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Tobacco Taxation Policy

Tax Evasion and Avoidance in Manufactured Cigarettes and Hand-rolled Tobacco in North Macedonia: Results from a Nationwide Survey of Smokers

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EXECUTIVE SUMMARY

This study analyzes the levels and types of tax avoidance and tax evasion behaviors of individual users of manufactured cigarettes (MC) and hand-rolled (HR) tobacco in North Macedonia, as well as identifies factors associated with these behaviors. The study uses novel data from the Survey on Tobacco Consumption in Southeastern European countries (STC-SEE)[1], conducted for the first time in 2019 in six SEE countries from the Balkan region – Albania, Bosnia and Herzegovina, Kosovo, Serbia, Montenegro, and North Macedonia – to provide guidance to policy makers by describing tax avoidance and tax evasion behaviors among adults according to various socioeconomic characteristics such as gender, income, age, education, social status, and proximity to the border.

Tax avoidance encompasses the legal means consumers use to pay lower prices by avoiding paying taxes, while tax evasion refers to the illegal ways consumers circumvent paying tobacco taxes. To identify a pack of MC or HR tobacco[2] as illicit, a comprehensive approach is used by setting strict criteria, as suggested by Joossens et al. (2014), and in accordance with relevant laws in North Macedonia.

Based on the STC-SEE results for North Macedonia, this report first provides a descriptive statistical analysis of tax evasion and avoidance according to various socioeconomic characteristics. Second, the research employs logistic multivariate analysis to identify possible factors affecting individuals' probability of evading taxes. The following are key findings of this research:

Tax evasion is relatively high in North Macedonia compared to EU countries. According to the findings, the prevalence of tax evasion among cigarette[3] smokers is 12.4 percent, while the prevalence of tax avoidance is 0.6 percent. Among current MC smokers 1.9 percent evade tax and 0.6 percent avoid tax, while among HR tobacco smokers the prevalence of tax evasion is much higher (86.7 percent). No tax avoidance is identified among HR smokers. Once the difference in consumption among smokers who use licit and illicit tobacco is taken into account, the overall share of tax evasion in North Macedonia is 14.6 percent of the market, with 88.1 percent of HR tobacco consumption and 1.7 percent of MC consumption being illicit. For comparison, Joossens et al. (2014) estimated that the overall proportion of illicit packs for both MC and HR is 6.5 percent on average for 18 European countries.[4] Additionally, they observed a higher proportion of tax evasion among HR smokers than MC smokers, which they found is

[1] The STC-SEE was conducted within the project Accelerating Progress on Effective Tobacco Tax Policies in Low- and Middle-Income Countries, guided by the University of Illinois at Chicago's (UIC) Institute for Health Research and Policy, in Albania, Bosnia and Herzegovina, Kosovo, North Macedonia, Montenegro, and Serbia, using the same questionnaire.

[2] Illicit HR tobacco can be bought in prepacked packs or in pouches, with health warning labels or not, with a brand name or not, or by direct measuring on the spot.

[3] Cigarettes include both MC and HR cigarettes.

[4] It is worth noting that Joossens et al. (2014) also estimated huge variations in tax evasion prevalence among countries, with it being highest in Latvia, at 37.8 percent, followed by Sweden with 18.8 percent, Bulgaria with 18.3 percent, Poland with 15.3 percent, Romania with 10.7 percent, and Czechia with 10 percent.

especially emphasized in the United Kingdom market, where the percentage of illicit buyers is four to five times higher for HR tobacco smokers than for MC smokers.

Even though HR tobacco smoking prevalence of 5.9 percent is not as high, very high prevalence of tax evasion among HR smokers is a significant problem for North Macedonia. HR tobacco is a cheaper smoking option than MC, as the price per 20 cigarettes of HR tobacco, on average, is lower than the price of 20 MC cigarettes (€0.94 versus €1.49, respectively). Furthermore, after the last price increase that survey respondents could remember, 3.1 percent of current smokers stated that they switched completely or partially to using HR cigarettes as a result. The switch to HR tobacco undermines the revenue objective, as the excise on HR tobacco is lower per stick compared to MC cigarettes. In general, illicit HR tobacco in North Macedonia comes from two main channels: illicit trade and illegal tobacco cultivation/production in domestic fields.

The MC market predominantly consists of domestic tax-paid purchases. Out of current MC smokers, 1.9 percent use illegal MC and 0.6 percent avoid paying taxes. When variations in smokers' smoking intensity are taken into consideration, the percent of illegal MC consumption is 1.7, while 0.6 percent of MC consumption is identified as tax avoidance. This is somewhat expected, keeping in mind that MC prices in North Macedonia are the lowest in the region. Illicit MC packs are bought mainly in open air or green markets,[5] but they do have a health warning label or tax stamp from North Macedonia. After checking all survey respondents' packs for the illicit criteria, one pack was an illegal brand ("Merit") and one pack satisfied the price threshold criterion of selling at less than 70 percent of the price of the cheapest pack in the domestic market. Finally, given the small number of illicit MC packs, no strong conclusions can be made about their origin. In general, they are mainly found in the southwestern region.

Based on the study findings, this report proposes several policy recommendations. Some recommendations have a general application, while others are particularly relevant to HR tobacco.

1. Immediate ratification and implementation of the Protocol to Eliminate Illicit Trade in Tobacco Products, which was signed by North Macedonia back in 2014, is necessary. The Protocol can be used as a clear guide for the creation of specific tobacco control measures. The Protocol to Eliminate Illicit Trade in Tobacco Products (2012)[6] also requires establishing thorough control of the supply chain and launching national and/or regional tracking and tracing systems as well as a global information-sharing point located in the Convention Secretariat to limit illegal trade. Additionally, to control possible crop leakages or illegal tobacco production, the Protocol suggests the introduction of a licensing system

[5] The open green markets are very common in the Balkans. They represent a designated area with rows of stalls where agricultural goods are sold, usually located in the center of the municipality of a neighborhood and can be fenced. They are commonly characterized by the absence of strict controls, except for some aspects of trade (for example the control of weight scales used to measure goods and the inspection of fresh meat for sale). Sellers usually need to pay a daily or monthly fee to the municipal government to be able to sell in these markets. Fees vary by municipality, location of the market, and location of the stalls at the market. However, in many cases, they also include informal sellers who create improvised and mobile stalls and sell their products without paying the fee.

[6] In addition, the Protocol also requires the introduction of other provisions to ensure control of the supply chain, such as licensing, due diligence, recordkeeping, and security and preventive measures, as well as measures in relation to internet- and telecommunication-based sales, duty-free sales, and free zones and international transit.

for all the participants in tobacco processing, starting from the suppliers of the seeds, to buyers of the leaves, agricultural producers, curing factories, transporters, manufacturers, exporters, and so on. These measures, accompanied by a strict tracking system of the financial transactions and due diligence of the participants of the market, could significantly limit possibilities for illicit trade and crop leakages.

2. Significant improvement of the government's law enforcement and institutional effectiveness is required for enforcing the obligations of the Protocol and combating illicit trade as well as crop leakages and illegal production. The capacity of institutions that are especially related to supply chain control and illegal tobacco cultivation is generally evaluated as relatively weak and has been for a long period of time (Havrylyshyn & Rooden, 2003; Transition Reports, EBRD, 2010, 2017-2018). The capacity of institutions such as licensing bodies and agencies, customs, various inspection bodies, and law enforcement should also be strengthened to reduce illegal domestic production, the porousness of borders, and selling in open air or green markets. Furthermore, fighting corruption could also have a positive effect on decreasing illicit trade in tobacco.
3. Regional cooperation should be strengthened. All these measures require not only national but also regional efforts of the governments in SEE. Having illicit tobacco products that come from neighboring countries suggests that international transit requires better regional control from the customs administrations and enforcement in each country. Hence, cooperation within the SEE region is required, consistent with the respective domestic legal and administrative systems of the countries, in order to enhance the effectiveness of law enforcement actions to combat illegal trade. Article 12 of the Protocol suggests measures to regulate the international transit and shipment of tobacco products, which can be used as a guide.
4. Finally, the findings of this report underline the need for independent monitoring on an on-going basis of the use, production, trade, manufacturing, and exporting of tobacco using clearly defined methodology, surveys, and publicly available and verifiable data and results for accurate and consistent analyses and evidence-based policy making.

CHAPTER 1. INTRODUCTION

A vast body of literature finds that significantly increasing the price of tobacco products through tax increases results in a reduction of tobacco consumption, while at the same time creating additional budget revenues and positive spillovers for public health (Nargis et al., 2020). However, for the policy to be fully effective, the tax increase should be followed by a comprehensive increase of prices for all tobacco products within the country as well as neighboring countries in order to avoid cross-border smuggling and illicit trade in various tobacco products (Brown et al., 2017).

The availability of lower-priced MC or HR tobacco encourages smokers to look for cheaper options, including the possibility of switching to a cheaper type of tobacco product (mostly from MC to HR) or buying cheaper illegal MC or HR tobacco, which undermines the objectives of tobacco taxation and health policy (Joossens et al., 2010). For example, based on STC-SEE data for North Macedonia, in 2019 the price of illegal MC was 8.1 percent lower than that of tax-paid MC,[7] while for HR cigarettes – which are mainly illegal – the price was almost 50 percent lower. Illegal trade decreases tax revenues and undermines health policy goals, as the required health warnings and declarations of ingredients are usually absent from illegal products. Illicit trade further undermines tobacco control efforts through several other indirect channels, including increased availability of tobacco products to youth, unregulated sales of illegal products in open greenmarkets, and increased socioeconomic disparities in tobacco use since illegal products are disproportionally consumed by low-income and less-educated populations (Ross, 2015).

Although the World Health Organization Framework Convention on Tobacco Control (WHO FCTC) Protocol to Eliminate Illicit Trade in Tobacco Products (WHO, 2013) defines illicit trade and all related activities, for the purposes of this study the legal and illegal methods consumers use to circumvent tobacco taxes are classified into two groups based on information from consumers: tax avoidance and tax evasion.[8] More details on the various types of tax evasion and avoidance is provided in Box 1 in the Appendix.

Briefly, tax avoidance encompasses all the legal mechanisms consumers use to pay a lower price by avoiding paying taxes, and is often related to poor policy or weak institutional oversight in the country. Even though tax avoidance activities are legal and mainly small scale, they increase the affordability of tobacco products and therefore reduce tax revenue and undermine public health objectives (Ross et al., 2017).[9] Tax evasion refers to illegal methods used by consumers to

[7] The size of the MC pack is determined by the Law of tobacco and tobacco products (2019) and it must be 20 cigarettes per pack. However, due to the extended period (year and a half) to full application of the new Law that expires by the end of October in 2020, in 2019 most packs on the tobacco market contained 19 cigarettes, complying with the old Law of tobacco and tobacco products from 2016.

[8] Notably, there are other participants in the tobacco market that can be involved in illicit trade, such as the producers, traders, sellers, and others. By confronting various studies on production, export-import, and trade, better insight into the extent of the illicit trade in one country can be assessed.

[9] There are other mechanisms of tax avoidance introduced by other participants on the market that can be more detrimental; for example, by manufacturers that can change the attributes of products in response to tax and hence

circumvent tobacco taxes, as the participants involved tend to evade paying all or some tobacco taxes.[10]

The illegal nature of all activities to circumvent tax in tobacco products makes the measurement of its scope extremely difficult. One method to assess the magnitude of tax avoidance and evasion is using consumption estimates based on survey data, while taking into account limitations related to surveys (Ramo et al., 2011). Many countries such as the United Kingdom, Canada, and the United States have used this method extensively to estimate the extent of cigarette tax avoidance and evasion (Guindon et al., 2013). The use of this method has also increased in Europe recently, especially with the Pricing Policies and Control of Tobacco in Europe (PPACTE) project that surveys more than 18,000 citizens in 18 European countries on their attitudes towards and responses to tobacco tax and price policies (Gallus et al., 2014). However, among SEE countries, only Bulgaria and Romania were part of this project. Hence, this study contributes to filling the gap in the scientific literature base by conducting the STC-SEE for the first time, providing new data, and analyzing possible factors that affect smoking and related illicit activities.

This report is structured as follows. After the introduction, the second section describes the data and the methodology applied in the study. It introduces an empirical approach to explain the factors affecting probability of tax evasion and avoidance, accompanied by the limitations and strengths of the study. Section 3 provides a descriptive statistical analysis of the size and characteristics of overall tax avoidance and evasion in North Macedonia, by various socioeconomic characteristics. In addition, this section describes in greater detail tax evasion of HR cigarettes, which comprises 90 percent of total evasion. Section 4 presents a discussion of the findings and recommendations for policy makers to reduce tobacco tax evasion. Lastly, this section summarizes the study findings and proposes the most effective approach to reducing tax evasion.

price increases. Examples of this in North Macedonia include changing the number of sticks in one MC pack from 20 to 19, to keep the price of a pack on the same or a slightly elevated price level, after the increase of tax. This practice is against the law, yet still observed in practice at the time of writing this report. Another example is selling tobacco for hand-rolling in pouches, as the tobacco packed in this way is taxed differently from MC packs.

[10] For more on the various forms of illegal activities related to tobacco, see Ross (2015).

CHAPTER 2. DATA AND METHODOLOGY

This study uses STC-SEE[11] data for North Macedonia, which includes information from 1,006 individuals aged 18 to 85 years, who were interviewed in person (face-to-face) at respondents' homes in September 2019. To the authors' knowledge, this is the first time such a survey of tobacco use in North Macedonia has been conducted. The survey included questions related to the socioeconomic characteristics of the respondents as well as their use and attitudes towards tobacco products.[12] Sampling weights were applied so that the results are nationally representative of the population.[13] In addition to the survey responses, for the purposes of this study current smokers were asked to show their last-purchased pack of tobacco product, which was also photographed. Thus, the self-reported information on illicit packs could be validated by inspection of the photos of the actual packs or pouches.

Considering that only 2.5 percent of all current smokers in North Macedonia use products other than "classic"[14] tobacco products,[15] this study focuses only on illegal behaviors of smokers of "classic" tobacco products (Mijovic Hristovska et al., 2020). Moreover, since the main two types of "classic" tobacco products are MC and HR tobacco – as less than 1 percent of current smokers use other types[16] – this study focuses only on MC and HR tobacco. Overall, the prevalence rate of smokers in North Macedonia who use "classic" tobacco products is 48.4 percent, within which 92.0 percent smoke MC and 12.5 percent use HR tobacco (Mijovic Hristovska et al., 2020).

Following Joossens et al. (2014), a comprehensive approach is used for identification of illicit packs or tax evasion, defining a pack of MC or HR as illicit if it has at least one of the tax evasion criteria as defined by the applied procedure and the relevant laws of North Macedonia.[17] Further details are provided in Table A1 in the Appendix. In general, the literature suggests several starting points in defining the criteria of illicit purchase such as place of purchase, brand and price of the last purchase, and the presence/absence of a tax stamp and health warning labels. These starting points are accompanied by appropriate questions and sets of answers in the survey. Finally, comparing the relevant legislation in North Macedonia with the answers from the survey, the following criteria for identifying an illicit pack of MC or HR pouch are identified:

- The pack was bought domestically in an illicit place of purchase as defined by law, as reported by smokers.

[11] STC-SEE was prepared by the Institute of Economic Sciences in Belgrade, Serbia, mostly based on the GATS core questionnaire, with several questions adapted from the ITC and PPACTE surveys.

[12] More details about the survey characterises and methodology can be found in Mijovic Hristovska et al. (2020).

[13] The details of sampling weight values are provided in Appendix A in Mijovic Hristovska et al. (2020).

[14] "Classic" tobacco products in STC-SEE include MC, HR tobacco, pipes full of tobacco, cigars and cigarillos and waterpipe with tobacco.

[15] Only 12 smokers reported using electronic cigarettes that produce a vapor from a liquid, smokeless tobacco, or water pipe with tobacco (Mijovic Hristovska et al., 2020, Table B4.2)

[16] Only 5 respondents stated that they use pipes full of tobacco, cigars and cigarillos, and pipe with tobacco (Table B4.3 in the Appendix in Mijovic Hristovska et al., 2020).

[17] More details on relevant laws in North Macedonia regulating tobacco production, use, sales, and distribution are provided in Mijovic Spasova et al. (2018).

- The pack was bought domestically and does not have the compulsory tax stamp. Packs or HR pouches with removed or destroyed tax stamps are not categorized according to this criterion, since the stamp could have been destroyed upon opening the pack. Packs with foreign tax stamps that were sold locally are categorized as illicit.
- The pack was bought domestically and does not have the appropriate health warning in the Macedonian or Albanian language.[18] Also, packs with foreign health warnings that were purchased locally are deemed illicit.
- The pack was bought domestically and its price is below the threshold of 70 percent of the cheapest price in the domestic market, since retail prices are highly regulated and cannot be discounted by any means; and,
- The pack was bought domestically, and its brand is not registered in the Register of Tobacco Brands in North Macedonia, as published on the website of the Ministry of Economy.[19] The last version of the publicly available Register is from 06.12.2017.[20]

With respect to tax avoidance, the identification of avoidance in MC packs or HR tobacco pouches follows two main criteria:

- If the pack/pouch was bought from a duty-free shop; or,
- If the pack/pouch was bought in a foreign country that has lower taxes/prices.

Based on the STC-SEE data, this study is the first to provide extensive descriptive statistical analysis of tax evasion in North Macedonia according to various socioeconomic characteristics, offering insight into factors associated with this behavior. In addition, empirical modeling is employed to evaluate relevant factors affecting probability to evade taxes.

The decision to evade or avoid taxes on cigarettes is modelled by using the binary choice model (logit model), which estimates the probability that the dependent variable y_i takes the value of one, representing tax evasion/avoidance, versus the value of zero (full tax-paid consumption).

The estimated model is given by the equation:

$$Y = P(y_i = 1) = f(X\beta) \qquad (1.1)$$

where y is tax evasion/avoidance of the respondent i. Y is an indicator variable taking the value of 1 if a tax evasion/avoidance pack is identified, X represents the vector of covariates, while β is the vector of the coefficients on the covariates.[21] Various specifications for the model are tested separately for evasion and avoidance, both separately for MC and HR as well as jointly.

The variables used in the descriptive and econometric analyses are explained in more details in Table A2 in the Appendix. They include socioeconomic characteristics such as gender, age group, employment status, type of residence (urban versus rural), household income, household income

[18] The law allows for health warning labels in the Albanian language, as it is spoken by 20 percent of the population.

[19] The register in pdf format can be downloaded from: http://www.economy.gov.mk/Upload/Documents/ПРЕГЛЕД%20НА%20РЕГИСТРИРАНИ%20МАРКИ%20НА%20ТУТУНСКИ%20ПРОИЗВОДИ.pdf

[20] The website of the Ministry of Economy was last checked on 07.09.2019.

[21] More on the details of the model and calculation of marginal effects of various variables can be found in Vladisavljevic (2019).

per member, personal income, and education level. It should be noted that many respondents did not provide household/personal income answers. They were obtained for analysis by imputing the missing values based on a simple regression imputation method. The predicted value of household income was obtained by regressing it according to key socioeconomic determinants such as age, gender, household size, number of adults, level of education, employment status, and municipality in which the household is living (Weinberg & Smeeding, 2001; Kastuan et al., 2020). The predicted values for household income were imputed to replace the missing values. This method has the advantage of preserving the relationships among variables involved in the imputation model, but it does not have the inherent variability around predicted values. Missing values for personal income were similarly imputed by obtaining predicted values from a regression including variables such as age, gender, employment, education level, and municipality.

Other variables used in the analysis include smoking status, tobacco type, smoking intensity, and attempts to quit smoking. Due to possible endogeneity issues related to the smoking status variables, the model is tested separately with and without them. Region and border variables in various alternatives are also introduced into the model. The border variable proves to be insignificant in all specifications, which is expected considering that North Macedonia has the lowest prices of tobacco products in the region (Table A3 in the Appendix). Various regression specifications were tested and, based on the Akaike information criterion (AIC) and Bayesian information criterion (BIC) and likelihood ratio, the best performing model was chosen.

It should be noted that self-reported data in surveys can contain serious limitations related to underreporting, known as the social desirability bias[22] or imperfect recall of the respondents, all of which cannot be easily measured (Althubaiti, 2016). For those cases in which smokers willingly showed their last-purchased pack, the information from the pack in the photo is compared with their answers. However, around 20 percent of current MC smokers and 24 percent of HR smokers refused to show their last-purchased pack (Table A4 in the Appendix). Another limitation that could lead to underestimation of tax evasion is related to the fact that the weight[23] of the last-purchased pack of HR tobacco was not recorded during the interviews, hence the price characteristic could not be taken into account for identification of illicit packs of HR. According to the STC-SEE results this was not a serious limitation, because the HR packs mostly fulfilled other criteria of illicit status, especially since most were bought on the green market.

On the other hand, a particular strength of this study is the novel data and the scientific approach, including empirical analysis, in the determination of factors affecting the probability of tax evasion in the case of North Macedonia. To the authors' knowledge, there have been no previous studies providing estimates of tobacco tax evasion in North Macedonia prior to this one.

[22] Social desirability bias occurs when respondents give the answer that they believe is socially desirable (Althubaiti, 2016). Socially desirable answers are culturally dependent and represent specific characteristics of the Western Balkans (Dodaj, 2012). In addition, keeping in mind that the respondents have to report illegal activity (buying and using illegal tobacco), it is expected that they might tend to hide that fact.

[23] The weight is required in order to be able to determine the price per cigarette rolled. Usually the price of the pouch is divided by the weight, and hence, to calculate the price per 20 cigarettes, 0.75 g. of loose tobacco is assumed as equivalent to one cigarette (Gallus et al., 2014).

CHAPTER 3. RESULTS

One of the main factors associated with tax avoidance and evasion behavior of smokers in North Macedonia is the price differential between legal and illegal packs of the same tobacco product, as well as across various tobacco products. As Table 0.1 shows, there are stark differences between the prices of legal and illegal MC[24] and legal and illegal HR tobacco, with HR tobacco being the cheapest alternative.[25]

Table 0.1 *Price differentials of MC and HR tobacco (legal vs. illegal purchase) (price in €, for 20 cigarettes)*

MC				HR	
From official source		Average price from STC-SEE		Mean illegal HR unit value per pack, from STC-SEE	Mean HR unit value, per pack, from STC-SEE
Cheapest brand	Most-sold brand	Legal purchase	Illegal purchase*	Illegal purchase**	Average estimate*
1.30	1.54	1.49	1.37	0.94	0.94

Notes: *The sample size is only 8 respondents; **sample size is 53 illicit HR smokers; ***sample size is 77 respondents, current and former, that reported buying HR in 2019.

Source: Authors' own calculations using official data from NMK Customs and data collected from sellers on the open green market and from shops

The average price of a legal pack of 20 MC is €0.55 higher than the average price paid for 20 HR cigarettes. According to STC-SEE data, almost one quarter of current smokers (23.3 percent) who smoke or used to smoke HR cigarettes stated that one of their reasons for doing so is that they are less expensive (Table A5 in the Appendix).[26] In addition, when current smokers were asked about their response to the latest increase in MC price that they could remember, 3.1 percent stated that they switched completely or partially to using HR cigarettes, 6.1 said that they switched completely or partially to cheaper brands, and 0.4 percent reported switching to illegal or smuggled MC (Mijovic Hristovska et al., 2020).

3.1. SIZE AND CHARACTERISTICS OF TAX AVOIDANCE AND EVASION

In general, consumption of "classic" tobacco products can be segmented into two distinct markets: the market of MC and the market of HR cigarettes (left and right panels, respectively, in Figure 1 and Table A6 in the Appendix).

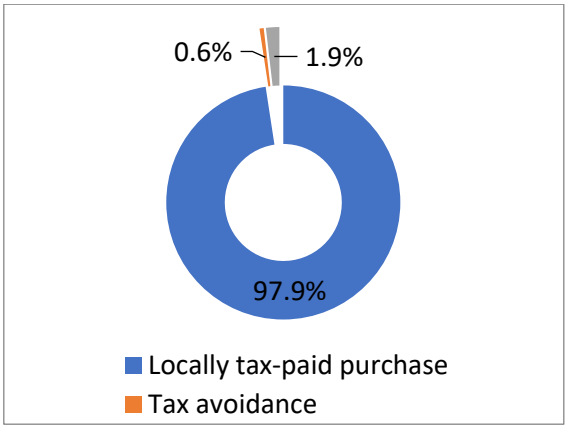
[24] The respondents were asked about the price they paid for their last purchase of one MC pack.

[25] Due to lack of data on weight for HR packs, the price for the HR pack/pouch is calculated by taking the mean HR unit value. An HR pack is calculated as the HR unit value multiplied by 20. HR unit value is calculated as $HRunitvalue = \frac{amount\ HR\ per\ month}{number\ HR\ cigarettes\ \ per\ month}$

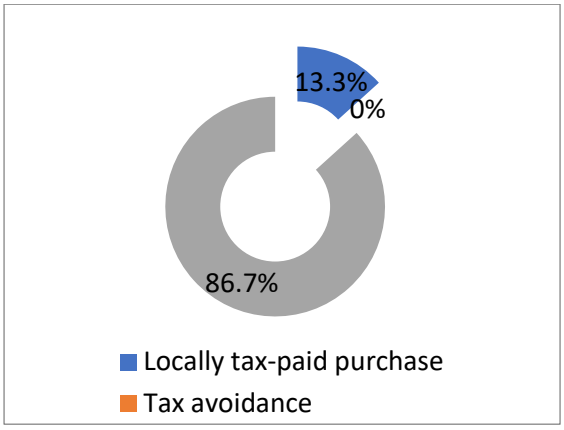
[26] Purchases that were motivated by the lowest price were assessed using the question: "Why do you use/used to smoke hand-rolled cigarettes?"

Figure 1. *Most HR smokers use illicit HR tobacco, while most MC smokers use legal cigarettes*

a) MC smokers predominantly buy locally tax-paid cigarettes (N=448)



b) HR smokers predominantly buy illicit HR tobacco (N=61)



Source: Authors' own calculations based on STC-SEE for North Macedonia (2019)

The MC market predominantly consists of domestic tax-paid purchases, with only 1.9 percent of current MC smokers using illegal MC and 0.6 percent avoiding paying taxes. On the other hand, the situation is completely the opposite for HR smokers, as 86.7 percent of current HR smokers use illegal HR tobacco and no tax avoidance was identified (Table A6 in the Appendix). This implies that overall tax evasion in North Macedonia is mainly dominated by HR smokers. Meanwhile, overall tax avoidance is negligible, again keeping in mind that MC prices are the lowest in the region.

3.1.1. Overall tax avoidance

As mentioned above, tax avoidance includes all the legal activities of smokers to pay lower prices. The prevalence of tax avoidance is 0.6 percent of all current smokers and the size of tax avoidance is 0.6 percent of cigarette consumption (tables A6 and A7 in the Appendix). Tax avoidance activities are very small scale and mainly involve individual travels of smokers to duty-free shops. Due to the small sample size of identified tax-avoided packs in this study, no conclusive statements can be made. Table A8 in the Appendix offers the percentage distribution of MC current smokers who avoid taxes, according to various socioeconomic characteristics; however, due to the small sample, it should only be considered for illustrative purposes.

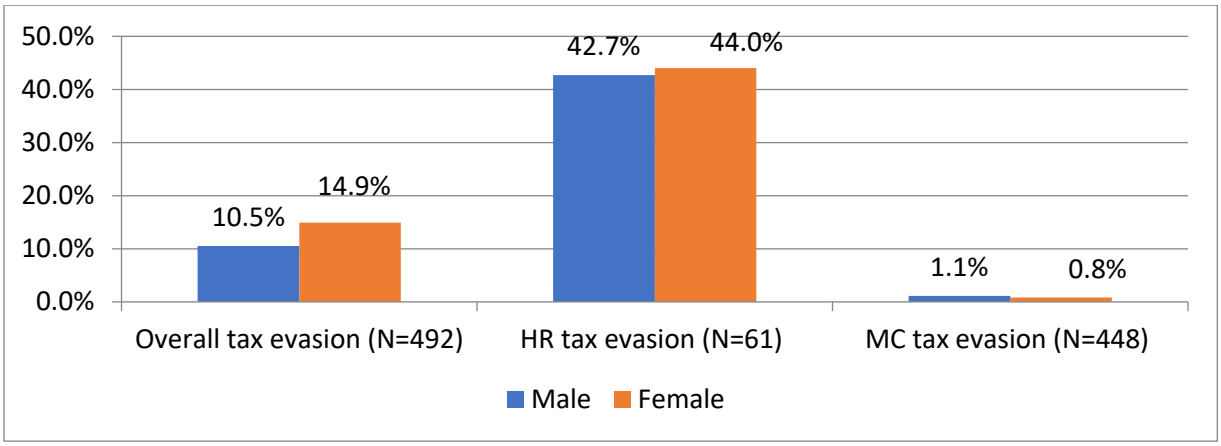
3.1.2. Tax evasion

Tax evasion includes all the illegal activities of smokers to evade taxes completely or partially. The overall prevalence of tax evasion is 12.3 percent, while 1.9 percent of MC current smokers and 86.7 percent of HR smokers evade taxes (Table A6 in the Appendix). Moreover, the estimated size of tax evasion or size of illicit trade of cigarettes in North Macedonia is 14.6 percent, with 1.7 percent of MC consumption and 88.1 percent of HR tobacco consumption being illicit (Table A7 in the Appendix). While the prevalence of tax evasion only estimates the percentage of smokers who evade taxes, the size of tax evasion is estimated by taking into account the smoking intensity

of smokers who evade taxes and using them as weights. Both measures suggest that HR smokers are more prone to tax evasion activities.

The study finds that female smokers are relatively more likely to engage in tax evasion than male smokers (24.9 percent versus 10.5 percent, respectively) (Figure 2 and Table A9 in the Appendix).

Figure 2. *Female smokers are more likely than male smokers to use illicit cigarettes*

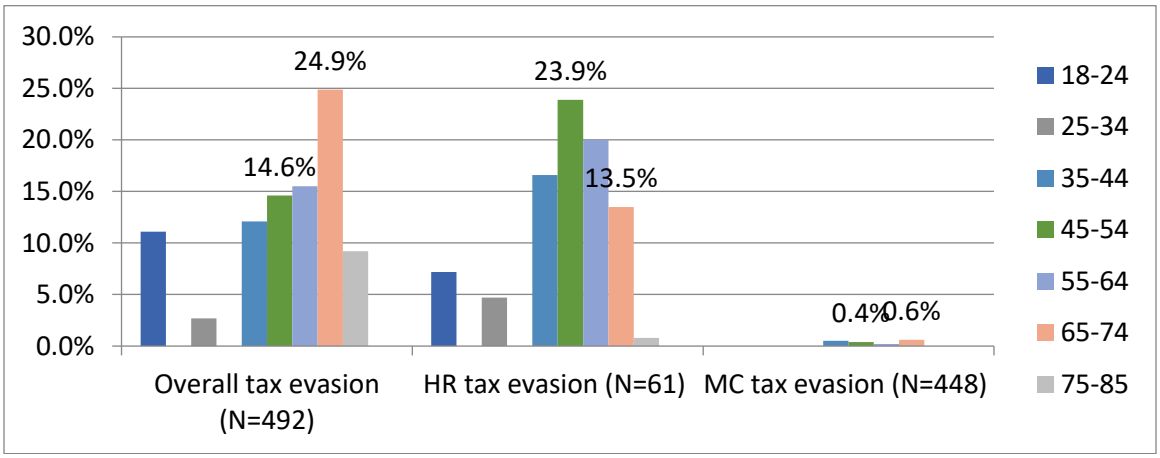


Source: Authors' own calculations based on STC-SEE for North Macedonia (2019)

According to age, smokers aged 65–74 have the highest prevalence of tax evasion for all types of cigarettes (24.9 percent) (

Figure **3**), while among HR tobacco smokers the prevalence of tax evasion is highest (23.9 percent) in the age group of 45–54 years. MC tax evasion is much smaller for every age group.

Figure 3. *Tax evasion is the highest among smokers aged 65–74*



Source: Authors' own calculations based on STC-SEE for North Macedonia (2019)

With respect to regional distribution, a relatively higher proportion of smokers in the region of Pelagonija tend to evade taxes (18.7 percent), which also happens to be where tobacco farming is concentrated. The smallest share of tax evasion is in Polog, in the west of North Macedonia (only 3.3 percent of smokers evade in this region). Within the HR market, the dominance of Skopje as a separate region is clear, as 34.4 percent of capital city HR smokers evade taxes (Table A9 in the Appendix).

Employment status is also relevant. Overall, more than one-fifth of unemployed and pensioner smokers evade taxes (22.6 percent and 21.3 percent, respectively), possibly due to budget constraints (**Error! Reference source not found.** and Table A9 in the Appendix). The situation is similar within the HR market, with 35 percent of HR unemployed smokers evading taxes. Regarding education levels, overall tax evasion is dominant among smokers with only a primary education, with 17.3 percent of them buying illicit packs (**Error! Reference source not found.** and Table A9 in the Appendix). The percentage share decreases by half for secondary school-educated smokers, and the lowest share is among highly educated smokers (4.1 percent). The situation is similar but more extreme in the HR market specifically, with 57.7 percent of primary school-educated HR smokers buying illicit packs.

Figure 4. *Unemployed smokers and pensioners are relatively more likely to use illicit cigarettes*

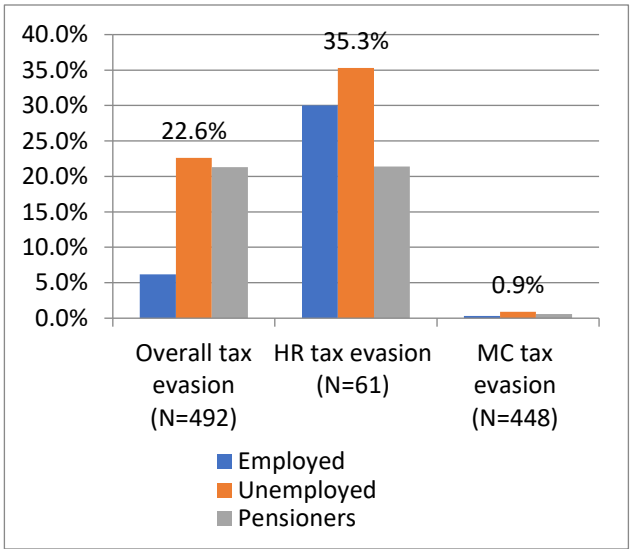
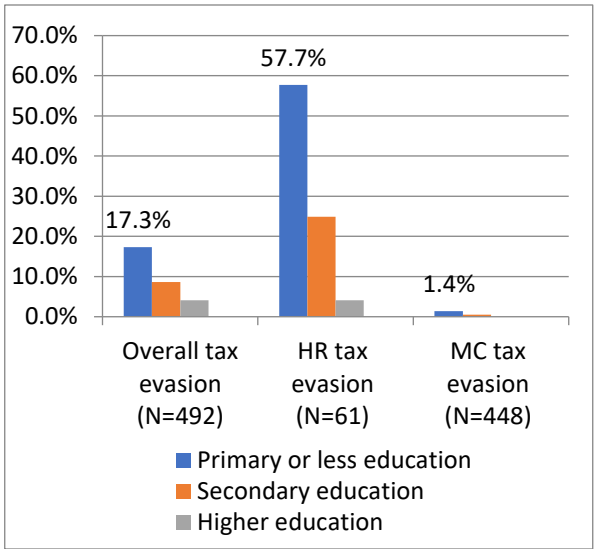


Figure 5. *Smokers with primary or less education are relatively more likely to evade taxes*

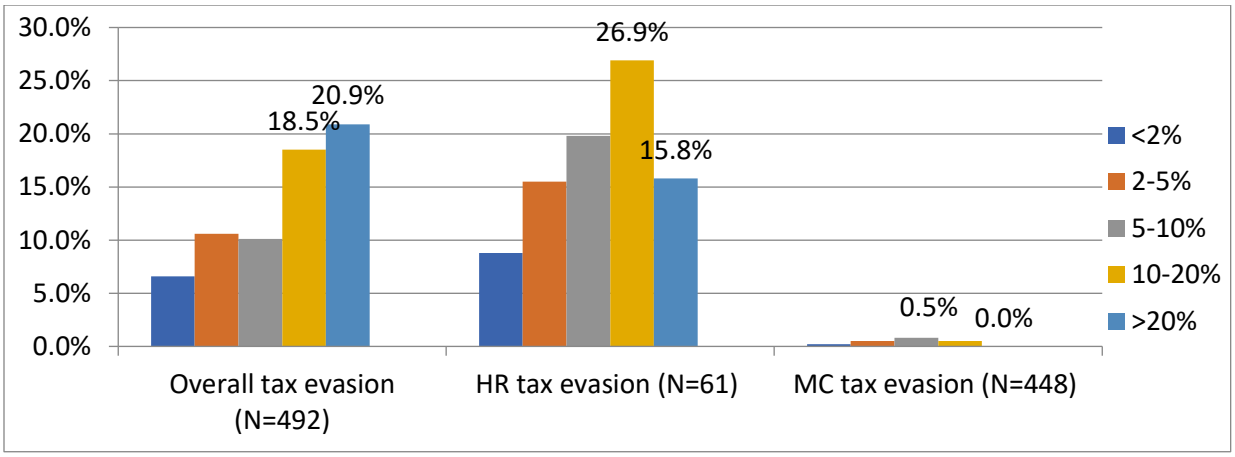


Source: Authors' own calculations based on STC-SEE for North Macedonia (2019)

The socioeconomic status of the household also plays a role in tax evasion behavior of smokers, especially in a traditional setting where the family bonds are relatively strong and different generations of a family live in one household and financially support each other. Overall, smokers with a larger share of monthly spending on cigarettes are more prone to tax evasion. Among the group that spends "more than 20 percent" of their budget on cigarettes, around one-fifth (20.9 percent) evade taxes (Figure 6 and Table A9 in the Appendix). Within the HR market, the highest

prevalence of tax evasion (26.9 percent) is recorded among smokers who spend between 10 and 20 percent of their monthly household income on cigarettes.

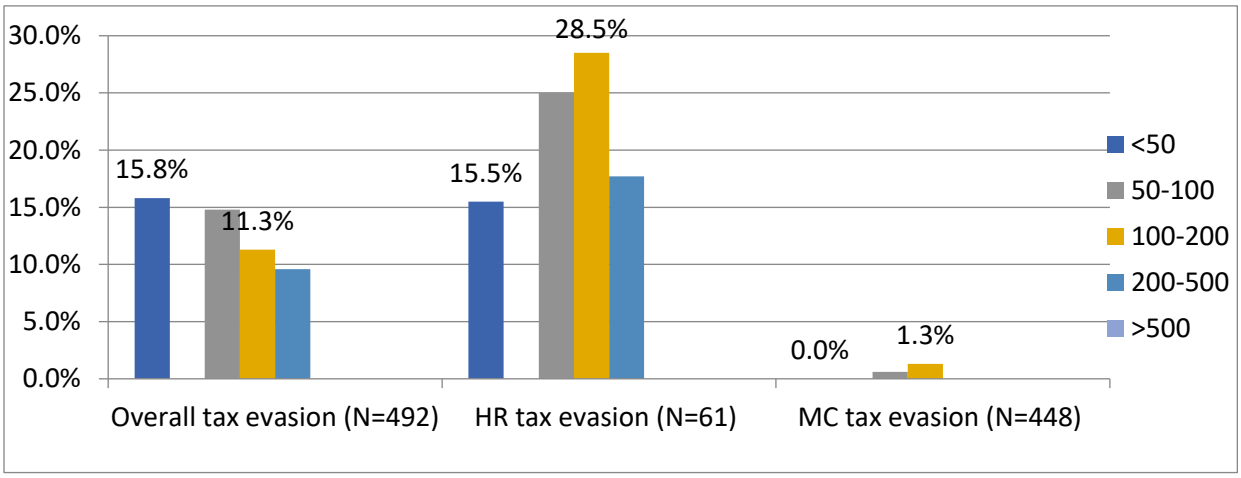
Figure 6. *Smokers with a higher percentage of spending on cigarettes are more likely to evade tax*



Source: Authors' own calculations based on STC-SEE for North Macedonia (2019)

Similarly, smokers with a monthly income below €50 per household member have the highest prevalence of tax evasion (15.8 percent), while prevalence decreases as the household income per member increases (Figure 7 and Table A9 in the Appendix). In the HR market, the highest prevalence of tax evasion is among smokers with household income per member of €50 to €100 per month and €100 to €200 per month (25 percent and 28.5 percent, respectively).

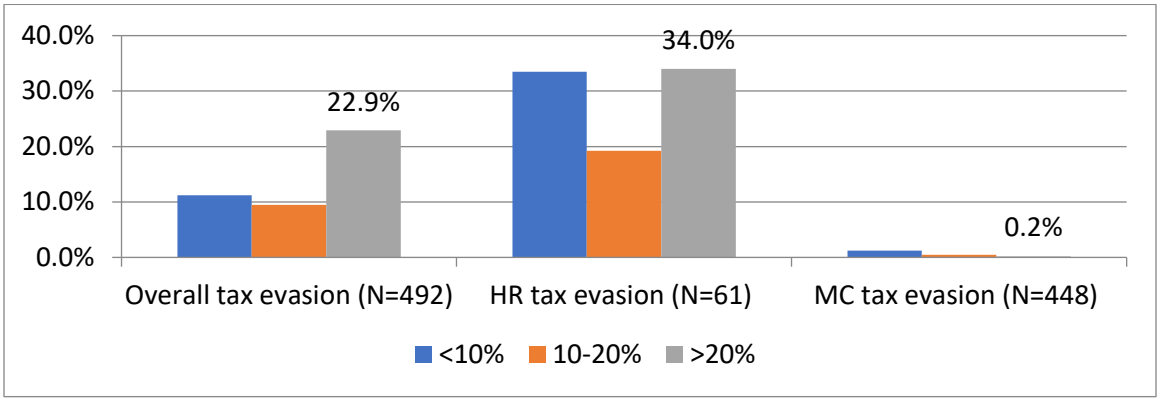
Figure 7. *Prevalence of tax evasion is the highest among smokers with the lowest household income per household member*



Source: Authors' own calculations based on STC-SEE for North Macedonia (2019)

Smokers who spend more than 20 percent of their personal income on cigarettes comprise the largest share of smokers who evade taxes (22.9 percent) (Figure 8 and Table A9 in the Appendix). This finding is even more pronounced among HR tobacco smokers, where 34 percent of HR smokers who spend more than 20 percent of their personal income on tobacco evade taxes.

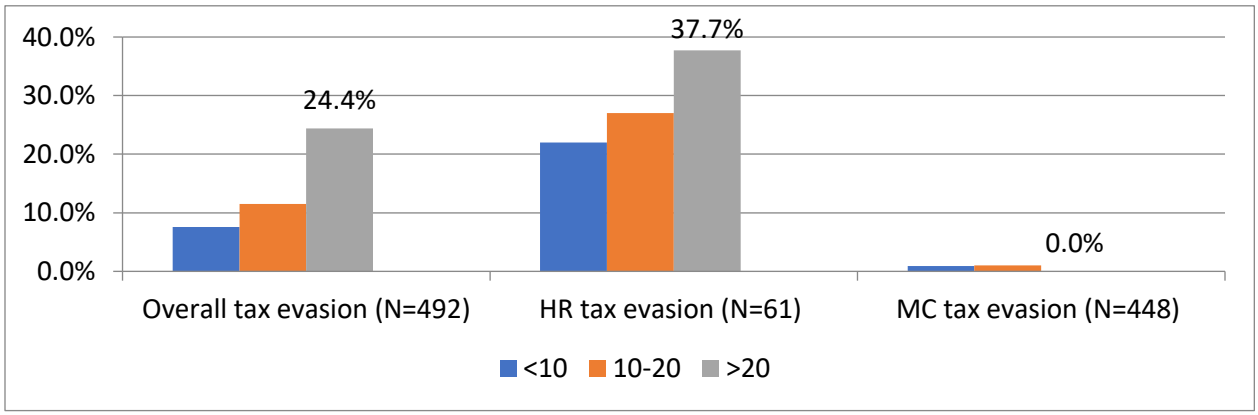
Figure 8. *Smokers who spend more than 20 percent of their personal income on cigarettes are more likely to evade taxes*



Source: Authors' own calculations based on STC-SEE for North Macedonia (2019)

Almost one quarter (24.4 percent) of heavy smokers who smoke more than 20 cigarettes per day evade taxes (Figure 9), and they are all HR smokers. That is, 37.7 percent of heavy HR smokers evade taxes (Table A9 in the Appendix).

Figure 9. *Smokers who smoke more than 20 cigarettes per day are more likely to evade taxes*



Note: The groups are light smoker (less than 10 cigarettes per day), medium smoker (10-20 cigarettes per day), and heavy smoker (more than 20 cigarettes per day).

Source: Authors' own calculations based on STC-SEE for North Macedonia (2019)

Tax evasion in HR

As mentioned above, overall tax evasion in North Macedonia is mainly dominated by HR cigarettes. Keeping in mind the predominance of tax evasion of HR tobacco, it should be noted that similar conclusions regarding socioeconomic characteristics for prevalence of tax evasion

among HR tobacco smokers can be drawn from the findings for "overall" evasion discussed above, though more details are available in Table A9 in the Appendix.

Most interviewed HR smokers purchased their last packs/pouches in the green or open air market or street (84.2 percent), without a tax stamp (74.8 percent), or without health warning labels (73.5 percent) (tables A10, A11, and A12 in the Appendix, respectively). More than 63 percent of illicit HR pouches met all four criteria for illicit status,[27] and 74.4 percent met three criteria (that is, place of purchase, inappropriate tax stamp, and inappropriate health warning labels) (Table A13 in the Appendix).

All of the above would suggest that the HR tobacco market is uncontrolled and takes place on the street or green markets, openly visible to passersby, children, and youth. After closer inspection of the photos of illicit HR pouches shown by the survey respondents, and after reviewing public official statements from Customs' and the Ministry of Internal Affairs' Reports, as well as the unofficial discussion with Customs' officials, some inference regarding the origin of this tobacco product can be made. Namely, it can be concluded that part of it comes from illegal imports from other countries, with a legal brand name and health warning labels in a foreign language or without any health warning. Meanwhile, another portion is packed in plain pouches, suggesting it is an unbranded tobacco mixture that possibly has come from undeclared imports in "yarma balas",[28] and has been repacked into smaller pouches. Sometimes even those smaller pouches are counterfeit, that is, made to look like they were packed and branded in a foreign country.[29] Finally, the third part is homegrown tobacco by domestic farmers who produce illegal tobacco.[30]

Tax evasion in MC

Within overall tax evasion in North Macedonia, MC represents a small share. In brief, 1.2 percent of MC smokers reported they purchased their last pack of MC in the green market, 0.6 percent did not have a tax stamp, and 0.2 percent did not have any health warning labels (tables A10, A11, and A12 in the Appendix, respectively). After checking for all criteria, only one MC pack brand was not registered in the Register of Brands. Only one pack was deemed illicit by the price threshold criterion of "less than 70 percent of the cheapest brand." Finally, all cases of illicit MC packs fulfilled one criterion of illicit status (Table A13 in the Appendix), with place of purchase dominating, with five in total of eight illicit MC packs. However, although these were bought on

[27] The four criteria are: illegal place of purchase, inappropriate tax stamp, inappropriate health warning label, and illegal brand.

[28] "Yarma bala" is defined as a packaging unit of unprocessed tobacco, packed in a wrapper of hemp or cotton cloth (Article 2, Law of Tobacco and tobacco products, 2019)

[29] According to an informal conversation with Customs officers, it was suggested that in many cases the smugglers counterfeit the pouches themselves in order to represent the HR tobacco as branded and already packed in a foreign country.

[30] All legal tobacco leaf production must be produced as part of a legal agreement with a tobacco buyer (Law of Tobacco and tobacco products, 2019). No tobacco leaves can be produced outside the Agreement arrangement. Usually, tobacco produced in North Macedonia, due to the peculiarities of the soil and its oriental type of small leaf tobacco, is used as spices in MC production and not as a ground mixture (Miceska and Dimitrieski, 2017). However, some families and farms do produce illegal tobacco, which is usually big leaf tobacco for ground mixture. Of course, this is forbidden by law as they do not have agreements with purchasing companies.

a green market, they did have a health warning label or tax stamp from North Macedonia. Keeping in mind the small number of illicit MC packs and the fact that sometimes they present contradictory characteristics of illicit status, no strong conclusions can be made about their origin. In general, they are mainly found in the southwestern region.

3.2. FACTORS AFFECTING PROBABILITY OF TAX EVASION OR AVOIDANCE

As mentioned above, multivariate logistic regression analysis was employed in order to empirically assess factors affecting probability of tax evasion, overall and by tobacco types. It should be noted that the model is heavily dominated by HR smokers' behavior, which is a specific weakness of the overall tax evasion estimation model. MC smokers are less likely to evade compared to HR tobacco smokers. According to the study results, male smokers and those living in the eastern part of the country are less likely to evade taxes than female smokers and smokers in other regions. Education matters, with higher-educated smokers demonstrating a lower probability to evade tax. According to employment status, unemployed smokers are more likely to evade taxes compared to employed smokers. Household income does not seem to affect tax evasive behavior in a statistically significant manner (Table A14 in the Appendix). Tables A15 through A17 in the Appendix show the results of tests performed on the chosen model.

Due to the lack of observations in the model for the MC market (8 observations out of 448), the specifications tested separately for MC had low explanatory power (Table A18 in the Appendix). According to the model of MC, unemployed and pensioner smokers are more likely to evade taxes compared to employed smokers. As with HR tobacco, household income does not seem to affect evasive behavior for MC smokers in a statistically significant manner. Finally, the probability to evade taxes increases with age, first with an increasing trend, and after with a decreasing trend. Tables A19 through A21 in the Appendix show the results of the tests performed on the chosen model. The model of the HR market exhibited a perfect prediction problem, as there were 53 positive outcomes out of 56 observations.

CHAPTER 4. DISCUSSION AND POLICY RECOMMENDATIONS

While the extent of tax avoidance might be minimal in "classic" tobacco products, a significant proportion of smokers uses illegal tobacco, mainly HR cigarettes, sold domestically at illegal places of purchase and without the appropriate tax stamp nor health warnings.

If government is concerned about the extent of tax evasion in North Macedonia but also for the Balkan region as a whole, there are many measures that can be implemented from a broader regional perspective as well as from a national level. Based on the findings, this study offers the following recommendations to the policy makers.

Immediate ratification and implementation of the Protocol to Eliminate Illicit Trade in Tobacco Products, which was signed by North Macedonia back in 2014, is necessary.

The Protocol, which aims to eliminate all forms of illicit trade, can be used as a guide in the creation of specific tobacco control measures. The Protocol to Eliminate Illicit Trade in Tobacco Products (2012)[31] requires establishing thorough control of the supply chain, launching national and/or regional tracking and tracing systems, and establishing a global information-sharing point located in the Convention Secretariat in order to limit illicit trade. Article 8 in the Protocol defines the rule that cigarette packages bear unique identification markings (containing essential information regarding the products), which will facilitate the tracking process. This is especially relevant for North Macedonia, as it is a large producer and exporter of tobacco leaves. Several practical steps towards securing the tobacco supply chain, as proposed by Balwicki et al. (2020), can be implemented in the case of North Macedonia such as levying excise tax on dry tobacco, requiring excise stamps on cured tobacco, and requiring cured tobacco dealers to report both purchase and sales as well as sales of the seed material. Even though the sale of tobacco crops is already legally limited to registered intermediary entities, inspection and control of domestic cultivation and production can be improved.

With respect to other measures proposed in the Protocol, several points that are particularly relevant to North Macedonia should be emphasized. Namely, introduction of licenses, which is stipulated in Article 6 of the Protocol, can be used as a specific instrument for controlling all the phases and economic agents involved in tobacco processing. This could be accompanied by imposing obligations for all the economic agents to follow strict and trackable security, financial, and record keeping measures to prevent the diversion of tobacco products into illicit trade channels.

Finally, the rules have no real meaning if they are not accompanied by appropriate criminal, civil, or enforcement procedures and sanctions when they are broken. Hence, significant improvement of institutional strength and law enforcement is required. The capacity of institutions such as customs, controls, inspection bodies, agencies for licensing, and police should

[31] In addition, the Protocol also requires introduction of other provisions to ensure control of the supply chain, such as licensing, due diligence, recordkeeping, and security and preventive measures, as well as measures in relation to internet- and telecommunication-based sales, duty-free sales, and free zones and international transit.

also be improved in order to execute all the obligations in the Protocol. In addition, the fight against corruption could also have positive effects on decreasing illicit trade in tobacco.

Article 6.2 of the WHO FCTC stipulates that each of the countries maintain measures that prohibit importation of duty-free products. North Macedonia can join these efforts by further limiting the duty-free allowance for cigarettes as many other countries have done. Borders are not a significant variable for tax evasion within North Macedonia, but they can be significant for outbound illicit trade. Hence, decreasing the porousness of the borders remains a significant goal in combating illicit trade.

All these measures require not only national but also coordinated regional efforts of the governments in SEE. Hence, cooperation throughout the SEE region is required, consistent with the respective domestic legal and administrative systems of the countries, in order to enhance the effectiveness of law enforcement actions to combat illegal trade in the region. In addition, transparent cooperation and communication within various government bodies in a country, as well as with relevant regional and international intergovernmental organizations, is needed in order to promote the effective implementation of illegal trade measures. From the regional perspective, price differentials of MC and HR between neighboring countries are significant. Those price differentials provide incentives for smokers from neighboring countries to purchase cigarettes (legal or illicit) in North Macedonia, which is the cheapest supplier in the region, as the survey data demonstrate.

Finally, this study's findings underline the need for independent monitoring on an on-going basis of the use, production, trade, manufacturing, and exporting of tobacco – using clearly defined methodology, surveys, and publicly available and verifiable data and results – for accurate and consistent analyses and evidence-based policy making.

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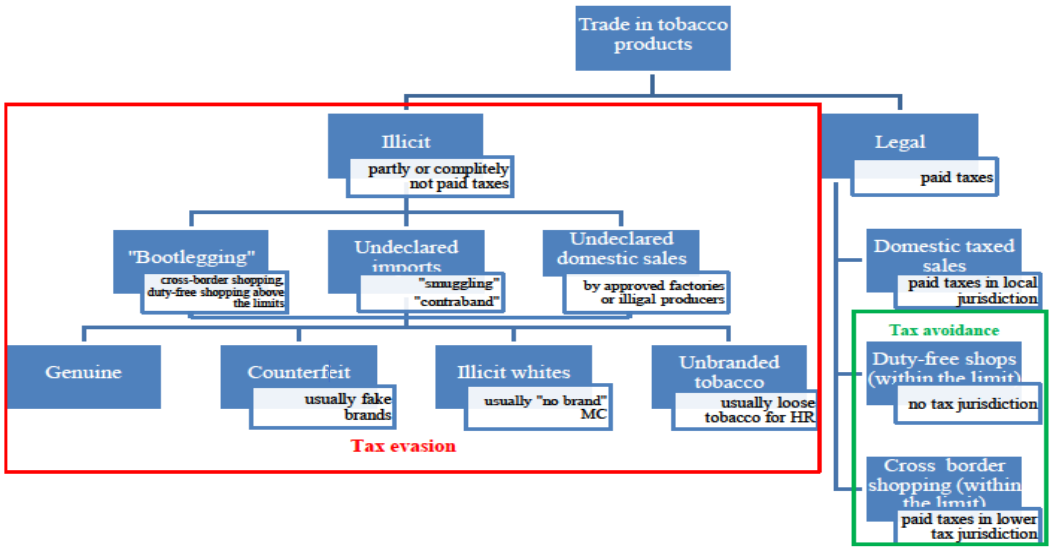
APPENDIX

BOX 1. MAIN DEFINITIONS

Trade in tobacco products encompasses all the acts or processes of buying, selling, or exchanging tobacco products, at either the wholesale or the retail level, within a country or one tax jurisdiction or between countries, among various tax jurisdictions.



Legal trade in tobacco products includes: domestic taxed sales, duty-free shopping within the allowable limit, and cross-border shopping within the allowable limit.

Illicit trade encompasses undeclared imports as well as undeclared domestic production.

Article 1 of the WHO FCTC defines illicit trade in tobacco products 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”.

- Undeclared import is the unlawful movement of tobacco products from one country or tax jurisdiction to another without payment of taxes or in breach of laws.
- Illicit domestic production is manufacturing of tobacco products in a tax jurisdiction that are not declared to the tax authorities. These products are sold without paying tax and may be manufactured in approved factories, and sold from a “back door,” or they may be manufactured in completely illegal factories.
- Bootlegging involves individuals or small groups who smuggle smaller quantities of cigarettes – taking advantage of price and tax differentials – for resale in higher price/tax jurisdictions. In fact, they abuse the legal privilege by not paying tax in the destination country. This can include individuals who import cigarettes in excess of national legal allowances for personal

use but also smaller groups who cross the borders almost daily and bring cigarettes in cartons to make extra income.

Both illegal imports and illegal domestic production can involve various types of tobacco products: genuine, counterfeit, illicit whites, and unbranded tobacco products.

- Genuine tobacco products are legal brands produced within one jurisdiction; however, if they are imported illegally without paying taxes or without paying all the taxes in/after production, they become illicit.
- Counterfeit tobacco products are manufactured illegally, usually with a fake famous trademark, and without paying taxes. They can be sold in the source country or smuggled in from another country.
- Illicit whites are usually brands that are not registered, and they can be produced locally or imported illegally without paying taxes. They can be smuggled across borders during their transit to the point of sale (often in a country with high tax rates) utilizing legal and informal distribution chains without payment of tax.
- Unbranded tobacco is sold as loose or fine-cut leaf tobacco (known in North Macedonia as "tutun"). It can be domestically produced or imported without paying taxes. It can have or not have a brand name or health warnings, and it is consumed in HR cigarettes or inserted into empty cigarette tubes.

Source: Ross & Blecher (2019)

Table A1. *Main criteria for identification of tax evasion or illicit packs (marked in yellow)/tax avoidance (marked in green)*

Starting points and relevant questions from STC-SEE	Relevant general legislation that directly or indirectly defines legal/illegal purchase (details on Laws provided in notes below)	Responses as given in STC-SEE	Relevant legislation vs given responses in STC-SEE	Creating the criteria of illicit pack
Place of purchase: **"Where did you buy it?"**	Articles 43 and 50 of Law of tobacco and tobacco products (2019) stipulate that the entity that trades tobacco and tobacco products needs to be legal, registered for trade of tobacco, either specialized or as part of its activity. Articles 44 and 49, further, forbid all manipulation of raw or fine-cut tobacco if not registered as a producer, importer, or exporter. Article 6 of the Law of trade stipulates that all retail activity can be done in designated rooms, shops, warehouses, and offices. With specific allowance, trade can be done in front of retail shops. However, this is not allowed for the tobacco products that cannot be placed in public places, such as streets, parks, open spaces, and green markets (Article 4 of Law for Protection against smoking). Article 28 of Law of Trade stipulates that the legal entity must have full evidential documentation of the goods, storage, and sales.	In grocery stores (small independent grocery stores, mini/super/hyper markets)	According to the Articles cited in column two in this table	Legal place of purchase
		In specialized tobacco shops	According to the Articles cited in column two in this table	Legal place of purchase
		In other countries (grocery, specialized shops, etc.)	Article 48 of Law of Excise stipulates that it is allowed to import tobacco products in personal luggage for personal use, within the allowed limit.	By Law it is a legal place of purchase.
				Tax avoidance: if purchase is in country with lower tax jurisdiction and within allowable limit
				Tax evasion: if purchase is in country with lower tax jurisdiction and if it is in excess of the allowable limit
		Duty-free shops	Article 48 in Law of excise allows import within the limit for personal use.	By Law it is a legal place of purchase.
				Tax avoidance: if purchase is within allowable limit

Starting points and relevant questions from STC-SEE	Relevant general legislation that directly or indirectly defines legal/illegal purchase (details on Laws provided in notes below)	Responses as given in STC-SEE	Relevant legislation vs given responses in STC-SEE	Creating the criteria of illicit pack
	Article 14 of the Law of Trade regulates sales on the green markets, where only tradesmen and agricultural producers registered in appropriate Registers can be allowed to sell. (However, this does not include tobacco producers, as they are forbidden to sell tobacco except to the registered buyers with whom they have agreements (Article 12 of the Law of Tobacco and tobacco products).			Tax evasion: if in excess of the allowable limit
		On the street, on the open green market, from independent/individual seller	According to the Articles cited in column two in this table	**Illicit place of purchase (tax evasion)**
		Nargile/shisha bar	Sales allowed by Law of protection against smoking (Article 4 Law of protection against smoking)	Legal place of purchase
		Café/restaurant/club/discothèque	Sales allowed by Law of protection against smoking (Article 4 Law of protection against smoking)	Legal place of purchase
		Other, where?	Online sale is allowed only through a tax representative within the country registered in the	Vending machines, sales by order, door-to-door – illegal places of purchase

Starting points and relevant questions from STC-SEE	Relevant general legislation that directly or indirectly defines legal/illegal purchase (details on Laws provided in notes below)	Responses as given in STC-SEE	Relevant legislation vs given responses in STC-SEE	Creating the criteria of illicit pack
			Customs - Article 43 and 44 Law of Excise (2019) Vending machines, by-order purchase of tobacco products, and door-to-door sales are forbidden by the Law of protection against smoking (Article 5, 5a)	Online – it is legal only from a representative that is registered within the country.
Tax stamp as a proof of paid tax: **"Did the packaging of manufactured cigarettes you last purchased have a tax stamp?"**	According to Article 87 from Law of Excise, all tobacco products must have a tax stamp with a specific serial number and marks issued by tax authorities. It is glued under the transparent layer in a way that it will be damaged in the first opening.	Local stamp		In accordance with Law
		Foreign stamp		Pack is not illicit if it has a foreign stamp, is bought in a foreign country, and imported within allowable limit.
				Illicit pack if it has foreign tax stamps that had been sold locally
		Stamp removed or destroyed	It can be destroyed on opening, which is actually recommended by Law.	Cannot be used for categorizing
		Lack of stamp		**Illicit pack -** It was bought domestically and without the compulsory tax stamp
		Does not know/remember		Cannot be used for categorizing
		Refused to answer		

Starting points and relevant questions from STC-SEE	Relevant general legislation that directly or indirectly defines legal/illegal purchase (details on Laws provided in notes below)	Responses as given in STC-SEE	Relevant legislation vs given responses in STC-SEE	Creating the criteria of illicit pack
Health warning label: **"Did the packaging of manufactured cigarettes you last purchased have health warnings?"**	Articles 68, 71, and 72 from the Law of tobacco and tobacco products (2019) stipulate that all tobacco products must have a health warning – The Articles provide detailed information on the size, font, positioning of the letters in the general andin the additional warning label as well as detailed information of the photo used as a warning label. Also, the size and visibility is strictly defined. This is also compulsory in Article 6 of the Law for protection from smoking (2018)	Health warning in local language		In accordance with Law
		Health warning in foreign language		Not illicit if it has foreign health warning label, is bought in a foreign country, and imported within allowable limit
				Illicit pack if it has foreign health warning that had been sold locally*
		No health warning		**Illicit pack** – It did not have the appropriate health warning at all or it was not in the Macedonian or Albanian language*
		Does not know/remember		Cannot be used for categorizing
		Refused to answer		Cannot be used for categorizing
Price of purchase: **"How much did you pay for it in €?"**	Articles 83 and 88 in Law of excise stipulates that the retail price must be reported in Ministry of Economy and Customs, to be registered and published in Official Gazette by producer or importer and cannot be decreased. In addition, Law forbids discounts or sales of	Exact sum in EUR		It is an illicit pack if it is bought domestically and its price was below the threshold of 70% of the lowest retail price (Joossens et al., 2014)

Starting points and relevant questions from STC-SEE	Relevant general legislation that directly or indirectly defines legal/illegal purchase (details on Laws provided in notes below)	Responses as given in STC-SEE	Relevant legislation vs given responses in STC-SEE	Creating the criteria of illicit pack
	all tobacco products. They must be sold in the original retail package (pack or pouch).	Missing value – Does not know		Cannot be used for categorizing
Brand of MC/HR: **"What brand of MC/HR did you buy the last time you purchased cigarettes for yourself?"**	Article 51 from Law of tobacco and tobacco products stipulates that the brand has to be registered in order to be in trade.	List of brands from the official Register of brands published on the Ministry of Economy web site Other – inserted by the interviewer		It was bought domestically and its brand is not registered in the Register of Brands in NMK, as published on the website of the Ministry of Economy.

Notes: Tax evasion criteria is marked orange, and tax avoidance criteria is marked green. * The Law allows for health warning label in Albanian language as it is spoken by 20% of the population.

Source: Based on STC-SEE data for North Macedonia (2019)

1. Law of Trade (2013, consolidated and cleaned text) – Official Gazette No. 157/13) http://www.economy.gov.mk/Upload/Documents/%D0%97%D0%90%D0%9A%D0%9E%D0%9D%20%D0%A2%D0%A0%D0%93%D0%9E%D0%92%D0%98%D0%88%D0%90%20.pdf (accessed: 02/10/2020)
2. Law of tobacco and tobacco products (2019)– Official Gazette of Republic of Macedonia No. 98/2019 published on: 21.05.2019 – website accessed: https://dejure.mk/zakon/zakon-za-tutun-proizvodi-od-tutun-i-srodni-proizvodi (accessed: 02/10/2020)
3. Law for protection from smoking (2018) - Official Gazette No. 36/1995, (27.07.1995) changes in 2003, 2004, 200, 2008, 2010, 2011, 2013, 2018) consolidated text from website: https://dejure.mk/zakon/zakon-za-zashtita-od-pushenjeto (accessed: 02/10/2020)
4. Law of Excise (2019) Official Gazette No. 108, published on 28.5.2019. (accessed: 02/10/2020)

Table A2. *Variables used in the descriptive statistics and modeling procedure*

Name of variable	Definition	Additional explanation
Gender	Female = 0, Male = 1	Dummy variable
Age	Age of the respondents	(in years)
Age group	18-24, 25-34, 35-44, 45-54, 55-64, 65-74, 75-85, >85	Categorical variable
Employment status	Unemployed, pensioner, employed	Categorical variable
Type of residence	Urban = 1, rural = 0	
Household income (in €), divided into categories as in STC-SEE	Less than 200, 201-300, 301-400, 401-500, 501-600, ,601-700, 701-800, 801-900, 901-1000, 1001-1200, 1201-1400, 1401-1600, 1601-1800, >1800	Categorical variable. Missing values were imputed by the use of simple regression imputation method and predictive values of household income.
Household income (in €), divided into three categories	Low - less than 400 Medium - 401-800 High - more than 800	Categorical variable. Imputed predictive values for missing values.
Household income per member (in €), categorized into five groups	less than 50 50-100 100-200 200-500 over 500	Categorical variable. Monthly household income is divided by household members. In addition, missing values were imputed.
Personal income (in €), divided into categories as in STC-SEE		Categorical variable. Again, missing values were retained by similar regression model imputing method.
Personal income (in €), divided into three categories	Low - less than 200 Medium - 201-400 High - more than 400	Categorical variable
Education level	Primary or less Secondary education Higher education	Categorical variable
Smoking status	Daily = 1 Less than daily = 0	Dummy variable
Tobacco type	MC = 1, HR = 0	Dummy variable
Smoking intensity	≤10 light smoker 11–20 medium smoker ≥21 heavy smoker	Categorical variable. Amount of cigarettes smoked per day
Attempts to quit smoking	Yes = 1, No = 0	Dummy variable for attempt to quit smoking in the past year.
Region	East, West, and Central	
Border	Municipality = 1 if border with Albania, Kosovo, and Serbia; 0 otherwise	Dummy variable. Municipalities bordering EU countries – Bulgaria and Greece, which have higher taxes and legal prices on tobacco products than

Name of variable	Definition	Additional explanation
		SEE also took value of zero. Border variables proved to be insignificant in all specifications, which was expected considering the fact that North Macedonia has the lowest prices of tobacco products in the region.
Border (alternative)	Distance in km	A variable measuring the distance from each municipality to the closest border with lower prices (no country in the case of North Macedonia)
Border (alternative)	Price difference weighted with distance	$Price\ difference = \frac{domestic\ price - neig}{Distance\ (domestic\ municip}$ (again not applied since there is no lower MC price country in the region)

Source: Authors' own compilation

Table A3. *Prices per pack (20 cigarettes) of MC in selected countries of Western Balkans (2019, in €)*

Country	Cheapest brand	Most-sold brand
Albania	1.61	(1) 1.94; (2) 2.58*
Bosnia and Herzegovina	2.30	2.40
Kosovo	1.68	2.05 (Lucky Strike)
Montenegro	1.90	2.30
North Macedonia (source:	1.30	1.54 (BOSS)
Serbia	1.70	2.10

Notes: *According to official Albanian data the most-sold brand was Marlboro, which is €2.58. However, according to WHO, the most-sold brand in 2018 in Albania was Karelia.

Source: Kosovo: retail store (as prices are regulated, price of a brand is identical across the country). Other countries: local Official Gazette or Customs Office.

Table A4. *Percentage of current smokers who did and did not show their last-purchased pack of MC and HR tobacco*

Show/did not show	MC (N=448)		HR (N=61)	
	Percentage (95% CI)		Percentage (95% CI)	
Did show	78.1	(74.1, 81.8)	68.2	(56.6, 79.4)
Did not show	20.4	(16.8, 24.2)	24.0	(15.1, 36.4)

Source: Authors' own calculations based on STC-SEE data for North Macedonia (2019)

Table A5. *Percent distribution of ever smokers of HR tobacco, by reasons of smoking HR*

Possible answers (N=492)	Percentage (95% CI)	
They taste better	2.4	(1.3, 4.1)
They are less expensive	23.2	(19.6, 7.0)
They are less harmful	2.5	(1.3, 4.1)
I smoke(d) less HR	5.7	(3.9, 8.0)
I smoked once/twice, just to try	5.0	(3.4, 7.3)
Refused to answer	0.0	
Other	0.7	(0.3, 1.9)

Notes: Answers includes all current smokers who had/have tried or smoked HR in life.

Source: Authors' own calculations based on STC-SEE data for North Macedonia (2019)

Table A6. *Prevalence of tax avoidance and evasion by type of cigarettes*

Within MC market (N=448)		
	Percentage (95% CI)	
Tax-paid purchase in domestic jurisdiction	97.9	(96.4, 99.0)
Tax evasion	1.9	(0.8, 3.3)
Tax avoidance	0.6	(0.2, 1.8)
Within HR cigarettes market (N=61)		
	Percentage (95% CI)	
Tax-paid purchase in domestic jurisdiction	13.3	(6.4, 23.2)
Tax evasion	86.7	(76.8, 93.6)
Tax avoidance	0	

Source: Authors' own calculations based on STC-SEE data for North Macedonia (2019)

Table A7. *Size of tax avoidance and evasion, by type of cigarettes*

Within MC market (N=448)		
	Percentage (95% CI)	
Tax-paid purchase in domestic jurisdiction	97.7	(97.2, 99.1)
Tax evasion	1.7	(0.9, 2.8)
Tax avoidance	0.6	(0.2, 1.4)
Within HR cigarettes market (N=61)		
	Percentage (95% CI)	
Tax-paid purchase in domestic jurisdiction	11.9	(8.9, 18.4)
Tax evasion	88.1	(79.6, 91.1)
Tax avoidance	0	

Source: Authors' own calculations based on STC-SEE data for North Macedonia (2019)

Table A8. *Percentage distribution of current MC smokers who avoid tax, by selected demographic and socioeconomic characteristics*

MC (N=448)			
		Percentage (95% CI)	
Gender	Male	0.0	
	Female	0.6	(0.2, 1.8)
Age category	18-24	0.0	
	25-34	0.3	(0.0, 1.0)
	35-44	0.2	(0.0,1.0)
	45-54	0.0	
	55-64	0.1	(0.0, 0.6)
	65-74	0.0	
	75-85	0.0	
Type of residence	Urban	0.1	(0.0, 0.6)
	Rural	0.5	(0.1, 1.4)
Regions	Vardar	0.0	
	Eastern	0.0	
	Southwestern	0.0	
	Southeastern	0.2	(0.0, 1.0)
	Pelagonia	0.0	
	Polog	0.0	
	Northeastern	0.3	(0.0, 1.0)
	Skopje	0.1	0.0, 0.6)

MC (N=448)			
		Percentage (95% CI)	
Education level	Primary school	0.4	(0.1, 1.4)
	Secondary school	0.2	(0.0, 1.0)
	High education		
Work status	Employed	0.2	(0.0, 1.0)
	Unemployed	0.4	(0.1, 1.4)
	Pensioners	0.0	
Cigarette expenditure as % of personal income	<10%	0.3	(0.0, 1.0)
	10-20%	0.3	(0.0, 1.0)
	>20%	0.0	
Cigarette expenditure as % of household income	<2%	0.2	(0.0, 1.0)
	2-5%	0.4	(0.1, 1.4)
	5-10%	0.0	
	10-20%	0.0	
	>20%	0.0	
Smoking status	Daily	0.0	
	Less than daily	0.6	(0.2, 1.8)
Smoking intensity (daily number of cigarettes)	<10	0.4	(0.1, 1.4)
	10-20	0.2	(0.0, 1.0)
	>20	0.0	
Average monthly household income by household member (€)	<50	0.0	
	50-100	0.3	(0.0, 1.0)
	100-200	0.0	
	200-500	0.3	(0.0, 1.0)
	>500	0.0	

Notes: *No avoidance was identified among HR smokers.
Source: Authors' own calculations based on STC-SEE data for North Macedonia (2019)

***Table A9**. Percentage distribution of current MC smokers who evade tax, by selected demographic and socioeconomic characteristics*

		Overall (MC+HR evasion) (N=492)		HR (N=61)		MC (N=448)	
		Percentage (95% CI)					
Gender	Male	10.5	(7.4, 14.5)	42.7	(30.8, 55.1)	1.1	(0.4, 2.4)
	Female	14.9	(10.6, 20.5)	44.0	(32.3, 56.8)	0.8	(0.3, 2.1)
Age category	18-24	11.1	(3.5, 22.0)	7.2	(2.3, 14.8)	0.0	
	25-34	2.7	(0.8, 7.3)	4.7	(1.4, 12.5)	0.0	
	35-44	12.1	(6.9, 20.0)	16.6	(8.8, 27.1)	0.5	(0.1, 1.4)
	45-54	14.6	(9.4, 22.5)	23.9	(15.1, 36.4)	0.4	(0.1, 1.4)
	55-64	15.5	(8.7, 23.8)	20.0	(11.2, 30.9)	0.2	(0.0, 1.0)
	65-74	24.9	(14.1, 39.1)	13.5	(6.4, 23.2)	0.6	(0.2, 1.8)
	75-85	9.2	(1.9, 55.8)	0.8	(0.2, 7.4)	0.0	
Settlement type	Urban	11.3	(8.1, 15.5)	45.0	(32.3, 56.8)	1.2	(0.4, 2.4)
	Rural	13.5	(9.6, 18.8)	41.7	(29.3, 53.5)	0.7	(0.2, 1.8)
Regions	Vardar	15.3	(5.7, 28.5)	8.8	(3.2, 17.0)	0.0	
	Eastern	3.5	(1.2, 10.7)	4.2	(1.4, 12.5)	0.0	
	Southwestern	16.9	(8.4, 27.7)	9.8	(4.2, 19.2)	0.7	(0.2, 1.8)
	Southeastern	12.9	(5.9, 23.4)	10.5	(4.2, 19.5)	0.2	(0.0, 1.0)
	Pelagonia	18.7	(9.2, 32.1)	10.7	(5.3, 21.2)	0.3	(0.0, 1.0)
	Polog	3.3	(0.6, 9.4)	3.5	(0.7, 10.1)	0.0	
	Northeastern	12.2	(4.4, 27.0)	4.8	(1.4, 12.5)	0.2	(0.0, 1.0)
	Skopje	16.5	(10.9, 23.4)	34.4	(23.4, 46.9)	0.4	(0.1, 1.4)
Education level	Primary or less	17.3	(12.8, 22.3)	57.7	(44.9, 69.2)	1.4	(0.6, 2.7)
	Secondary	8.6	(5.4,	24.9	(15.1,	0.5	(0.1,

			13.5)		36.4)		1.4)
	Higher	4.1	(0.7, 10.3)	4.1	(0.7, 10.1)	0.0	
Work status	Employed	6.2	(3.9, 9.4)	30.0	(19.2, 41.7)	0.3	(0.0, 1.0)
	Unemployed	22.6	(16.0, 31.4)	35.3	(23.4, 46.9)	0.9	(0.3, 2.1)
	Pensioners	21.3	(13.3, 31.6)	21.4	(12.5, 32.8)	0.6	(0.2, 1.8)
Cigarette expenditure as % of personal income	<10%	11.2	(7.6, 15.9)	33.5	(22.0, 45.1)	1.2	(0.4, 2.4)
	10-20%	9.5	(5.7, 15.4)	19.2	(11.2, 30.9)	0.5	(0.1, 1.4)
	>20	22.9	(16.9, 28.5)	34.0	(23.4, 46.9)	0.2	(0.0, 1.0)
Cigarette expenditure as % of household income	<2%	6.6	(2.8, 13.1)	8.8.	(3.2, 17.0)	0.2	(0.0, 1.0)
	2-5%	10.6	(5.8, 17.7)	15.5	(7.6, 25.2)	0.5	(0.1, 1.4)
	5-10%	10.1	(5.8, 15.3)	19.8	(11.2, 30.9)	0.8	(0.2, 1.8)
	10-20%	18.5	(11.6, 26.6)	26.9	(16.5, 38.2)	0.5	(0.1, 1.4)
	>20%	20.9	(11.8, 35.1)	15.8	(8.8, 27.1)	0.0	
Smoking status	Daily	10.4	(4.1, 18.9)	4.5	(1.4, 12.5)	0.8	(0.3, 2.1)
	Less than daily	12.5	(9.7, 15.9)	82.2	(71.0, 90.0)	1.1	(0.4, 2.4)
Smoking intensity (daily number of cigarettes)	<10	7.6	(4.5, 11.5)	22.0	(12.5, 32.8)	0.9	(0.3, 2.1)
	10-20	11.5	(7.5, 16.7)	27.0	(16.5, 38.2)	1.0	(0.4, 2.4)
	>20	24.4	(16.6, 33.8)	37.7	(26.3, 50.2)	0.0	
Average monthly household income by household member (EUR)	<50	15.8	(7.7, 25.6)	15.5	(7.6, 25.2)	0.0	
	50-100	14.8	(9.4, 22.0)	25.0	(15.1, 36.4)	0.6	(0.2, 1.8)
	100-200	11.3	(7.4, 16.2)	28.5	(17.8, 40.0)	1.3	(0.6, 2.7)
	200-500	9.6	(5.3, 16.4)	17.7	(10.0, 29.0)	0.0	
	>500	0.0		0.0		0.0	

Source: Authors' own calculations based on STC-SEE data for North Macedonia (2019)

Table A10. *Percentage distribution of HR and MC smokers, by place of purchase of their last purchased pack*

Place of purchase	HR (N=61)		MC (N=448)	
	Percentage (95% CI)			
In grocery stores (small independent grocery stores, mini/super/hyper markets)	6.5	(2.5, 16.1)	96.6	(94.6, 98.0)
In specialized tobacco shops	6.0	(1.5, 13.6)	0.9	(0.3, 2.1)
In other countries (grocery stores, specialized tobacco shops, etc.)	3.3	(0.7, 11.0)	0.4	(0.1, 1.4)
Duty-free shops	0.0		0.8	(0.2, 1.8)
On the street, on the open market, from an independent/individual seller	84.2	(72.7, 91.7)	1.2	(0.4, 2.5)
Nargile/Shisha bar	0.0		0.0	
Café/Restaurant/Club/Discotheque	0.0		0.1	(0.0, 1.1)
Other	0.0		0.0	

Source: Authors' own calculations based on STC-SEE data for North Macedonia (2019)

Table A11. *Percentage distribution of HR and MC current smokers, by tax stamp on their last-purchased pack*

Tax stamp	HR (N=61)		MC (N=448)	
	Percentage (95% CI)			
Local stamp	13.9	(7.0, 5.2)	94.1	(91.6, 96.0)
Foreign stamp	3.6	(0.7, 11.0)	2.4	(1.2, 4.0)
Stamp removed or destroyed	0.9	(0.0, 4.4)	2.0	(1.0, 3.7)
Lack of stamp	74.8	(62.6, 84.9)	0.6	(0.2, 1.8)
Does not know/Does not remember	6.8	(2.5, 16.1)	0.9	(0.3, 2.1)
Refused to answer	0.0		0.1	(0.0, 1.1)

Source: Authors' own calculations based on STC-SEE data for North Macedonia (2019)

Table A12*. Percentage distribution of HR and MC current smokers, by health warning label on their last-purchased pack*

Health warning	HR (N=61)		MC (N=448)	
	Percentage (95% CI)			
Health warnings in local language	17.8	(9.6, 29.4)	94.3	(91.9, 96.7)
Health warnings in foreign language	1.7	(0.2, 8.0)	5.0	(3.2, 7.3)
No health warnings	73.5	(60.7, 83.4)	0.2	(0.0, 1.1)
Does not know/Does not remember	7.0	(2.5, 16.1)	0.4	(0.1, 1.4)
Refused to answer	0.0		0.1	(0.0, 1.1)

Source: Authors' own calculations based on STC-SEE data for North Macedonia (2019)

Table A13. *Percentage distribution of illicit MC and HR packs, by the number of illicit criteria*

	Two criteria				Three criteria		Four criteria
Criteria*	**Illegal place of purchase and inappropriate tax stamp**	**Inappropriate tax stamp and inappropriate health warning label**	**Illegal place of purchase and inappropriate health warning label**	**Illegal place of purchase and price below the threshold****	**Illegal place of purchase, inappropriate tax stamp, and inappropriate health warning label**	**Illegal place of purchase, inappropriate tax stamp, and price below the threshold**	**Illegal place of purchase, inappropriate tax stamp, inappropriate health warning label, and illegal brand**
	Percentage (95%CI)						
HR (N=53)	77.7 (64.8, 87.0)	75.7 (62.8, 85.5)	74.4 (60.7, 84.0)	N/A	74.4 (60.7, 84.0)	N/A	63.1 (48.8, 74.4)
MC (N=8)***	No MC packs fulfilled more than one criterion according to the data.						

Notes: *The explanation of criteria in this table is given in a shortened version. For more precise definitions of each of the five criteria see Table A1 in this Appendix. **For HR, price below 70% criteria as defined in Table A1 could not be applied, due to the reasons given in the text in the Data and methodology section. ***For MC, the sample size for illicit packs is small; hence data should be taken with caution. As mentioned, five criteria were used for determining illicit packs. However, no cases for either MC or HR meet all five criteria.

Source: Authors' own calculations based on STC-SEE data for North Macedonia (2019)

Table A14. *Estimation results for overall evasion (MC and HR)*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	**Dependent variable (tax evasion)**								
Male	-0.302	-0.343	-0.284	-0.252	-0.491	-0.264	-1.259**	-1.247**	-1.223**
	(0.439)	(0.418)	(0.418)	(0.426)	(0.453)	(0.408)	(0.577)	(0.597)	(0.574)
Age 25-34		-1.350	-1.229	-1.323	-1.575	-1.205	-0.590	-0.490	
		(1.147)	(1.142)	(1.133)	(1.068)	(1.137)	(1.522)	(1.723)	
35-44		0.562	0.630	0.578	0.224	0.667	0.914	0.992	
		(1.000)	(1.001)	(0.978)	(1.002)	(1.000)	(1.481)	(1.647)	
45-55		0.445	0.533	0.459	0.145	0.565	1.095	1.174	
		(1.004)	(1.005)	(0.995)	(1.006)	(1.021)	(1.497)	(1.678)	
55-64		0.393	0.447	0.436	0.000619	0.466	-0.467	-0.384	
		(0.955)	(0.968)	(0.960)	(0.954)	(0.975)	(1.277)	(1.405)	
65-74		0.742	0.762	0.713	0.515	0.761	0.0920	0.132	
		(1.082)	(1.116)	(1.107)	(1.082)	(1.124)	(1.443)	(1.519)	
75-85		-0.296	-0.0974	0.128	-0.172	-0.136	-1.164	-1.141	
		(1.144)	(1.207)	(1.296)	(1.097)	(1.202)	(1.586)	(1.618)	
Border (dummy)	-0.323	-0.372							
	(0.541)	(0.538)							
Secondary education	-0.536	-0.587*							-0.299
	(0.348)	(0.322)							(0.485)
Higher education	-1.015**	-0.925**							-1.776**
	(0.415)	(0.402)							(0.897)
Unemployed	1.413**	1.402**	1.384**	1.437**	1.297**	1.401**	1.305**	1.324**	1.230**
	(0.581)	(0.602)	(0.598)	(0.605)	(0.603)	(0.577)	(0.633)	(0.653)	(0.594)
Pensioners	1.069	0.897	0.951	0.924	0.813	0.972	1.428*	1.462*	1.075
	(0.717)	(0.627)	(0.614)	(0.618)	(0.628)	(0.591)	(0.770)	(0.805)	(0.772)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	**Dependent variable (tax evasion)**								
Household income (medium) (400-800	-0.328	-0.376	-0.437	-0.494	-0.660	-0.416	-0.818	-0.787	-0.783
€)	(0.533)	(0.560)	(0.573)	(0.568)	(0.588)	(0.548)	(0.572)	(0.520)	(0.522)
(High) (>800 €)	-1.174	-1.286	-1.234	-1.225	-1.659	-1.194	-0.554	-0.534	-0.546
	(0.948)	(0.965)	(0.950)	(0.939)	(1.102)	(0.944)	(1.155)	(1.173)	(1.106)
Residence	-0.0737	-0.0838	-0.0488	-0.0139	0.133	-0.0781	0.0979	0.0728	-0.167
	(0.365)	(0.386)	(0.373)	(0.380)	(0.377)	(0.389)	(0.635)	(0.644)	(0.597)
West	-0.509	-0.389	-0.572	-0.536	-0.439	-0.579	0.281	0.276	0.204
	(0.495)	(0.482)	(0.389)	(0.395)	(0.399)	(0.395)	(0.572)	(0.576)	(0.556)
East	-1.037***	-0.876**	-0.865**	-0.893**	-0.899**	-0.868**	-1.044*	-1.050*	-1.160*
	(0.386)	(0.383)	(0.372)	(0.375)	(0.372)	(0.377)	(0.618)	(0.621)	(0.611)
Age	0.108								0.161
	(0.102)								(0.152)
Age squared	-0.000941								-0.00170
	(0.00104)								(0.00159)
Education (years)			0.155	0.155	0.151	0.155	0.222	0.218	
			(0.106)	(0.109)	(0.0956)	(0.109)	(0.143)	(0.142)	
Education squared (years)			-0.0112**	-0.0111*	-0.0100*	-0.0114**	-0.0170**	-0.0169**	
			(0.00553)	(0.00569)	(0.00551)	(0.00571)	(0.00853)	(0.00847)	
Smoking status (daily, less)				0.546					
				(0.424)					
Number of cigarettes					0.00536***			-0.000716	
					(0.00163)			(0.00266)	

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	**Dependent variable (tax evasion)**								
Expenditure on cigarettes						-0.0129			
						(0.0369)			
Tobacco type							-5.475***	-5.532***	-5.267***
(MC vs. HR)							(0.640)	(0.757)	(0.628)
Constant	-4.266	-1.653	-2.208	-2.691	-2.521*	-2.126	2.346	2.428	-0.307
	(2.727)	(1.366)	(1.516)	(1.649)	(1.481)	(1.570)	(2.123)	(2.112)	(3.775)
Observations	528	528	528	528	528	528	528	528	528
aic	343.2	343.3	343.4	344.1	333.7	345.2	211.2	213.1	210.5
bic	403	420.1	415.9	421	410.6	422	288.1	294.2	270.2
r2_p	0.139	0.161	0.155	0.158	0.187	0.155	0.521	0.522	0.502
ll	-157.6	-153.6	-154.7	-154.1	-148.9	-154.6	-87.61	-87.57	-91.23

Notes: The unweighted sample size is 531. In the modeling in Stata command [iweight=weight] was used, and the results refer to a weighted sample. The sample size is even smaller (528) due to missing values in the education variable.

Source: Authors' own calculations based on STC-SEE data for North Macedonia (2019)

Table A15. *Link test for chosen model 9 for overall tax evasion (MC and HR)*

	Model 9			
	Coef.	Std. Err.	z	P>z
_hat	1.01	0.145	6.98	0.000
_hatsq	0.006	0.045	0.15	0.882
_cons	-0.02	0.298	-0.06	0.951

Source: Authors' own calculations based on STC-SEE data for North Macedonia (2019)

Table A16*. Hosmer and Lemeshow goodness of fit test (MC and HR)*

Model 9	Group (5) table	Group (10) table
observations	528	528
groups	5	10
chi2	3.83	8.74
p	0.2805	0.2722

Source: Authors' own calculations based on STC-SEE data for North Macedonia (2019)

Table A17. *Multicollinearity (MC and HR)*

Variable	Coefficient	Tolerance	R-Squared
Gender	1.09	0.9169	0.0831
Age	39.25	0.0255	0.9745
Age squared	39.8	0.0251	0.9749
Border	1.36	0.7359	0.2641
Household income (medium)	1.32	0.7548	0.2452
Household income (high)	1.34	0.745	0.255
Residence	1.15	0.8702	0.1298
Region (West)	1.67	0.5999	0.4001
Region (East)	1.37	0.7323	0.2677
Education	9.47	0.1056	0.8944
Education squared	9.78	0.1023	0.8977
Smoking status (daily, less than daily)	1.46	0.6839	0.3161
Expenditure on cigarettes	3.6	0.2774	0.7226
Smoking intensity (number of cigarettes)	3.39	0.2953	0.7047
Mean VIF	8.29		

Source: Authors' own calculations based on STC-SEE data for North Macedonia (2019)

Table A18. *Estimation results for tax evasion (MC)*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
VARIABLES	Dependant variable (MC tax evasion)									
Male	0.256	0.192	0.372	0.120	0.657	0.724	0.372	0.657	0.364	0.519
	(0.693)	(0.632)	(0.769)	(0.726)	(0.842)	(0.846)	(0.769)	(0.842)	(0.676)	(0.702)
Border	-1.250	-1.904**								
	(0.970)	(0.826)								
Secondary education	-0.715	-0.818							-0.681	
	(0.925)	(0.810)							(0.907)	
Higher education										
Employment status (Unemployed)	2.244**	2.782***	2.525***	2.393**	2.867**	3.019***	2.525***	2.867**	2.325**	2.272**
	(0.995)	(1.043)	(0.952)	(1.067)	(1.155)	(1.150)	(0.952)	(1.155)	(0.994)	(1.014)
Pensioners	1.771	0.915	1.459	1.243	1.769	1.847	1.459	1.769	1.985**	2.153**
	(1.080)	(1.304)	(1.161)	(1.234)	(1.305)	(1.338)	(1.161)	(1.305)	(0.985)	(1.017)
Household income (medium) (400-800	-0.0599	0.249	0.188	0.658	0.564	0.638	0.188	0.564	-0.129	0.000668
€)	(0.984)	(1.109)	(1.026)	(1.182)	(1.254)	(1.231)	(1.026)	(1.254)	(0.953)	(0.959)
(High) (>800 €)	0.811	1.373	1.684	1.947	1.832	1.846	1.684	1.832	1.084	1.373
	(1.511)	(1.730)	(1.673)	(1.914)	(1.843)	(1.855)	(1.673)	(1.843)	(1.436)	(1.547)
Residence	0.518	0.577	0.469	0.102	0.261	0.211	0.469	0.261	0.464	0.554
	(0.769)	(0.887)	(0.815)	(0.927)	(0.868)	(0.931)	(0.815)	(0.868)	(0.725)	(0.700)
West	0.604	0.704	0.163	0.0535	-0.0108	-0.0297	0.163	-0.0108	0.291	0.247
	(0.713)	(0.892)	(0.891)	(0.831)	(0.941)	(0.942)	(0.891)	(0.941)	(0.753)	(0.733)
East	-0.558	-0.558	-0.507	-0.140	-0.485	-0.489	-0.507	-0.485	-0.524	-0.524
	(1.074)	(1.193)	(1.163)	(1.076)	(1.187)	(1.210)	(1.163)	(1.187)	(1.084)	(1.038)
Age (years)	0.288***								0.313***	0.376***
	(0.0958)								(0.0925)	(0.121)
Age squared (years)	-0.00268**								-0.00294***	-0.00356***
	(0.00116)								(0.00104)	(0.00117)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
VARIABLES	Dependant variable (MC tax evasion)									
Education (years)			0.104	0.0515	0.133	0.121	0.104	0.133		0.128
			(0.169)	(0.175)	(0.181)	(0.185)	(0.169)	(0.181)		(0.213)
Education squared (years)			-0.0159	-0.0119	-0.0196	-0.0191	-0.0159	-0.0196		-0.0198
			(0.0137)	(0.0122)	(0.0165)	(0.0161)	(0.0137)	(0.0165)		(0.0173)
Smoking status (daily, less)				-1.808**						
				(0.876)						
Number of cigarettes					-0.00686*			-0.00686*		
					(0.00362)			(0.00362)		
Expenditure on cigarettes						-0.121**				
						(0.0538)				
Age 25-34		-	-	-	-	-	-	-		
35-44		-0.494	-0.271	-0.811	0.0513	0.120	-0.271	0.0513		
		(1.233)	(0.999)	(1.034)	(1.056)	(1.106)	(0.999)	(1.056)		
45-55		-1.761	-1.077	-1.444	-0.884	-0.811	-1.077	-0.884		
		(1.451)	(1.435)	(1.449)	(1.469)	(1.491)	(1.435)	(1.469)		
55-64		-2.015**	-1.293	-2.064**	-1.077	-1.090	-1.293	-1.077		
		(0.881)	(0.944)	(0.892)	(0.964)	(0.934)	(0.944)	(0.964)		
65-74		-	-	-	-	-	-	-		
75-85		-	-	-	-	-	-	-		
Constant	-12.45***	-3.778	-3.837*	-1.792	-3.539	-3.448	-3.837*	-3.539	-13.21***	-14.14***
	(2.802)	(2.320)	(2.225)	(2.516)	(2.316)	(2.449)	(2.225)	(2.316)	(2.842)	(3.907)
Observations	382	301	362	362	362	362	362	362	382	478

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
VARIABLES	Dependant variable (MC tax evasion)									
aic	92.4	87.09	89.53	87.98	90.19	89.33	89.53	90.19	91.82	92.01
bic	143.7	139	144	146.4	148.6	147.7	144	148.6	139.2	146.2
R2_p	0.18	0.211	0.197	0.243	0.214	0.226	0.197	0.214	0.162	0.207
LL	-33.2	-29.5	-30.76	-28.99	-30.09	-29.66	-30.76	-30.09	-33.91	-33

Notes: The unweighted sample size is current MC smokers, that is 481, while after weighting it is 448. In the modeling in Stata command [iweight=weight] was used for estimations, and the results refer to a weighted sample. The sample size is even smaller in most of the specifications due to fact that some groups within a categorical variable, such as education or age groups, predicted failure perfectly, and hence those observations were not used for estimation. In the chosen model missing values in the education variable decreased the sample size for three observations.

Source: Authors' own calculations based on STC-SEE data for North Macedonia (2019)

Table A19. *Link test for chosen model 10 for MC tax evasion*

	Model 10			
	Coef.	Std. Err.	z	P>z
_hat	1.71	0.840	2.04	0.041
_hatsq	0.098	0.101	0.97	0.333
_cons	1.089	1.517	0.72	0.473

Source: Authors' own calculations based on STC-SEE data for North Macedonia (2019)

Table A20. *Hosmer and Lemeshow goodness of fit test for MC tax evasion*

Model 10	Group (5) table	Group (10) table	Group (20) table	Group (50) table	Group (100) table
observations	478	478	478	478	478
groups	5	9	19	47	93
chi2	8.53	13.90	18.82	41.21	78.74
p	0.0362	0.0530	0.338	0.6331	0.8167

Source: Authors' own calculations based on STC-SEE data for North Macedonia (2019)

Table A21. *Multicollinearity MC tax evasion*

Variable	Coefficient	Tolerance	R-Squared
gender	1.10	0.907	0.093
age	43.33	0.0231	0.9769
age2	43.77	0.0228	0.9772
border	1.48	0.6769	0.3231
Household income (medium)	1.44	0.6945	0.3055
Household income (high)	1.47	0.6803	0.3197
residence	1.17	0.8529	0.1471
Region (West)	1.94	0.5157	0.4843
Region (East)	1.47	0.6803	0.3197
Education	9.55	0.1047	0.8953
Education squared	10.24	0.0976	0.9024
Smoking status) daily, less than daily	1.12	0.8905	0.1095
Expenditure on cigarettes	7.12	0.1405	0.8595
Smoking intensity (number of cigarettes)	7.22	0.1384	0.8616
Mean VIF	9.46		

Source: Authors' own calculations based on STC-SEE data for North Macedonia (2019)