figure 3.3), urban residents more than rural residents (20.9 percent compared to 16.5 percent, respectively), and those from BD more than those from RS and FBiH (83.9 percent compared to 12.4 percent and 19.6 percent, respectively) (Appendix Table A5).

Figure 3.3 *Female MC smokers are more likely than male to buy illicit cigarettes (N=339)*
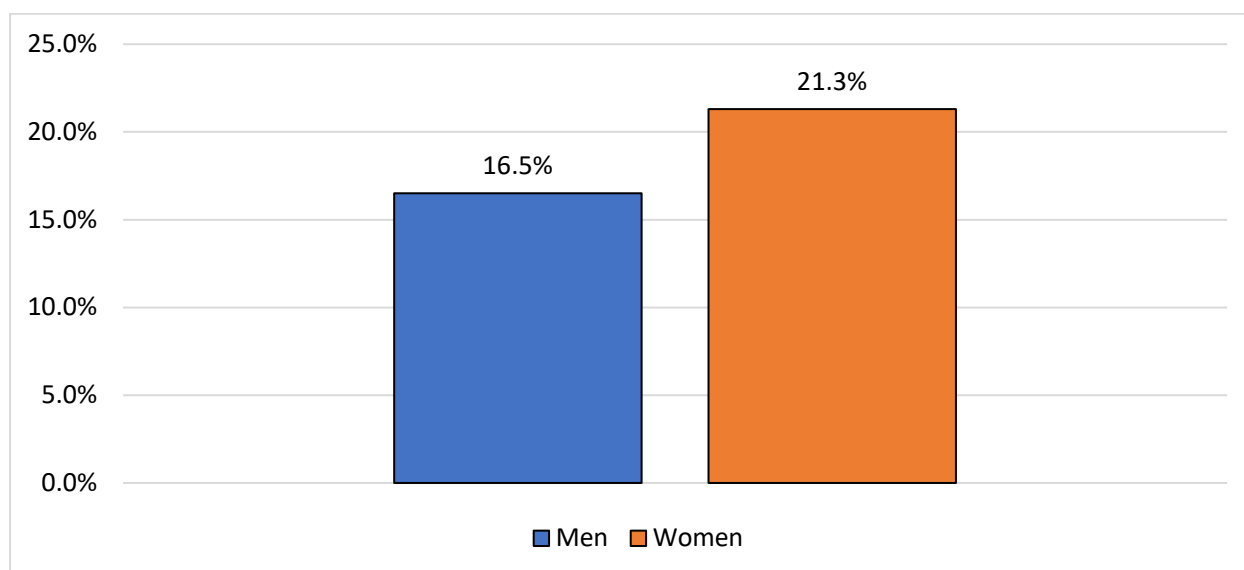
Source: Authors' calculations using STC-SEE data for BiH (Appendix Table A5)

Smoking intensity of MC does not seem to be correlated with prevalence of tax evasion, since the smokers who smoke between 10 and 20 cigarettes per day have the largest percent of those to evade tax (53.3 percent), while the other two groups have smaller percentages (38.6 percent of of smokers who smoke fewer than 10 cigarettes per day and 8.1 percent for those who smoke more than 20 cigarettes per day) (Figure 3.4).

Figure 3.4 *Prevalence of tax evasion does not seem to be correlated with smoking intensity (N=339)*
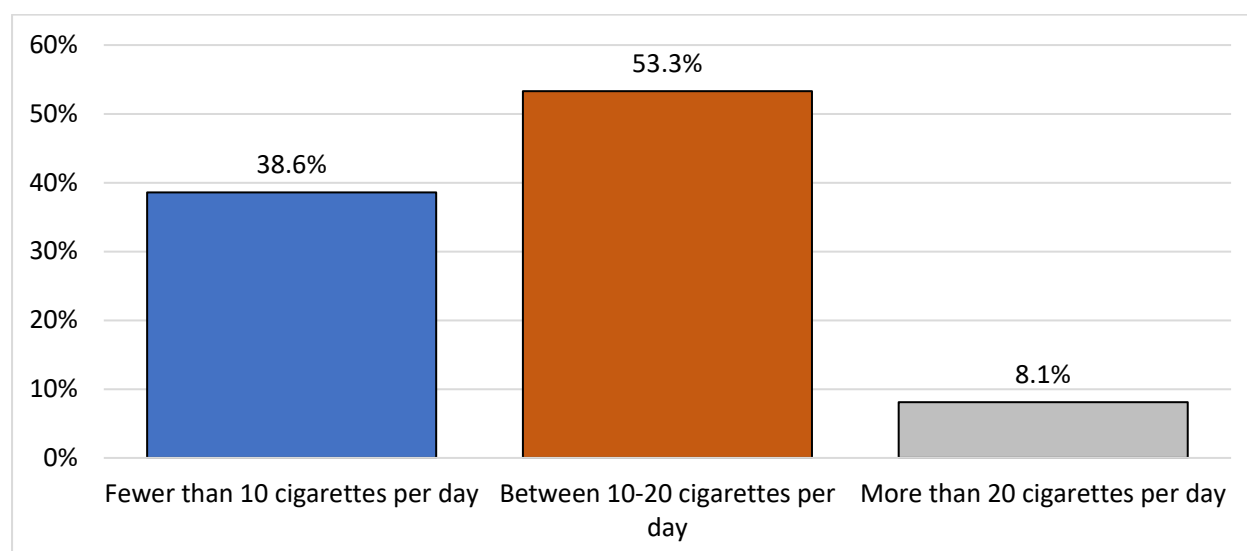
Source: Authors' calculations using STC-SEE data for BiH (Appendix Table A5)

Four in five MC smokers bought their last pack at a legal place of purchase—a legal brand with appropriate HWLs (see Appendix Table A6 for more details). Additionally, more than two-thirds of MC smokers purchased their last pack with a local tax stamp (77.6 percent) and nine out of ten at a price greater than 70 percent of the cheapest brand (Appendix Table A6).

Most MC packs were bought in a legal place of purchase have appropriate HWLs (97.6 percent) and local tax stamps (92.0 percent) (Appendix tables A8 and A9). Therefore, more than nine out of ten MC packs bought in a legal place of purchase have other legal elements.

Additionally, 92 percent of MC packs that have HWLs in the local language also have a local tax stamp (Appendix Table A10), implying that in the vast majority of cases, legal MC packs are bought in legal places of purchase, have an appropriate HWL, and have a local tax stamp.

On other hand, most MC packs which were bought at an illegal place of purchase do not have an appropriate HWL or tax stamp (71.1 percent and 78.9 percent, respectively) (Appendix Table A11). Moreover, more than 80 percent of MC packs without appropriate HWLs do not have appropriate tax stamps (Appendix Table A11). Therefore, most illicit packs do not have either HWL or an appropriate tax stamp. Finally, more than two-thirds (68.5 percent) of illicit MC packs meet all three criteria: illegal place of purchase, no appropriate HWL, and no appropriate tax stamp (Appendix Table A11).

The photo database inspection and the brand analysis show that the most common brands of illegal MC are FM, Corset, King, and Manchester. These brands have the highest presence in the illicit market in BiH. FM brand is produced in North Macedonia, has the proper HWL, and

is intended to be sold in duty-free shops; the same is true for Corset, a brand manufactured in Bulgaria. The only brand that does not have a proper HWL and tax stamp is Manchester, and its origin is the United Arab Emirates.

3.3. TAX EVASION FOR HR CIGARETTES

Among 88 smokers of HR cigarettes, 93.3 percent evade tobacco tax based on at least one of the three defined criteria for HR cigarette packs—91.2 percent lack the proper tax stamp, 86.4 percent lack a HWL, and 84.1 percent were purchased from an illegal source (Figure 4.5).

Figure 4.5 Nine in ten HR cigarette smokers purchased their last pack without the appropriate tax stamp (N=88)
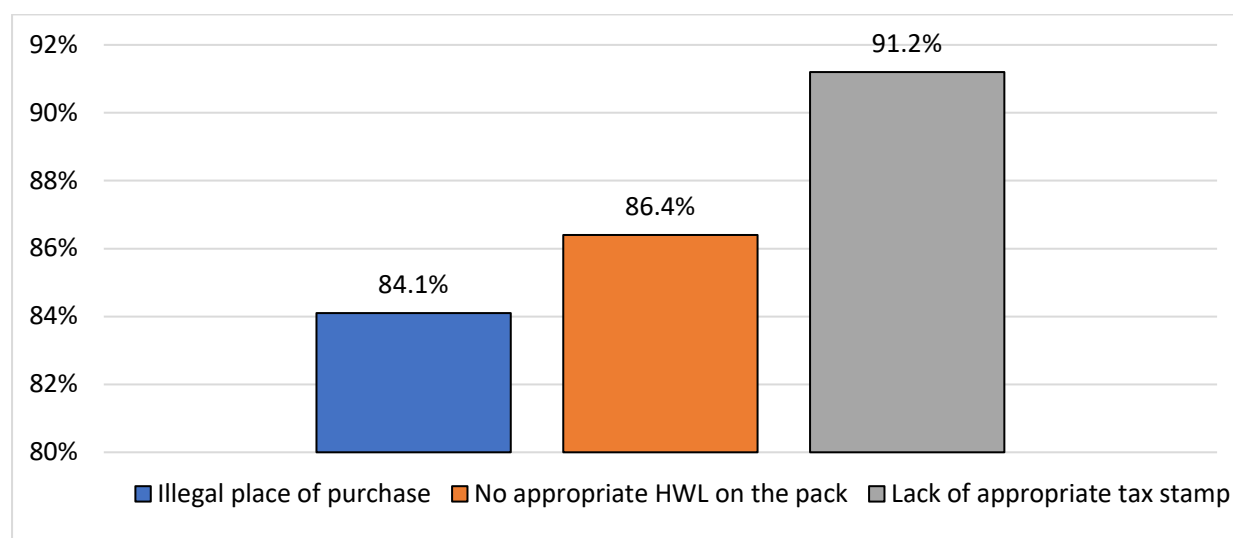
Source: Authors' calculations using STC-SEE data for BiH (Appendix Table A12)

Women are more likely than men to buy illicit HR cigarettes (97.9 percent versus 31.7 percent, respectively). Urban residents are more likely to consume illicit HR tobacco compared to rural residents (98.1 percent compared to 91.3 percent, respectively), and HR cigarette smokers from BD are more likely to buy illicit HR cigarettes than those from RS and FBiH (100 percent, 96.5 percent, and 91.4 percent, respectively) (Appendix Table A13).

Additionally, while 45.3 percent of HR cigarette smokers who smoke fewer than 20 cigarettes per day buy illicit HR tobacco, the prevalence is far lower (9.6 percent) among smokers with the highest smoking intensity of more than 20 cigarettes per day (Figure 4.6 and Appendix Table A13).

Figure 4.6 *Less than 10 percent of HR smokers who smoke more than 20 HR cigarettes per day evade tax.*
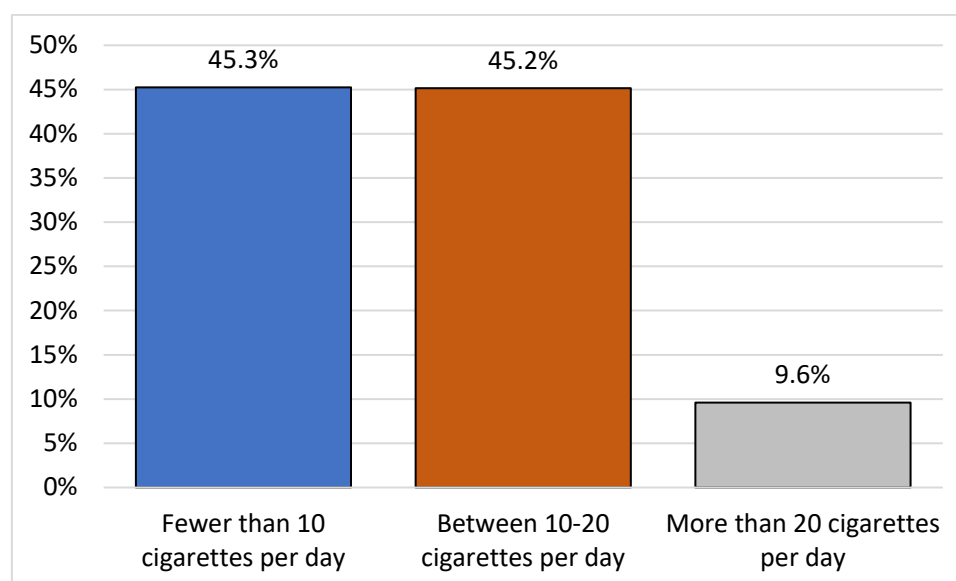
Source: Authors' calculations using STC-SEE data for BiH

Only 15.9 percent of HR cigarette smokers buy HR tobacco in grocery stores or in specialized tobacco shops, and only 7.6 of last-purchased HR cigarette packs have an appropriate HWL (Appendix Table A14). An extremely small share (2.6 percent) of HR cigarette smokers buy HR tobacco packs with a clear local tax stamp. Therefore, the majority of illicit HR tobacco lacks the appropriate tax stamp (Appendix Table A14).

Among those HR cigarette packs bought on the street or open air markets, 92.8 percent have no appropriate HWL (Appendix Table A16) and almost all (98.5 percent) have either no tax stamp or it was removed or destroyed (Appendix Table A2). Therefore, almost all HR packs bought in an illegal place of purchase are also illegal by HWL and tax-stamp criteria (99.0 percent of HR packs without an appropriate HWL also had no tax stamp) (Appendix Table A3). Finally, four in five HR tobacco packs (81.9 percent) are illegal by all three criteria for tax evasion (Appendix Table A19).

3.4. FACTORS AFFECTING PROBABILITY OF TAX EVASION

3.4.1. Estimation of probability of tax evasion – overall model (both MC and HR)

For estimating an overall evasion model, which includes both MC and HR cigarette smokers, a large set of covariates is used. According to the econometric criteria, seven models that best determine odds to engage in tax evasion are used (Appendix Table A21).

The sociodemographic characteristics that are significant for determining the odds of engaging in MC or HR cigarette tax evasion are the following: household size, employment status, level of education, age, and region. Younger smokers, smokers with a higher level of education, and those who live in larger households are less likely to evade tobacco taxes, while unemployed smokers, pensioners, and smokers who live in BD are more likely to use illicit tobacco.

Smoking behavioral characteristics are also an important factor for determining the probability of tax evasion. The probability is higher for smokers who smoke more cigarettes, daily smokers, and HR cigarette smokers.

The propensity for tax evasion is higher in the municipalities bordering Montenegro, and it decreases as the distance between the municipality and the border with Serbia and Montenegro increases. As prices of the most-sold brand are lower in Serbia and Montenegro than in BiH, the price-to-distance ratio related to lower-tax jurisdictions is also an important factor for cigarette tax evasion. If the price difference relative to the distance from the neighboring country with lower cigarette prices is higher, the probability of evasion is higher. Lower cigarette prices in Serbia and Montenegro likely stimulate illicit purchases of cigarettes by residents of BiH, especially for smokers who live in municipalities that are closer to these countries.

3.4.2. Estimation of probability of tax evasion for manufactured cigarette smokers

The probability of tax evasion is also estimated separately for MC smokers. Similar explanatory variables as in the overall model are used because MC smokers represent the largest percentage of all smokers. Six models that best describe the propensity for illicit purchasing of an MC pack are used (Appendix Table A24).

The important sociodemographic factors for determining the propensity for tax evasion for MC smokers are the following: household size, employment status, age, and level of education. MC smokers who live in households with a larger number of members, unemployed smokers, pensioners, and older smokers are more likely to buy illicit MC. MC smokers who have a tertiary level of education and those who live in municipalities bordering Montenegro are also more likely to buy illicit packs. The propensity increases as the distance to the border with a neighboring country with lower cigarette prices (Serbia or Montenegro) declines. Similarly, the higher the price difference of an MC pack between Serbia and Montenegro, weighted by distance, the higher the probability that MC smokers purchase an illicit pack.

3.4.3. Estimation of probability of tax evasion for HR cigarette smokers

The very small number of HR smokers in the sample, most of whom showed packs identified as illicit, narrows the number of independent variables to be used for estimating the probability of tax evasion for HR cigarette smokers. Three models are used for analysis of the determinants of HR cigarette tax evasion (Appendix Table A27).

Level of education is a statistically significant determinant of tax evasion for HR cigarette smokers, as those with a higher level of education are less likely to buy illicit HR tobacco. Older smokers are also less likely to buy illicit HR tobacco, but those who have a higher intensity of smoking are more likely to evade tobacco taxes. In addition, HR cigarette smokers who live in urban areas or in municipalities closer to the borders with Serbia and Montenegro are more likely to evade tax on HR tobacco.

CHAPTER 4. DISCUSSION AND POLICY RECOMMENDATIONS

While small-scale tax evasion and avoidance of tax on tobacco purchased for personal consumption is often tolerated, large-scale tax evasion and avoidance may be evidence of weak laws or ineffective implementation, money laundering, corporate malfeasance, or financing of other organized criminal activities.

When the difference in consumption among those who use licit and illicit products is taken into account, it is estimated that the share of illicit tobacco trade in BiH is significant and amounts to 32.3 percent of the total tobacco market. This is mostly driven by HR tobacco (95.4 percent of all HR tobacco consumption is illicit). Illicit consumption of MC, while still high, is significantly lower (18.1 percent). This study also estimates that 35.3 percent of current smokers in BiH evade tobacco tax—18.6 percent of MC and 93.3 percent of HR cigarette smokers. Even though a much smaller percentage of MC smokers evade tax, smoking prevalence for MC is significantly higher than for HR cigarettes (33.9 percent versus 8.8 percent, respectively). Therefore, tax evasion among MC smokers must not be ignored and should be considered an important part of total evasion by policy makers in the development of future measures aimed at reducing the size of the illicit tobacco market. Given that 95.4 percent of HR cigarette consumption is illicit, with almost 85 percent of it purchased in open air markets, stricter measures, such as enforcing tax stamps on HR tobacco packs, should be implemented. Also, control of the supply chain should be strengthened, with imposing stricter sanctions on all actors in the supply chain.

Younger smokers, smokers with a higher level of education, and those who live in larger households are less likely to evade taxes. On the other hand, unemployed smokers, pensioners, smokers living in BD, daily smokers, those with higher smoking intensity, and HR cigarette smokers are more likely to evade tax. Moreover, smokers who live in municipalities closer to the border with Serbia or Montenegro (lower-tax jurisdictions) are more likely to consume illicit cigarettes.

Analysis of the survey results shows that the share of the illicit market and the propensity for tobacco tax evasion is significant in BiH. As BiH has not yet ratified the WHO FCTC Protocol to Eliminate Illicit Trade in Tobacco Products, which addresses means of countering illicit trade in tobacco products, this should be done as soon as possible. Implementing measures recommended by the Protocol would facilitate a systemic approach in the fight against the illicit tobacco trade.

A significant source of illicit purchases is on the street or in open air markets, and tax evasion is more frequent in the municipalities closer to Serbia and Montenegro. Introducing stricter controls and inspections at the border crossing will prevent or reduce cross-border cigarette smuggling. Almost all MC cases of tax evasion involve evasion by several criteria, while nine out of ten HR cigarette packs lack an appropriate tax stamp. These data imply that more frequent and efficient inspections within the country are needed. BD is identified as the region with the highest percentage of tax evasion. Therefore, the local government should be involved and accountable to curb illegal activities in this region. However, this does not release the governments of RS and FBiH nor the BiH Council of Ministers from responsibility, since indirect taxation is the responsibility of the Indirect Taxation Authority at the BiH country level and inspections are the responsibility of entity levels for both RS and FBiH.

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APPENDIX

Table A1. *Tax evasion for MC and HR cigarette smokers by criterion (N=411)*

Criteria	Percentage (CI=95%)			
	Overall	Illegal place of purchase	No appropriate HWL on the pack	Lack of appropriate tax stamp
Evasion	35.3 (30.7, 39.9)	29.5 (25.1, 33.9)	30.2 (25.8, 34.6)	32.8 (28.3, 37.3)

Table A2. *Percentage distribution of evasion cases for MC and HR cigarette smokers, by selected demographic and socioeconomic characteristics (N=411)*

		Percentage (CI=95%)
Overall		35.3 (30.7, 39.9)
Gender	Male	37.4 (32.7, 42.1)
	Female	32.7 (28.2, 37.2)
Education	Primary or less	49.6 (44.8, 54.4)
	Vocational	43.5 (38.7, 48.3)
	High school	30.8 (26.3, 35.3)
	Higher	14.1 (10.7, 17.5)
Residence	Urban	33.1 (28.6, 37.6)
	Rural	37.3 (32.6, 42.0)
Age	18-24	7.7 (5.1, 10.3)
	25-34	18.4 (14.7, 22.1)
	35-44	23.0 (18.9, 27.1)
	45-54	40.6 (35.9, 45.3)
	55-64	44.8 (40.0, 49.6)
	65-74	68.8 (64.3, 73.3)
	75-85	100.0 (100.0, 100.0)
Region	FBiH	35.6 (31.0, 40.2)

Percentage (CI=95%)		
	RS	30.9 (26.4, 35.4)
	BD	90.0 (87.1, 92.9)
Household income per month (in EUR)	<400	54.6 (49.8, 59.4)
	400-800	30.5 (26.0, 35.0)
	800-1,200	17.8 (14.1, 21.5)
	>1,200	22.2 (18.2, 26.2)
Smoking intensity	Fewer than 10 cigarettes per day	12.2 (9.0, 15.4)
	Between 10-20 cigarettes per day	12.1 (8.9, 15.3)
	More than 20 cigarettes per day	11.0 (8.0, 14.0)

Table A3. MC and HR cigarette smokers by place of purchase, presence of HWL, and presence of tax stamp (N=411)

Percentage (CI=95%)	
Place of purchase	
In grocery stores (small independent grocery stores, mini/super/hyper markets), kiosks	69.4 (64.9, 73.9)
In specialized tobacco shops*	0.9 (0.0, 1.8)
On the street, on the open air market, or from an independent/individual seller	29.5 (25.1, 33.9)
HWL presence	
HWL in local language	68.6 (64.1, 73.1)
HWL in foreign language**	7.5 (5.0, 10.0)
No health warnings	22.7 (18.7, 26.7)
Does not know	1.2 (0.1, 2.3)
Tax stamp presence	
Local stamp	62.3 (57.6, 67.0)
Foreign stamp	1.4 (0.3, 2.5)
Stamp removed or destroyed	1.6 (0.4, 2.8)
Lack of stamp	32.8 (28.3, 37.3)
Does not know	1.9 (0.6, 3.2)

*Specialized tobacco stores as place of purchase were identified only for HR tobacco.

**HWL in foreign language was identified only for MC.

Table A4. Tax evasion for MC smokers by each criterion (N=339)

	Percentage (CI=95%)					
Criteria	Overall	Illegal place of purchase*	No adequate HWL on the pack (lack of HWL, HWL in foreign language)	Lack of appropriate tax stamp	Brand is not legal in BiH	Purchased at price lower than 70% of the lowest price
Overall	18.6 (14.5, 22.7)	15.4 (11.6, 19.4)	15.4 (11.6, 19.4)	17.6 (13.9, 22.1)	15.3 (11.8, 18.8)	8.3 (5.6, 11.0)

Table A5. Percentage of evasion cases for MC smokers, by selected demographic and socioeconomic characteristics (N=339)

	Percentage (CI=95%)	
Overall		18.6 (14.5, 22.7)
Gender	Male	16.5 (12.5, 20.5)
	Female	21.3 (16.9, 25.6)
Education	Primary or less	21.2 (16.8, 25.5)
	Vocational	27.8 (23.0, 32.5)
	High school	17.5 (13.5, 21.6)
	Higher	9.3 (6.2, 12.4)
Residence	Urban	20.9 (16.5, 25.2)
	Rural	16.5 (12.5, 20.5)
Age	18-24	4.7 (2.4, 7.0)
	25-34	11.4 (8.0, 14.8)
	35-44	10.5 (7.2, 13.8)
	45-54	23.7 (19.2, 28.2)

	Percentage (CI=95%)	
	55-64	24.8 (20.2, 29.4)
	65-74	45.7 (40.4, 51.0)
	75-85	0.0 (0.0, 0.0)
Region	FBiH	19.6 (15.4, 23.8)
	RS	12.4 (8.9, 15.9)
	BD	83.9 (80.0, 87.8)
Household income per month (in EUR)	<400	23.6 (14.7, 32.5)
	400-800	15.9 (8.3, 23.5)
	800-1,200	18.3 (10.2, 26.4)
	>1,200	5.9 (1.0, 10.8)
Smoking intensity	Fewer than 10 cigarettes per day	38.6 (33.4, 43.8)
	Between 10-20 cigarettes per day	53.3 (48.0, 58.6)
	More than 20 cigarettes per day	8.1 (5.2, 11.0)

Table A6. *Percentage of evasion cases for MC smokers, by place of last purchase, presence of health warning, presence of tax stamp, legality of the brand, price of the last-purchased pack of MC (N=339)*

Criteria	Percentage (CI=95%)
Place of purchase	
In grocery stores (small independent grocery stores, mini/super/hyper markets), kiosks	84.6 (80.6, 88.4)
On the street, on the open air market, or from an independent/individual seller	15.4 (11.6, 19.4)
HWL presence	
HWL in local language	84.6 (80.3, 88.1)
HWL in foreign language	9.2 (6.4, 12.7)
No health warnings	6.2 (3.7, 8.9)
Tax stamp presence	
Local stamp	77.6 (73.4, 82.3)
Foreign stamp	1.8 (0.2, 2.8)
Stamp removed or destroyed	1.8 (0.4, 3.2)
Lack of stamp	17.6 (13.9, 22.1)
Does not know	1.2 (0.0, 1.9)
Brand legality	
Legal brand	84.7 (81.2, 88.2)
Illegal brand	15.3 (11.8, 18.8)
Price	
Higher than 70% of the cheapest brand	91.7 (89.0, 94.4)
Lower than 70% of the cheapest brand	8.3 (5.6, 11.0)

Table A7. Percentage of evasion cases for MC smokers, separately for defined criteria, by selected demographic and socioeconomic characteristics (N=339)

Demographic and socioeconomic characteristics	Percentage (CI=95%)				
	Criteria				
	Illegal place of purchase*	No adequate HWL on the pack (lack of HWL, HWL in foreign language)	Lack of appropriate tax stamp	Brand is not legal in BiH	Purchased at price lower than 70% of the lowest price
Overall	15.4 (11.6, 19.4)	15.4 (11.6, 19.4)	17.6 (13.9, 22.1)	15.3 (11.8, 18.8)	8.3 (5.6, 11.0)
Gender					
Male	13.8 (10.1, 17.5)	15.9 (12.0, 19.8)	15.4 (11.6, 19.2)	12.7 (9.2, 16.2)	7.0 (4.3, 9.7)
Female	17.9 (13.8, 22.0)	15.1 (11.3, 18.9)	20.7 (16.4, 25.0)	18.8 (14.6, 23.0)	10.0 (6.8, 13.2)
Education					
Primary or less	20.0 (15.7, 24.3)	26.1 (21.4, 30.8)	21.5 (17.1, 25.9)	14.4 (10.7, 18.1)	7.6 (4.8, 10.4)
Vocational	23.3 (18.8, 27.8)	15.1 (11.3, 18.9)	27.8 (23.0, 32.6)	21.7 (17.3, 26.1)	13.0 (9.4, 16.6)
High school	13.2 (9.6, 16.8)	8.7 (5.7, 11.7)	16.0 (12.1, 19.9)	14.2 (10.5, 17.9)	8.4 (5.4, 11.4)
Higher	7.4 (4.6, 10.2)	15.4 (11.6, 19.2)	7.4 (4.6, 10.2)	10.7 (7.4, 14.0)	3.6 (1.6, 5.6)
Residence					
Urban	17.8 (13.7, 21.9)	15.8 (11.9, 19.7)	20.4 (16.1, 24.7)	18.4 (14.3, 22.5)	7.1 (4.4, 9.8)
Rural	13.6 (10.0, 17.2)	3.8 (1.8, 5.8)	15.3 (11.5, 19.1)	13.0 (9.4, 16.6)	9.1 (6.0, 12.2)
Age					
18-24	3.8 (1.8, 5.8)	9.8 (6.6, 13.0)	3.8 (1.8, 5.8)	3.2 (1.3, 5.1)	3.2 (1.3, 5.1)
25-34	9.9 (6.7, 13.1)	10.4 (7.2, 13.6)	11.1 (7.8, 14.4)	11.8 (8.4, 15.2)	5.3 (2.9, 7.7)
35-44	7.9 (5.0, 10.8)	17.8 (13.7, 21.9)	9.2 (6.1, 12.3)	9.2 (6.1, 12.3)	3.4 (1.5, 5.3)
45-54	17.9 (13.8, 22.0)	19.6 (15.4, 23.8)	23.8 (19.3, 28.3)	19.6 (15.4, 23.8)	10.8 (7.5, 14.1)
55-64	22.0 (17.6, 26.4)	41.3 (36.1, 46.5)	25.5 (20.9, 30.1)	19.4 (15.2, 23.6)	10.6 (7.3, 13.9)
65-74	39.3 (34.1, 44.5)	0.0 (0.0, 0.0)	41.4 (36.2, 46.6)	27.7 (22.9, 32.5)	14.9 (11.1, 18.7)
75-85	0.0 (0.0, 0.0)	15.8 (11.9, 19.7)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)
Region					
FBiH	17.2 (13.2, 21.2)	10.3 (7.1, 13.5)	19.0 (14.8, 23.2)	15.9 (12.0, 19.8)	9.8 (6.6, 13.0)

	Percentage (CI=95%)				
	Criteria				
Demographic and socioeconomic characteristics	Illegal place of purchase*	No adequate HWL on the pack (lack of HWL, HWL in foreign language)	Lack of appropriate tax stamp	Brand is not legal in BiH	Purchased at price lower than 70% of the lowest price
RS	8.6 (5.6, 11.6)	87.5 (84.0, 91.0)	11.2 (7.8, 14.6)	10.1 (6.9, 13.3)	5.0 (2.7, 7.3)
BD	62.5 (57.3, 67.7)	20.4 (16.1, 24.7)	87.5 (84.0, 91.0)	63.6 (58.5, 68.7)	10.0 (6.8, 13.2)
Household income per month (in EUR)					
<400	27.0 (22.3, 31.7)	15.6 (11.7, 19.5)	28.4 (23.6, 33.2)	19.2 (15.0, 23.4)	10.1 (6.9, 13.3)
400-800	12.7 (9.2, 16.2)	11.5 (8.1, 14.9)	14.5 (10.8, 18.2)	14.7 (10.9, 18.5)	9.4 (6.3, 12.5)
800-1,200	10.1 (6.9, 13.3)	6.3 (3.7, 8.9)	14.5 (10.8, 18.2)	12.3 (8.8, 15.8)	2.8 (1.0, 4.6)
>1,200	6.3 (3.7, 8.9)	13.0 (9.4, 16.6)	6.3 (3.7, 8.9)	5.6 (3.2, 8.0)	5.6 (3.2, 8.0)
Smoking intensity					
Fewer than 10 cigarettes per day	13.0 (9.4, 16.6)	12.7 (9.2, 16.2)	16.0 (12.1, 19.9)	6.1 (3.5, 8.6)	12.9 (9.4, 16.5)
Between 10-20 per day	19.1 (14.9, 23.3)	19.7 (15.5, 23.9)	21.9 (17.5, 26.3)	10.1 (6.9, 13.4)	19.2 (15.0, 23.4)
More than 20 cigarettes per day	11.6 (8.2, 15.0)	11.6 (8.2, 15.0)	9.5 (6.4, 12.6)	9.4 (6.3, 12.5)	10.3 (7.1, 13.6)

Notes: *Purchased on the street, on the open air market, or from an independent/individual seller

Table A8. *Cross-tabulation: percentage of MC smokers, by place of purchase and HWL presence (N=339)*

Percentage (CI=95%)			
	HWL		
Place of purchase of MC	**HWL in local language**	**HWL in foreign language**	**No health warnings**
In grocery stores (small independent grocery stores, mini/super/ hyper markets), kiosks	97.6 (96.0, 99.2)	1.4 (0.1, 2.7)	1.0 (0.0, 2.1)
On the street, on the open air market, from an independent/individual seller	13.5 (9.9, 17.1)	51.9 (46.6, 57.2)	34.6 (29.5, 39.7)

Table A9. *Cross-tabulation: percentage of MC smokers, by place of purchase and tax stamp presence (N=339)*

Percentage (CI=95%)				
	Tax stamp			
Place of purchase of MC	**Local stamp**	**Foreign stamp**	**Stamp removed or destroyed**	**Lack of stamp**
In grocery stores (small independent grocery stores, mini/super/ hyper markets), kiosks	92.0 (89.0, 94.0)	1.7 (0.3, 3.1)	1.4 (0.2, 2.6)	3.5 (1.5, 5.5)
On the street, on the open air market, from an independent/individual seller	0.0 (0.0, 0.0)	1.9 (0.4, 3.4)	3.8 (1.8, 5.8)	94.3 (91.8, 96.8)

Table A10. *Percentage of MC smokers, by HWL and tax stamp (N=339)*

Percentage (CI=95%)				
	Tax stamp			
Place of purchase of MC	**Local stamp**	**Foreign stamp**	**Stamp removed or destroyed**	**Lack of stamp**
HWL in local language	92.0 (89.1, 94.9)	1.7 (0.3, 3.1)	1.4 (0.2, 2.6)	3.5 (1.5, 5.5)
HWL in foreign language	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	6.3 (3.7, 8.9)	93.8 (91.2, 96.4)
No health warnings	0.0 (0.0, 0.0)	4.8 (2.5, 7.1)	0.0 (0.0, 0.0)	95.2 (92.9, 97.5)

Table A11. *Percentage distribution of MC smokers by combination of evasion criteria (N=63)*

Percentage (CI=95%)			
Illegal place of purchase and lack of appropriate HWL*	Illegal place of purchase and lack of appropriate tax stamp**	Lack of appropriate HWL and lack of appropriate tax stamp***	All three criteria****
71.1 (66.3, 75.9)	78.9 (74.6, 83.3)	79.7 (75.5, 84.0)	68.5 (63.5, 73.4)

*Criteria: no HWL, HWL in foreign language, and place of purchase on the street

**Criteria: Place of purchase on the street, lack of tax stamp

***Criteria: No HWL, HWL in foreign language, lack of tax stamp

****Criteria: Place of purchase on the street, lack of HWL, lack of tax stamp

Table A12. *Tax evasion for HR cigarette smokers by each criterion (N=88)*

Percentage (CI=95%)				
Criteria	Overall	Illegal place of purchase	No appropriate HWL on the pack	Lack of appropriate tax stamp
Overall	93.3 (88.1, 98.5)	84.1 (76.4, 91.7)	86.4 (79.2, 93.5)	91.2 (85.3, 97.1)

Table A13. *Percentage of evasion cases for HR cigarette smokers, by demographic and socioeconomic characteristics (N=88)*

Percentage (CI=95%)	
Overall	**93.3 (88.1, 98.5)**
Gender	
Male	91.7 (85.9, 97.5)
Female	97.9 (94.9, 100.9)
Education	
Primary or less	92.4 (86.9, 97.9)
Vocational	95.5 (91.2, 99.8)
High school	97.3 (93.9, 100.7)
Higher	76.9 (68.1, 85.7)
Residence	
Urban	98.1 (95.2, 101.0)
Rural	91.3 (85.4, 97.2)
Age	
18-24	100.0 (100.0, 100.0)
25-34	100.0 (100.0, 100.0)
35-44	100.0 (100.0, 100.0)
45-54	82.8 (74.9, 90.7)
55-64	95.1 (90.6, 99.6)
65-74	97.6 (94.4, 100.8)
75-85	100.0 (100.0, 100.0)
Region	
FBiH	91.4 (85.5, 97.3)
RS	96.5 (92.7, 100.3)
BD	100.0 (100.0, 100.0)
Household income per month (in EUR)	
<400	87.7 (80.8, 94.6)
400-800	100.0 (100.0, 100.0)
800-1,200	100.0 (100.0, 100.0)
>1,200	100.0 (100.0, 100.0)
Smoking intensity	
Fewer than 10 cigarettes per day	45.3 (34.9, 55.6)
Between 10-20 cigarettes per day	45.2 (34.8, 55.5)
More than 20 cigarettes per day	9.6 (3.4, 15.8)

Table A14. *Percentage of HR cigarette smokers, by place of last purchase, presence of health warning, and presence of tax stamp on HR cigarettes (N=88)*

Criteria	Percentage (CI=95%)
Place of purchase	
In grocery stores (small independent grocery stores, mini/super/hyper markets), kiosks	11.4 (4.8, 18.0)
In specialized tobacco shops	4.5 (0.2, 8.8)
On the street, on the open air market, from an independent/individual seller	84.1 (76.5, 91.7)
HWL presence	
HWL in local language	7.6 (2.1, 13.1)
No HWL	86.4 (79.2, 93.6)
Does not know	5.6 (0.8, 10.4)
Refused to answer	0.4 (0.0, 1.7)
Tax stamp presence	
Local stamp	2.6 (0.0, 5.9)
Stamp removed or destroyed	1.1 (0.0, 3.3)
Lack of stamp	91.2 (85.3, 97.1)
Does not know	4.7 (0.3, 9.1)
Refused to answer	0.4 (0.0, 1.7)

Table A15. *Percentage of evasion cases for HR cigarette smokers, separately for defined criteria, by selected demographic and socioeconomic characteristics (N=88)*

Demographic and socioeconomic characteristics	Percentage (CI=95%)		
	Illegal place of purchase	No appropriate HWL on the pack	Lack of appropriate tax stamp
Overall	84.1 (76.4, 91.7)	86.4 (79.2, 93.5)	91.2 (85.3, 97.1)
Gender			
Male	83.5 (75.7, 91.3)	85.0 (77.5, 92.5)	90.7 (84.6, 96.8)
Female	85.8 (78.5, 93.1)	90.4 (84.2, 96.6)	92.6 (87.1, 98.1)
Education			
Primary or less	80.8 (72.6, 89.0)	85.1 (77.7, 92.5)	92.4 (86.9, 97.9)
Vocational	89.4 (83.0, 95.8)	94.2 (89.3, 99.1)	100.0 (100.0, 100.0)
High school	92.7 (87.3, 98.1)	88.0 (81.2, 94.8)	86.5 (79.4, 93.6)
Higher	58.2 (47.9, 68.5)	58.1 (47.8, 68.4)	58.2 (47.9, 68.5)
Residence			
Urban	87.7 (80.8, 94.6)	91.7 (85.9, 97.5)	93.6 (88.5, 98.7)
Rural	82.6 (74.7, 90.5)	84.2 (76.6, 91.8)	90.2 (84.0, 96.4)
Age			
18-24	100.0 (100.0, 100.0)	100.0 (100.0, 100.0)	100.0 (100.0, 100.0)
25-34	63.8 (53.8, 73.8)	82.9 (75.0, 90.8)	82.9 (75.0, 90.8)
35-44	68.1 (58.4, 77.8)	89.4 (83.0, 95.8)	93.3 (88.1, 98.5)
45-54	70.1 (60.5, 79.7)	70.1 (60.5, 79.7)	82.8 (74.9, 90.7)
55-64	100.0 (100.0, 100.0)	98.0 (95.1, 100.9)	98.0 (95.1, 100.9)
65-74	97.6 (94.4, 100.8)	91.8 (86.1, 97.5)	97.6 (94.4, 100.8)
75-85	100.0 (100.0, 100.0)	100.0 (100.0, 100.0)	83.1 (75.3, 90.9)
Region BiH			
FBiH	82.7 (74.8, 90.6)	89.1 (82.6, 95.6)	88.6 (82.0, 95.2)
RS	85.5 (78.1, 92.9)	80.3 (72.0, 88.6)	95.2 (90.7, 99.7)
BD	100.0 (100.0, 100.0)	100.0 (100.0, 100.0)	100.0 (100.0, 100.0)
Household income per month (in EUR)			
<400	81.6 (73.5, 89.7)	82.4 (74.4, 90.4)	85.3 (77.9, 92.7)
400-800	89.4 (83.0, 95.8)	96.8 (93.1, 100.5)	96.8 (93.1, 100.5)
800-1,200	86.9 (79.9, 93.9)	96.8 (93.1, 100.5)	86.9 (79.9, 93.9)
>1,200	66.2 (56.3, 76.1)	96.8 (93.1, 100.5)	66.2 (56.3, 76.1)
Smoking intensity			
Fewer than 10 cigarettes per day	80.8 (72.6, 89.0)	79.0 (70.5, 87.5)	85.0 (77.5 , 92.4)
Between 10-20 per day	85.6 (78.3, 92.9)	93.1 (87.8, 98.4)	97.5 (94.3 , 100.8)
More than 20 cigarettes per day	94.6 (89.8, 99.3)	94.6 (89.8 , 99.3)	94.6 (89.8 , 99.3)

Notes: *Purchased on the street, on the open air market, from an independent/individual seller

Table A16. *Cross-tabulation: percentage of HR cigarette smokers, by place of purchase and HWL presence (N=88)*

Place of purchase of HR	Percentage (CI=95%)		
	HWL		
	HWL in local language	No HWL	Does not know/Does not remember or refused to answer
In grocery stores (small independent grocery stores, mini/super/ hyper markets), kiosks	27.6 (18.3, 36.9)	72.4 (63.1, 81.7)	0.0 (0.0, 0.0)
In specialized tobacco shops	100.0 (100.0, 100.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)
On the street, on the open air market, from an independent/individual seller	0.0 (0.0, 0.0)	92.8 (87.4, 98.2)	7.2 (1.8, 12.6)

Table A17. *Cross-tabulation: percentage of HR cigarette smokers, by place of purchase and tax stamp presence (N=88)*

Place of purchase of HR	Percentage (CI=95%)				
	Tax stamp				
	Local stamp	Stamp removed or destroyed	Lack of stamp	Does not know/Does not remember	Refused to answer
In grocery stores (small independent grocery stores, mini/super/ hyper markets), kiosks	22.7 (13.9, 31.5)	4.9 (0.4, 9.4)	72.4 (63.1, 81.7)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)
In specialized tobacco shops	0.0 (0.0, 0.0)	11.2 (4.6, 17.8)	0.0 (0.0, 0.0)	88.8 (82.2, 95.4)	0.0 (0.0, 0.0)
On the street, on the open air market, from an independent/individual seller	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	98.5 (96.0, 101.0)	1.0 (0.0, 3.1)	0.5 (0.0, 2.0)

Table A18. *Cross-tabulation: percentage of HR cigarette smokers, by HWL and tax stamp presence (N=88)*

Percentage (CI=95%)				
HWL	Tax stamp			
	Local stamp	Stamp removed or destroyed	Lack of stamp	Does not know/Does not remember
HWL in local language	34.9 (24.6, 45.2)	13.9 (6.4, 21.4)	0.0 (0.0, 0.0)	51.2 (40.4, 62.0)
No HWL	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	99.0 (96.8, 101.2)	1.0 (0.0, 3.2)
Does not know/Does not remember	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	100.0 (100.0, 100.0)	0.0 (0.0, 0.0)

Table A19. *Cross-tabulation: percentage distribution of HR cigarette smokers by combination of evasion criteria (N=82)*

Percentage (CI=95%)			
Illegal place of purchase and no appropriate HWL	Illegal place of purchase and no appropriate tax stamp	Lack of appropriate HWL and lack of appropriate tax stamp	All three criteria
82.8 (74.6, 91.0)	81.9 (73.6, 90.2)	90.9 (84.6, 97.1)	81.9 (73.6, 90.2)

Table A20. *Description of variables used in the probability model*

Variables	Notes
Sociodemographic characteristics	
Household income in absolute level, monthly (in BAM)	low (<= 500), middle (501-900), high (>900)
Household income per household member, monthly (in BAM)	low (<= 162.5), middle (162.5 - 250), high (>250)
Personal income (in BAM)	< 200, 201-300, 301-400, 401-500, 501-600, 601-700, 701-800, 801-900, 901-1000, 1001-1200, 1201-1400, >1400
Employment status	Employed, Self-employed, Unemployed, Pensioners
Level of education	Primarily - (primarily or less, incomplete secondary), Secondary (three and four year of professional school, gymnasium), Tertiary (Higher school/College, University, Postgraduate)
Type of residence	Rural, Urban
Age	continuous variable, in years
Age group	"18-24", "25-44", "45-64", "65+ "
Gender	Male, Female
Region	FBiH (Federation of BiH), RS (Republic of Srpska), BD (District of Brcko)
Smoking behavioral characteristics	
MC smoking intensity (MC per day)	"Light" (1-10) "Moderate" (11-20), "Standard" (21-30), "Heavy" (> 30)
HR smoking intensity (HR cigarettes per day)	"< 20 ", "> 20"
MC+ HR smoking intensity (cigarettes per day)	"Light" (1-10) "Moderate" (11-20), "Standard" (21-40), "Heavy" (> 40)
Smoking intensity	Continuous variable, cigarettes per day
Weekly expenditure on cigarettes	Continuous variable, expenditure on cigarettes in BAM
Price of MC cigarettes	Unit value, calculated as a ratio between expenditure on MC and quantity of cigarettes purchased
Smoking status (Dummy)	"Daily smokers", "Other"(less than daily smoker and non-smoker)
MC current smokers (Dummy)	"Current smoker_mc" (daily or less than daily MC smokers), "Other" (non-smoker of MC)
HR current smokers (Dummy)	"Current smoker_hr" (daily or less than daily HR smokers), "Other" (non-smoker of HR cigarettes)
Determinants of cross-border cigarette purchases	
Dummy variable for the municipalities at the border with Serbia	If the municipality is at the border with Serbia, dummy variable takes value 1, if otherwise 0

Variables	Notes
Dummy variable for the municipalities at the border with Montenegro	If the municipality is at the border with Montenegro, dummy variable takes value 1, if otherwise 1
Minimum distance from the municipality to nearest country with lower price	Value of variable is equal to the distance (in km) to the closest border crossing of the country (Serbia or Montenegro) with lower cigarette price
Price-to-distance ratio	There are three steps to calculate this ratio: (1) price difference of most sold cigarette price category between BiH and Serbia and between BiH and Montenegro; (2) for each municipality and both lower-tax jurisdictions, price difference is divided with driving distance to the closest border crossing; (3) for a particular municipality, a higher price-to-distance ration is chosen.

Table A21. *Probability estimation of tax evasion for MC and HR cigarette smokers*

VARIABLES	(1) model_1	(2) se	(3) model_2	(4) se	(5) model_3	(6) se
Smoking intensity (cig per day)	0.428**	(0.174)	0.426**	(0.176)	-0.121	(0.201)
Household size	-0.101	(0.128)	-0.100	(0.127)	-0.215*	(0.111)
Employment status (vs. Employed)						
Self-employed	-0.737	(0.556)	-0.740	(0.551)	-0.297	(0.508)
Unemployed	0.537	(0.336)	0.546	(0.333)	0.549*	(0.302)
Pensioners	0.876*	(0.463)	0.874*	(0.462)	0.322	(0.528)
Education (vs. Primary)						
Secondary	-0.422	(0.363)	-0.418	(0.362)	0.397	(0.380)
Tertiary	-1.354***	(0.425)	-1.351***	(0.425)	-0.371	(0.510)
Region (vs. FBiH)						
RS	-0.628	(0.482)	-0.634	(0.485)	-0.580	(0.478)
BD	2.189***	(0.223)	2.183***	(0.233)	2.864***	(0.282)
Age	0.031***	(0.009)	0.031***	(0.008)	0.034***	(0.008)
Gender	0.212	(0.309)	0.214	(0.306)	-0.208	(0.350)
Type of residence - Urban	-0.117	(0.237)	-0.119	(0.236)	0.214	(0.248)
Daily smokers dummy			0.201	(0.853)		
Current smoker of HR cigarettes					5.056***	(0.733)
Price-to-distance ratio						
Constant	-2.233***	(0.754)	-2.436***	(0.877)	-2.372***	(0.575)
Observations	497		497		497	
Log Link	-209.3		-209.3		-142.4	
AIC	442.6		444.5		310.8	
BIC	493.1		499.2		365.5	
Pseudo R2	0.199		0.199		0.455	

Note: the number of observations is higher than the number of smokers because the average value of weights for smokers is less than 1

Table A21. (continued) *Probability estimation of tax evasion for MC and HR cigarette smokers*

VARIABLES	(7) model_4	(8) se	(9) model_5	(10) se	(11) model_6	(12) se	(13) model_7	(14) se
Smoking intensity (cig per day)	-0.121	(0.202)	-0.201	(0.248)	-0.104	(0.220)	-0.135	(0.207)
Household size	-0.216*	(0.111)	-0.209*	(0.111)	-0.267**	(0.106)	-0.208*	(0.109)
Employment status (vs. Employed)								
Self-employed	-0.298	(0.510)	-0.321	(0.516)	0.013	(0.532)	-0.266	(0.509)
Unemployed	0.547*	(0.302)	0.563*	(0.299)	0.549*	(0.330)	0.545*	(0.307)
Pensioners	0.305	(0.525)	0.339	(0.534)	0.130	(0.448)	0.287	(0.533)
Education (vs. Primary)								
Secondary	0.378	(0.388)	0.388	(0.380)	0.209	(0.381)	0.347	(0.384)
Tertiary	-0.383	(0.510)	-0.355	(0.501)	-0.553	(0.518)	-0.401	(0.502)
Region (vs. FBiH)								
RS	-0.634	(0.534)	-0.694	(0.493)	-0.696	(0.485)	-0.781	(0.542)
BD	2.860***	(0.282)	2.866***	(0.284)	2.329***	(0.316)	2.803***	(0.279)
Age	0.034***	(0.008)	0.035***	(0.008)	0.038***	(0.007)	0.036***	(0.008)
Gender	-0.193	(0.366)	-0.188	(0.341)	-0.361	(0.327)	-0.160	(0.368)
Type of residence - Urban	0.217	(0.249)	0.232	(0.251)	0.189	(0.243)	0.210	(0.249)
Daily smokers dummy								
Current smoker of HR cigarettes	5.059***	(0.736)	5.181***	(0.781)	5.412***	(0.829)	5.084***	(0.752)

VARIABLES	(7) model_4	(8) se	(9) model_5	(10) se	(11) model_6	(12) se	(13) model_7	(14) se
Border municipality dummy - SERBIA	0.302	(0.983)						
Border municipality dummy - MONTENEGRO			1.429**	(0.624)				
Distance from nearest country with lower prices					-0.007**	(0.003)		
Price-to-distance ratio							13.937**	(5.722)
Constant	-2.363***	(0.577)	-2.286***	(0.617)	-1.280	(0.860)	-2.44***	(0.596)
Observations	497		497		497		497	
Log Link	-142.3		-141.3		-136.2		-141.1	
AIC	312.6		308.6		300.4		310.2	
BIC	371.5		363.3		359.3		369.1	
Pseudo R2	0.455		0.459		0.478		0.460	

Note: the number of observations is higher than the number of smokers because the average value of weights for smokers is less than 1

Table A22. *Linktest – overall evasion model (both MC and HR)*

evasion	Coef.	Std. Err.	z	P>z	[95% Conf. Interval]	
Model 1						
_hat	1.062876	0.150129	7.08	0	0.768628	1.357124
_hatsq	0.065317	0.084877	0.77	0.442	-0.10104	0.231673
_cons	-0.0513	0.148901	-0.34	0.73	-0.34314	0.240545
Model 2						
_hat	1.063541	0.150195	7.08	0	0.769164	1.357918
_hatsq	0.065708	0.084368	0.78	0.436	-0.09965	0.231068
_cons	-0.05138	0.148607	-0.35	0.73	-0.34265	0.23988
Model 3						
_hat	1.004034	0.110986	9.05	0	0.786506	1.221563
_hatsq	-0.01245	0.045694	-0.27	0.785	-0.10201	0.07711
_cons	0.039519	0.237624	0.17	0.868	-0.42621	0.505253
Model 4						
_hat	1.00351	0.111272	9.02	0	0.785422	1.221598
_hatsq	-0.01124	0.045652	-0.25	0.805	-0.10072	0.078232
_cons	0.035483	0.23715	0.15	0.881	-0.42932	0.500288
Model 5						
_hat	1.006139	0.110045	9.14	0	0.790456	1.221822
_hatsq	-0.0195	0.044178	-0.44	0.659	-0.10609	0.067086
_cons	0.061438	0.23386	0.26	0.793	-0.39692	0.519795
Model 6						
_hat	1.00175	0.114891	8.72	0	0.776567	1.226932
_hatsq	0.009658	0.043569	0.22	0.825	-0.07574	0.095053
_cons	-0.02502	0.21867	-0.11	0.909	-0.45361	0.403564
Model 7						
_hat	1.001834	0.11123	9.01	0	0.783826	1.219841
_hatsq	-0.00828	0.044924	-0.18	0.854	-0.09633	0.079772
_cons	0.025244	0.232862	0.11	0.914	-0.43116	0.481646

Table A23. Hosmer-Lemeshow GoF test – overall evasion model (MC+HR)

Model 1					
Number of observations	497	497	497	497	497
Number of groups	5	10	15	20	50
Hosmer-Lemeshow chi2(3)	0.39	3.41	6.46	9.44	39.82
Prob > chi2	0.9427	0.906	0.928	0.9486	0.7935
Model 2					
Number of observations	497	497	497	497	497
Number of groups	5	10	15	20	50
Hosmer-Lemeshow chi2(3)	0.4	3.43	4.87	8.48	42.08
Prob > chi2	0.9397	0.9049	0.9779	0.9706	0.7131
Model 3					
Number of observations	497	497	497	497	497
Number of groups	5	10	15	20	50
Hosmer-Lemeshow chi2(3)	2.84	4.64	4.92	16.56	44.38
Prob > chi2	0.4162	0.7949	0.977	0.5534	0.6221
Model 4					
Number of observations	497	497	497	497	497
Number of groups	5	10	15	20	50
Hosmer-Lemeshow chi2(3)	2.61	4.91	5.32	11.85	45.39
Prob > chi2	0.4554	0.7673	0.9673	0.8547	0.5803
Model 5					
Number of observations	497	497	497	497	497
Number of groups	5	10	15	20	50
Hosmer-Lemeshow chi2(3)	4.64	8.02	16.89	22.82	47.12
Prob > chi2	0.2005	0.4315	0.2044	0.1977	0.5088
Model 6					
Number of observations	497	497	497	497	497
Number of groups	5	10	15	20	50
Hosmer-Lemeshow chi2(3)	1.19	7.29	6.53	13.85	43.41
Prob > chi2	0.7549	0.5056	0.9245	0.7387	0.6611
Model 7					
Number of observations	497	497	497	497	497
Number of groups	5	10	15	20	50
Hosmer-Lemeshow chi2(3)	4.32	6.07	9.6	16.32	50.18
Prob > chi2	0.2286	0.6397	0.7263	0.5699	0.3869

Table A24. *Probability estimation of tax evasion for MC smokers*

VARIABLES	(1) model_1	(2) se	(3) model_2	(4) se	(5) model_3	(6) se
Household size	-0.210*	(0.111)	-0.202*	(0.107)	-0.212*	(0.111)
Smoking intensity (mc_cig per day)	-0.116	(0.172)	-0.134	(0.172)	-0.118	(0.173)
Employment status (vs. Employed)						
Self-employed	-0.221	(0.585)	-0.251	(0.592)	-0.220	(0.586)
Unemployed	0.647**	(0.299)	0.653**	(0.298)	0.641**	(0.299)
Pensioners	0.473	(0.483)	0.452	(0.485)	0.457	(0.481)
Education (vs. Primary)						
Secondary	0.621	(0.394)	0.617	(0.396)	0.602	(0.402)
Tertiary	0.031	(0.597)	0.037	(0.598)	0.015	(0.597)
Region BiH						
RS	-0.603	(0.476)	-0.633	(0.474)	-0.669	(0.522)
BD	2.957***	(0.300)	2.917***	(0.295)	2.952***	(0.299)
Age	0.035***	(0.008)	0.036***	(0.008)	0.035***	(0.008)
Gender	-0.264	(0.365)	-0.262	(0.361)	-0.246	(0.382)
Type of residence - Urban	0.171	(0.267)	0.159	(0.270)	0.178	(0.270)
Daily smokers dummy			1.524	(1.159)		
Border municipality dummy - SERBIA					0.349	(0.907)
Border municipality dummy - MONTENEGRO						

VARIABLES	(1) model_1	(2) se	(3) model_2	(4) se	(5) model_3	(6) se
Distance from nearest country with lower prices						
Price-to-distance ratio						
Constant	-2.681***	(0.644)	-4.206***	(1.324)	-2.663***	(0.641)
Observations	436		436		436	
Log Lik	-135		-134.2		-134.8	
AIC	293.9		294.4		295.7	
BIC	342.8		347.4		348.7	
Pseudo R2	0.153		0.157		0.153	

Note: the number of observations is higher than the number of MC smokers because the average value of weights for MC smokers is less than 1

Table A24. (continued) *Probability estimation of tax evasion for MC smokers*

VARIABLES	(7) model_4	(8) se	(9) model_5	(10) se	(11) model_6	(12) se
Household size	-0.210*	(0.111)	-0.266**	(0.111)	-0.206*	(0.110)
Smoking intensity (mc_cig per day)	-0.131	(0.177)	-0.093	(0.187)	-0.131	(0.177)
Employment status (vs. Employed)						
Self-employed	-0.227	(0.587)	0.067	(0.595)	-0.180	(0.581)
Unemployed	0.664**	(0.297)	0.624*	(0.330)	0.641**	(0.304)
Pensioners	0.520	(0.488)	0.351	(0.424)	0.451	(0.484)
Education (vs. Primary)						
Secondary	0.605	(0.391)	0.433	(0.388)	0.576	(0.394)
Tertiary	0.035	(0.595)	-0.169	(0.604)	-0.002	(0.593)
Region BiH						
RS	-0.704	(0.497)	-0.739	(0.485)	-0.813	(0.530)
BD	2.958***	(0.299)	2.419***	(0.331)	2.894***	(0.296)
Age	0.034***	(0.008)	0.037***	(0.007)	0.036***	(0.008)
Gender	-0.267	(0.366)	-0.420	(0.344)	-0.216	(0.382)
Type of residence - Urban	0.187	(0.270)	0.156	(0.262)	0.175	(0.271)
Daily smokers dummy						
Border municipality dummy - SERBIA						
Border municipality dummy - MONTENEGRO	0.991**	(0.451)				

VARIABLES	(7) model_4	(8) se	(9) model_5	(10) se	(11) model_6	(12) se
Distance from nearest country with lower prices			-0.007**	(0.003)		
Price-to-distance ratio					14.187***	(5.338)
Constant	-2.611***	(0.681)	-1.548*	(0.873)	-2.727***	(0.655)
Observations	436		436		436	
Log Lik	-134.4		-129.4		-133.7	
AIC	292.7		284.7		293.4	
BIC	341.7		337.7		346.5	
Pseudo R2	0.157		0.188		0.161	

Note: the number of observations is higher than the number of MC smokers because the average value of weights for MC smokers is less than 1

Table A25. *Linktest – MC evasion model*

evasion_mc	Coef.	Std. Err.	z	P>z	[95% Conf. Interval]	
Model 1						
_hat	1.021236	0.285311	3.58	0	0.462037	1.580434
_hatsq	0.00999	0.108363	0.09	0.927	-0.2024	0.222376
_cons	0.002066	0.263593	0.01	0.994	-0.51457	0.518699
Model 2						
_hat	1.065562	0.293701	3.63	0	0.489918	1.641206
_hatsq	0.030037	0.108168	0.28	0.781	-0.18197	0.242042
_cons	0.00792	0.26521	0.03	0.976	-0.51188	0.527723
Model 3						
_hat	1.031056	0.288327	3.58	0	0.465946	1.596167
_hatsq	0.014473	0.108517	0.13	0.894	-0.19822	0.227163
_cons	0.003364	0.264345	0.01	0.99	-0.51474	0.52147
Model 4						
_hat	0.984675	0.272619	3.61	0	0.450353	1.518998
_hatsq	-0.00724	0.104105	-0.07	0.945	-0.21128	0.1968
_cons	-0.00129	0.257749	0	0.996	-0.50647	0.503891
Model 5						
_hat	1.154219	0.299587	3.85	0	0.567041	1.741398
_hatsq	0.062602	0.097493	0.64	0.521	-0.12848	0.253684
_cons	0.030191	0.257798	0.12	0.907	-0.47508	0.535464
Model 6						
_hat	1.070169	0.296037	3.61	0	0.489947	1.65039
_hatsq	0.031671	0.108143	0.29	0.77	-0.18029	0.243627
_cons	0.009169	0.263761	0.03	0.972	-0.50779	0.526131

Table A26. *Hosmer-Lemeshow GoF test – MC evasion model*

Model 1					
Number of observations	436	436	436	436	436
Number of groups	5	10	15	20	50
Hosmer-Lemeshow chi2(3)	2.41	7.84	9.66	12.94	43.26
Prob > chi2	0.4918	0.4491	0.7215	0.7952	0.6672
Model 2					
Number of observations	436	436	436	436	436
Number of groups	5	10	15	20	50
Hosmer-Lemeshow chi2(3)	1.87	5.72	7.92	15.87	45.41
Prob > chi2	0.5998	0.6785	0.8488	0.6017	0.5796
Model 3					
Number of observations	436	436	436	436	436
Number of groups	5	10	15	20	50
Hosmer-Lemeshow chi2(3)	1.25	3.87	9.38	10.48	32.66
Prob > chi2	0.7416	0.8688	0.7438	0.9152	0.9557
Model 4					
Number of observations	436	436	436	436	436
Number of groups	5	10	15	20	50
Hosmer-Lemeshow chi2(3)	3.35	8.28	14.57	23.6	53.25
Prob > chi2	0.3414	0.4066	0.3347	0.1687	0.2792
Model 5					
Number of observations	436	436	436	436	436
Number of groups	5	10	15	20	50
Hosmer-Lemeshow chi2(3)	1.83	7.86	12.09	22.2	41.84
Prob > chi2	0.6084	0.4477	0.5205	0.2234	0.722
Model 6					
Number of observations	436	436	436	436	436
Number of groups	5	10	15	20	50
Hosmer-Lemeshow chi2(3)	1.66	4.29	8.53	18.64	33.21
Prob > chi2	0.6458	0.8303	0.8074	0.414	0.9484

Table A27. *Probability estimation of tax evasion for HR cigarette smokers*

VARIABLES	(1) model_1	(2) se	(3) model_2	(4) se	(5) model_3	(6) se
Household size	0.155	(0.382)	0.250	(0.413)	0.413	(0.515)
Smoking intensity (HR_cig per day)	1.545*	(0.819)	1.368	(0.842)	0.983	(0.936)
Education (vs. Primary)	-1.497***	(0.545)	-1.909*	(1.023)	-1.546**	(0.745)
Age	-0.100	(0.073)	-0.167**	(0.080)	-0.119*	(0.066)
Gender	0.219	(1.580)	-0.126	(0.737)	0.156	(1.059)
Type of residence - **Urban**	2.086*	(1.149)	2.992**	(1.474)	2.930**	(1.219)
Distance from nearest country with lower prices			-0.018**	(0.008)		
Price-to-distance ratio					1,531.789	(1,088.5)
Constant						
Observations	76		76		76	
Log Lik	-7.409		-5.762		-6.496	
AIC	28.82		27.52		28.99	
BIC	45.13		46.17		47.64	
Pseudo R2	0.657		0.733		0.699	

Note: the number of observations is lower than the number of HR cigarette smokers because the average value of weights for HR cigarette smokers is greater than 1

Table A28. *Linktest – HR evasion model*

evasion_hr	Coef.	Std. Err.	z	P>z	[95% Conf. Interval]	
Model 1						
_hat	0.970834	0.621454	1.56	0.118	-0.24719	2.188861
_hatsq	0.007104	0.116905	0.06	0.952	-0.22202	0.236233
_cons	0.010749	1.145097	0.01	0.993	-2.2336	2.255098
Model 2						
_hat	1.171976	0.923526	1.27	0.204	-0.6381	2.982054
_hatsq	-0.03485	0.146916	-0.24	0.812	-0.3228	0.253098
_cons	-0.0684	1.119704	-0.06	0.951	-2.26298	2.126176
Model 3						
_hat	0.92686	0.512205	1.81	0.07	-0.07704	1.930763
_hatsq	0.021088	0.101802	0.21	0.836	-0.17844	0.220616
_cons	0.012211	1.044547	0.01	0.991	-2.03506	2.059486

Table A29. *Hosmer-Lemeshow GoF test – HR evasion model*

Model 1					
Number of observations	76	76	76	76	76
Number of groups	5	10	15	20	50
Hosmer-Lemeshow chi2(3)	0.66	2.88	4.43	10.15	19.88
Prob > chi2	0.8818	0.9414	0.9857	0.9269	0.9999
Model 2					
Number of observations	76	76	76	76	76
Number of groups	5	10	15	20	50
Hosmer-Lemeshow chi2(3)	0.19	1.06	4.96	8.76	12.12
Prob > chi2	0.9792	0.9979	0.9761	0.965	1
Model 3					
Number of observations	76	76	76	76	76
Number of groups	5	10	14	19	47
Hosmer-Lemeshow chi2(3)	0.36	0.57	3.07	3.83	15.3
Prob > chi2	0.949	0.9998	0.995	0.9996	1