



tobaccotaxation

Economic Research Informing Tobacco Tax Policy



**Accelerating Progress on Tobacco Taxes
in Low-and-Middle Income Countries**

Research on Economics of Tobacco and Tobacco Taxation

National Study: CROATIA



**University of Split
Faculty of Economics, Business and Tourism
Split , 2018**

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Foreword

Smoking prevalence in Croatia remains among the highest in Europe. Comprehensive tobacco control policies that include higher tobacco taxes and prices, clean indoor air laws, and bans on tobacco marketing are effective in both preventing youth from starting to smoke and encouraging smokers to quit.

In this monograph, we have collected the results of the research carried out in Croatia within the International Scientific Project *Accelerating Progress on Effective Tobacco Tax Policies in Low- and Middle-Income Countries*. The project is funded by the University of Illinois at Chicago's Institute for Health Research and Policy through its partnership with the Bloomberg Philanthropies, and it is the first of this kind in Croatia. The Institute of Economic Sciences from Belgrade, Serbia is coordinating a regional network of researchers. The following partner institutions are taking part in this research: Institute of Economic Sciences (Serbia), Development Solutions Associates - DSA Center (Albania), University of Banja Luka (Bosnia and Herzegovina), Faculty of Economics, Business and Tourism of the University of Split (Croatia), Centre for Political Courage - CPC (Kosovo), Analytica (Macedonia), and Institute for socio-economic analyses - ISEA (Montenegro).

The project aims at fostering research and policy dialogue on tax reforms concerning tobacco consumption and formulating clear and achievable policy responses to reduce tobacco consumption in the region. Policy dialogue among all relevant stakeholders on efficient tax policies is an important aspect of creating a national tobacco control policy. The short-term goal of such co-operation is to put tobacco taxation issues on the political agenda, to create a dialogue between researchers and decision-makers, and to develop recommendations that will result in sustainable and systematic policy change. The long-term goal is to create an effective

tobacco control policy and to develop a strategic plan to reduce the damage caused by the use of tobacco in Croatia.

We hope that the published materials within this book will provide insight and thus a better understanding of tobacco market and tobacco consumption characteristics in Croatia. These findings will hopefully provide opportunities to improve tax policy, primarily by further increasing excise duties on tobacco products, which should ultimately result in increased tax revenues, healthcare savings, and improving the health of the population.

Split, December 2018

Editor

Professor Željana Aljinović Barać, PhD

Executive Summary

In 2017 economic situation in Croatia was stable with increased economic activity supported by favorable EU and global economic environment. The Croatian tobacco market is oligopolistic - controlled by few global companies dictating market conditions. Domestic producer Tvornica duhana Rovinj (TDR) was the leading independent cigarette manufacturer in Central Europe with a market leading position in Croatia and a position of scale in Bosnia and Serbia over the decade, until September 2015, when it was acquired from Adris Grupa by British American Tobacco (BAT). After takeover, the BAT became the market leader in Croatia with a share of around 58.5 percent and together with Philip Morris International that held 34.5 percent of market share in 2015, they could significantly affect the market conditions. Smoking and consequently the demand for tobacco products have been slowly declining in popularity in Croatia due to continuously more restrictive tobacco regulations. Croatia became a Party to the WHO Framework Convention on Tobacco Control (WHO FCTC) on October 12, 2008. Furthermore, by joining EU in 2013, Croatia adopted EU regulations so the Directive 2014/40/EU was incorporated in the national acts. Tobacco and related products are covered under several laws and regulations and Croatian government through Ministry of Finance - Customs Administration provides the framework for the effective tobacco taxation which is an important element of tobacco control. The prevalence of smoking in Croatia measured by number of smokers has stabilized over time and shows a slight decline in recent years. With regard to consumption of tobacco products by category, sales of cigarettes still accounts for more than 95 percent of overall annual volume sales. While total cigarettes volume sales continue to decline, value sales are rising at the same time due to increased prices. Although public opinion on smoking in Croatia has changed over time, with growing number of smokers considering to quit and decreasing social acceptance of smoking, the smoking rates of about 30 percent or one third of the total adult population are still quite high.

The results of the research carried out within this project indicate that in Croatia the demand for tobacco is price-sensitive. The aggregate time-series analysis suggests that a 10 percent increase in prices would result on the average reduction in long-term demand for cigarettes of 6.1 percent. The income elasticity is also

negative, suggesting that a 10 percent increase in income would lead from 3.9 to 9.1 percent decrease in the long run cigarette consumption. However, since time series analysis is strongly limited by the number of available annual observations these estimations should be taken with a great caution. Therefore, cigarette price elasticity and income elasticity are also estimated using household budget survey (HBS) data. Results of HBS analysis are considered to be more reliable because the amount of data so provided is much greater (i.e. thousands of observations) than from time series (i.e. eighteen years). Estimated results of analysis based on Deaton's (1988) model indicate that a 10 percent increase in cigarette price would lead to a 10.7 percent decrease in cigarette consumption. Furthermore, a 10 percent income increase would raise cigarette consumption by 9.1 percent. For example, annual consumption of cigarettes in Croatia in 2017 was estimated to be 309 million cigarette packs and the weighted average price of a pack of cigarettes was 3.60 EUR. Specific excise was 26 percent of the average retail price, ad valorem excise 34 percent and VAT 20 percent of retail price. Accordingly, if we assume that in the next year Croatian GDP will increase by 2.8 percent and cigarette prices will stay unchanged, then we can expect an increase in cigarette consumption by 2.55 percent and the same percentage of increase of tax revenues. However, according to our model estimations if specific excise increases by 10 percent, this would lead to 0.51 percent decrease in cigarette consumption but total tax revenues would increase by 3.2 percent (total excise revenues growth of 3.50 percent and VAT revenues growth of 2.34 percent).

Based on the evidence from our research cigarette price policy could be used as a very effective government tool for reducing tobacco use Croatia. The government should increase taxes on tobacco and related products, especially in the part of specific excise duties in order to raise their price, so tobacco products will become less affordable over time. Moreover, increased excise duties should result in increased budget tax revenues, healthcare savings, and improving the health of the population. Collected budget funds should be target located to the healthcare system and education system to compensate negative effects and costs caused by smoking. Also, a commitment to regional harmonization of fiscal policies is needed to limit incentives for cross-border transactions, both with European Union countries as well as with western Balkan countries, because Croatia is highly threatened by illicit trade and illicit import of tobacco and related products due to its geo-communication position.

1. Introduction

The Republic of Croatia is geographically situated in southeastern part of Europe. With the surface area of 56,594 km² it is 127th country in the world according to size. This area is populated by 4.1 million of inhabitants, which ranks Croatia on 126th place in the world by population. The greatest population concentration is in the capital city of Croatia, Zagreb, where 18 percent of the population lives today. However, from the middle part of the 20th century Croatia has been facing the depopulation as birth rate has been constantly falling and death rate has been rising simultaneously. With the average population density of 73.8 per km, Croatia is one of the more sparsely populated European countries.

According to the World Bank country classifications by income level, Croatia belongs to Europe and Central Asia region and has been assigned in upper-middle income category, which means that average Gross National Income (GNI) per capita ranges from 3,301 EUR (3,956 USD) to 10,209 EUR (12,235 USD). However, as of July 1 2018, the new thresholds for classification by income were determined for the World Bank's 2019 fiscal year and Croatia has been moved from upper-middle to high-income category with the average GNI higher than 10,059 EUR (12,055 USD) (<https://blogs.worldbank.org/opendata/new-country-classifications-income-level-2018-2019>). Some basic information about Croatia in 2017 are presented in Table 1.1.

Table 1.1. Croatia country profile (2017)

| | |
|------------------------------------|--------------------------------|
| Region | Europe and Central Asia |
| Income Category (2017-2018) | Upper-middle |
| Population (proj., 000) | 4,125 |
| Surface area (sq km) | 56,594 |
| Capital city population | Zagreb; 802,338 |

Source: <https://data.worldbank.org>; https://www.dzs.hr/eng/Publication/cro_in_fig.htm

In 2017, economic situation in Croatia was stable, with increased economic activity supported by favorable European Union (EU) and global economic environment. Croatia enjoys a fairly stable inflation rate in the recent years that tended to decrease. In 2017, the average inflation rate in Croatia amounted to about 1.1 percent compared to the previous year.

The Gross Domestic Product (GDP) in Croatia was worth 44.114 billion EUR in 2017 and the GDP per capita recorded in Croatia in same year was 11,880 EUR. After six-year recession and negative economic growth, Croatia has finally returned to the positive growth from 2015, with GDP growth rate of 1.6 percent, 3.0 percent and 2.8 percent till 2017, respectively. In July 2013, in the midst of recession, Croatia became a member of the EU. Access to the EU single market has helped Croatian economy in recovery, so positive trend of GDP growth rate is expected to prevail in the future years. Nevertheless, GDP growth will probably slow down to predicted value of 2.6 percent in 2018, following an expected fall in private consumption due to the end of the favorable tax reform effects and slowing wage growth (<https://www.worldbank.org/en/country/croatia/overview#3>).

The economic recovery resulted in rising employment, which coupled with high levels of out-migration, led to a notable decline in the unemployment rate. According to the Labor Force Survey (LFS), unemployment rate in Croatia is constantly decreasing in the last four years, so the average annual number of unemployed persons has decreased to 193,967 in 2017 from 328,187 noted in 2014. In observed period employment rate and average number of persons in employment are continuously increasing, as expected. The average annual number of employed persons has increased to 1,407 thousand in 2017 from 1,342 thousand recorded in 2014.

The average monthly gross wage was approx. 1,040 EUR between 2012 and 2016 and has increased to amount of 1,080 EUR per person employed in 2017. However, it is important to note that the changes in gross wages are not equal to trends of net wages. According to the Croatian chamber of economy (<https://www.hgk.hr/english/average-annual-wages-growth-najava>), growth of gross wages was faster than the net salary growth because of the impact of the changes in income tax rates and thresholds of taxable income. Moreover, since the 2016, the dynamics of wages growth is not comparable to previous years, due to the change in methodology or due to the transfer to the new source of data (JOPPD form) which ensures a more complete coverage of the wages data compared to the earlier statistical research (RAD-1 form).

All these facts described above, especially recession and unemployment are main causes of poverty in Croatia. The at-risk-of-poverty rate for 2017 is not available but

obtained data show that approx. 20 percent of people in Croatia, or every fifth person was living in households where the equalized total disposable household income is below the at-risk-of-poverty threshold.

Overview of Croatian economic profile in the 2012-2017 period is presented in Table 1.2.

Table 1.2. Croatia economy outlook

| Macroeconomic indicators | 2012 | 2014 | 2015 | 2016 | 2017 |
|--|-------------|-------------|-------------|-------------|-------------|
| Gross domestic product, in millions EUR | 44,022 | 43,416 | 45,251 | 46,309 | 44,114 |
| Gross domestic product, per capita, EUR | 10,312 | 10,249 | 10,586 | 11,161 | 11,880 |
| Gross domestic product, real growth, in % | -2.2 | -0.1 | 1.6 | 3.0 | 2.8 |
| Average consumer prices inflation | 3.4 | -0.2 | -0.5 | -1.1 | 1.1 |
| Number of unemployed persons, average | 324,324 | 328,187 | 285,906 | 241,860 | 193,967 |
| Unemployment rate according to the LFS (in %) | 15.9 | 17.3 | 16.2 | 13.1 | 11.2 |
| Gross wages (average monthly, in EUR) | 1,046 | 1,042 | 1,055 | 1,030 | 1,080 |
| Employment rate according to the LFS (in %) | 43.2 | 43.3 | 44.2 | 44.6 | 45.8 |
| Persons in employment, average in 000 | 1,395 | 1,342 | 1,356 | 1,390 | 1,407 |
| At risk of poverty rate (in %) | 20.4 | 19.4 | 20.0 | 19.5 | n/a |

Source: <https://data.worldbank.org>; https://www.dzs.hr/eng/Publication/cro_in_fig.htm

The Croatian tobacco market is oligopolistic - controlled by few global companies dictating market conditions. Domestic producer Tvornica duhana Rovinj (TDR) was the leading independent cigarette manufacturer in Central Europe with a market leading position in Croatia and a position of scale in Bosnia and Serbia over the decade, until September 2015, when it was acquired from Adris Grupa by British

American Tobacco (BAT). Besides TDR, BAT has also bought all tobacco sector companies of Adris Grupa (raw tobacco producer Hrvatski duhani, packaging producer Istragrafika and retail chains e-Novine and Oprese) for a total enterprise value of 550 million EUR (<http://www.bat.com/newsrelease>). After takeover, BAT became the market leader in Croatia with a share of around 58.5 percent and together with Philip Morris International that holds 34.5 percent of market share in 2015, can significantly affect market conditions (Bajo and Jurinec, 2016). Detailed tobacco market structure is shown in Figure 1.1.

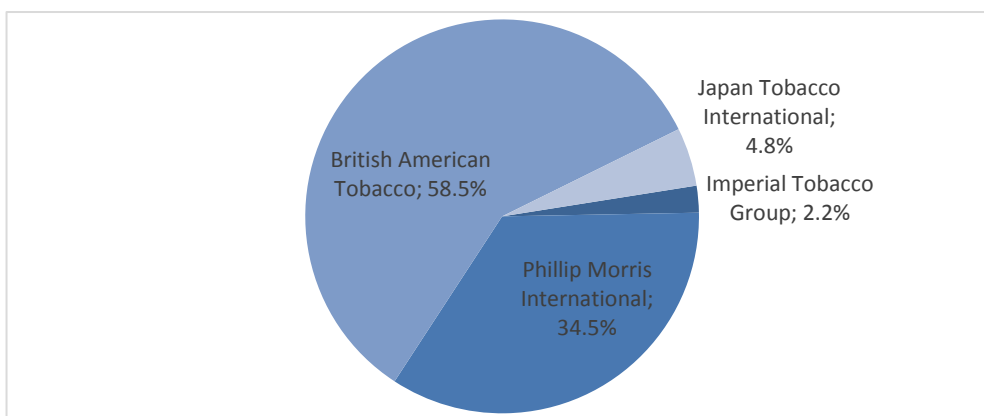


Figure 1.1. Croatian tobacco market shares structure in 2015

Source: Adapted from Nielsen, 2015 in Bajo and Jurinec, 2016

According to Euromonitor (2017) research, cigarettes continue to dominate as tobacco products in Croatia, accounting for more than 95 percent of overall volume sales. While cigarettes volume sales continue to decline, value sales are rising at the same time due to increased prices. However, Euromonitor (2018) notes that tobacco companies active in Croatia have reported negative net income for the first time. Usually a very lucrative business despite high taxation, tobacco reports losses because of the negative financial result for the leader BAT Hrvatska doo.

Another specificity of Croatian tobacco market is frequent changes of tobacco regulations, especially in the process of its joining to EU in 2013. To become a member of the EU, Croatia was supposed to meet the Copenhagen criteria and implement EU rules and regulations in all areas, which caused frequent changes to laws and regulations on tobacco and related products in order to harmonize the Croatian regulatory framework with EU rules. This applies in particular to the

minimum rates and amounts of excise duty that Croatia, as well as all other member states should apply.

EU member states have agreed on common EU rules to make sure that excise duties are applied in the same way and to the same products throughout the EU, which helps to prevent trade distortions in the Union single market, ensures fair competition and reduces administrative burdens for companies.

In the end, it is important to mention financial meltdown of Croatian agro-food giant Agrokor in March 2017. In the retail sector, Agrokor has two companies in Croatia: Konzum - chain of grocery stores which is the biggest retailer in Croatia and Tisak - a network of 1,300 outlets mostly newspapers kiosks, that is also among the five biggest retailers. When the scandal emerged, Moody's and S&P's downgraded Agrokor's rating because of its heavily indebtedness. After that, number of Agrokor's subsidiaries had solvency problems. In 2017, indebtedness of Konzum was 98.88 percent and 80.37 percent for Tisak (Njavro et al., 2018). Given that Agrokor (i.e. Konzum and Tisak) is one of the strongest retail channel for tobacco products, the potential consequences of this financial scandal for tobacco companies and tobacco market in general, are clear: tobacco companies are suppliers whose payments had been delayed for months so they cannot be safe of possible liquidity and solvency problems caused by the heavy indebtedness of Agrokor.

2. Supply of tobacco products (Paško Burnač, PhD)

Practices and policies affecting the production of raw tobacco and the manufacture of cigarettes and other tobacco products can have an important effect on the characteristics and patterns of tobacco product use. Trends in economics and market structure of tobacco growing and tobacco product manufacturing can also impact tobacco control efforts. However, tobacco control policies targeting the supply side of the market are less widely used than those targeting the demand side. Thus, less is known about the impact of these policies on tobacco use. In addition, the increasing role of low- and middle-income countries in global tobacco growing and tobacco product manufacturing has raised new challenges for tobacco control policy.

Most of the policy-relevant economic research on tobacco in Croatia has focused on the arguments in the cigarette demand function (Goel and Budak, 2007). The literature has addressed how policy variables directly influence smoking by individuals (Zelenika, 2009). There is another domain in which economic issues arise and economic analysis has produced important understanding: how policy effects on the economic welfare of the industry indirectly influence smoking and health. So, it is important to examine these two issues, each of which has been raised in the course of the social debate on the economic and health consequences of tobacco. The first involves economic policy intended to benefit the agricultural sector of the Croatian tobacco industry: how the regulation of domestic tobacco growing affects the price and quantity of tobacco grown, and through this channel influences the price and consumption of cigarettes. The second issue addresses the broad question of how tobacco industry affects employment and the trade balance.

The first part of this chapter discusses the role of tobacco farming, and the second part covers the related subject of production of tobacco products. The subjects of tobacco-related employment is discussed in detail in the third part, and exporting and importing manufactured tobacco in the fourth part of this chapter. We conclude this chapter with the most recent trends in the tobacco industry.

2.1. Tobacco farming

Tobacco farming takes place on approximately 4.2 million hectares (10.5 million acres) of land in 124 countries around the world, with low and middle income countries accounting for about 92 percent of world production (The Economics of Tobacco and Tobacco Control, 2016, p. 353). More than 80 percent of the world's tobacco is produced in only 10 countries, with upper middle-and-lower middle-income countries responsible for most production, whether measured by volume or share of area. The People's Republic of China, India, and Brazil account for almost two-thirds of total tobacco production. The European Union, if treated as a single entity, would be the sixth-largest tobacco producer.

Most tobacco-growing operations are small family farms, averaging less than one hectare in many countries, where family members are an integral part of the labor force. Although tobacco farmers often grow other crops either for their own consumption or for sale, the livelihood of many tobacco farmers depends on tobacco crops.

The volume of tobacco production has risen from 1995 to 2012 at the world level, from 6,285,959 tons of tobacco in 1995 to 7,490,661 tons in 2012. The quantities of tobacco produced increased at the same time in Croatia, from 8,548 to 11,800 tons, according to Food and Agriculture Organization of the United Nations (FAOSTAT) data. In the European Union production has almost halved, with 456,306 falling to 244,953 tones (Table 2.1).

Table 2.1. Quantity of tobacco produced in tons

| YEAR | WORLD | EU | CROATIA |
|------|-----------|---------|---------|
| 1995 | 6,285,959 | 456,306 | 8,548 |
| 2000 | 6,737,541 | 448,494 | 9,714 |
| 2005 | 6,757,733 | 438,046 | 9,579 |
| 2010 | 6,892,832 | 266,624 | 8,491 |
| 2012 | 7,490,661 | 244,953 | 11,800 |

Source: FAOSTAT, according to Tušek: *Analysis of the tobacco market in Croatia*, 2016, p. 30

If the data of the Association of Croatian tobacco producers – *Krupan list* (Tušek, 2016) are analyzed, in Croatia in the observed ten-year period, the highest amount of tobacco was produced in 2009 on 6,093 hectares, while in 2016 the production

fell to 4,623 hectares (Figure 2.1). According to the announcement of the abolition of tobacco production subsidies in 2017, the Association estimates that the production of tobacco will halve in the following years.

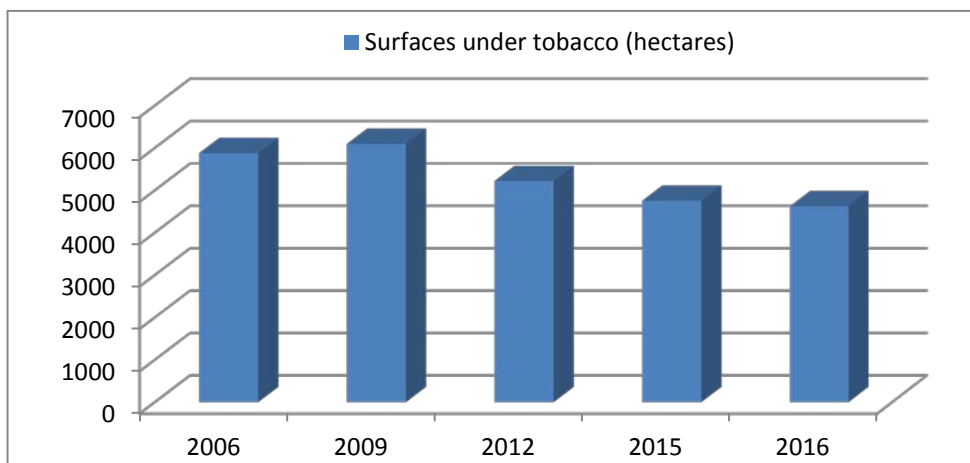


Figure 2.1. Surfaces under tobacco (hectares) in Croatia, 2006 -2016

Source: Association of Croatian tobacco producers – Krupan list, according to Tušek: Analysis of the tobacco market in Croatia, 2016, p. 28

The tobacco production subsidies have been a source of contention within the public health community for years, with most health professionals believing that the subsidies encourage tobacco growing and thereby smoking. The subsidies to farmers and craftsmen in Croatia amounted to 487 million EUR in 2016 (<http://www.mfin.hr/hr/proracun>) which represents approximately 3 percent of total budget expenditures but the problem is that there are no disaggregated data, so it is difficult to determine which portion of these subsidies refers to the tobacco industry.

As for tobacco production in Croatia, 2009 was the year when 13.3 million kilograms of tobacco were produced. Since then, production has declined year-on-year (with the exception of 2011), so in 2016 it reached 9 million kilograms of tobacco (Figure 2.2). Given the announced abolition of subsidies for tobacco production, an additional reduction in production is expected in 2018 and 2019, as a large number of manufacturers could give up production.

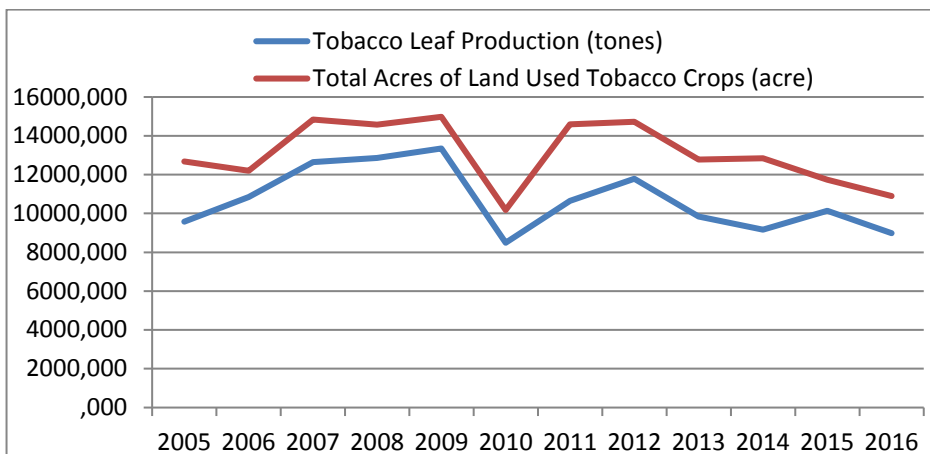


Figure 2.2. The amount of tobacco produced in Croatia, 2005-2016

Source: Euromonitor International (2017)

With the same reduction in the number of production areas under tobacco as well as the amount obtained, the number of tobacco producers organized in small family farms is also decreasing. In the observed period of ten years the highest number of tobacco producers in Croatia was recorded in 2006, 1,481 producers, while their number with the years fell due to low purchase prices and high production costs, in 2016 to 890 manufacturers (Figure 2.3). According to the Association of Croatian tobacco producers, it is estimated that in 2018 this number could count only 400 manufacturers.

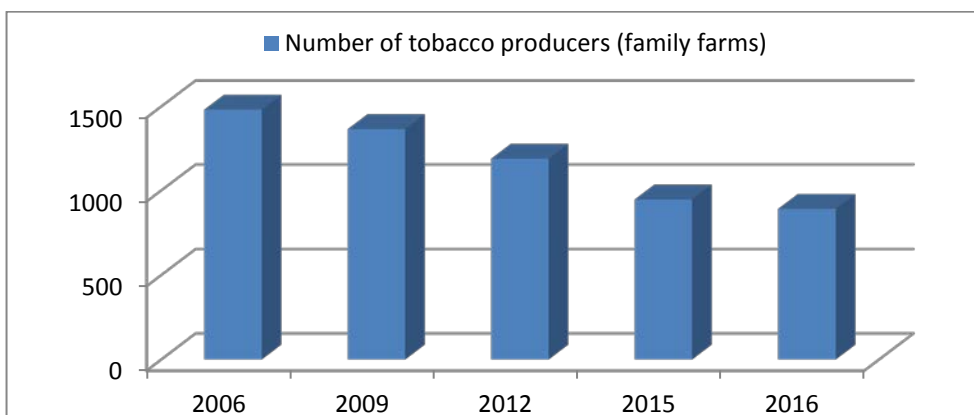


Figure 2.3. Tobacco producers (family farms) in Croatia, 2006-2016

Source: Association of Croatian tobacco producers – Krupan list, according to Tušek: Analysis of the tobacco market in Croatia, 2016., p. 30

In Croatia, non-aromatic types of tobacco are produced - virginia (dried on hot air), berley (shredded) and herzegovinan tobacco (dried on sun). Two companies are among the main producers: *Hrvatski duhani Ltd.* from Virovitica and *Agroduhan Ltd.* from Slatina. *Hrvatski duhani* holds 80 percent, and *Agroduhan* 20 percent tobacco market (Bajo and Jurinec, 2016). *Hrvatski duhani* are the leading producers of flue cured Virginia and Burley tobacco on the Croatian market. By June 2015, they were part of *Adris* group, which owned the *Tvornica duhana Rovinj*. *Agroduhan* deals with the production of tobacco type flue cured Virginia in cooperation with individual farms. *Agroduhan* was founded in 1996 as a subsidiary of *Duhan*, company for production, purchase and tobacco sales. Tobacco production is organized on the surfaces in ownership and lease of small agricultural producers (family farms). Available quantities of tobacco for sale are on domestic, European or on the market from the former Soviet Union.

2.2. Production of tobacco products

The global tobacco industry is highly proprietary and market-oriented where the world's largest manufacturers are multinational companies with 82.9 percent market share, of which China National Tobacco Corporation holds 44 percent, Phillip Morris International 14.6 percent, British Tobacco 10.7 percent, Japan Tobacco International 8.9 percent and Imperial Tobacco 4.7 percent of the market share (Statista, 2017). It is obvious from the above that the five producers determine the trends in the global tobacco market.

In Croatia, the cigarette industry is a classic example of an oligopoly, taking into account a small number of producers operating in this industry. Manufacturers are interdependent on each other and have a direct influence on each other. For new producers to enter the market there is a strong barrier because manufacturers already have developed brands and their loyal customers. With the favorable geographic position of Croatia, and due to the developed domestic tobacco production (as mentioned in previous section), Croatia is interesting for global tobacco companies.

The trend that is present in surfaces under tobacco and the amount of tobacco produced can also be seen in the production of tobacco products. If we look at the production of cigarettes in Croatia, we can see that the maximum amount was produced in 2008 (15.586 million), followed by a trend of decrease (with the exception of 2010). In the last three years of the analyzed period, production stabilized in 2016 as well, amounting to 8.342 million cigarettes (Figure 2.4).

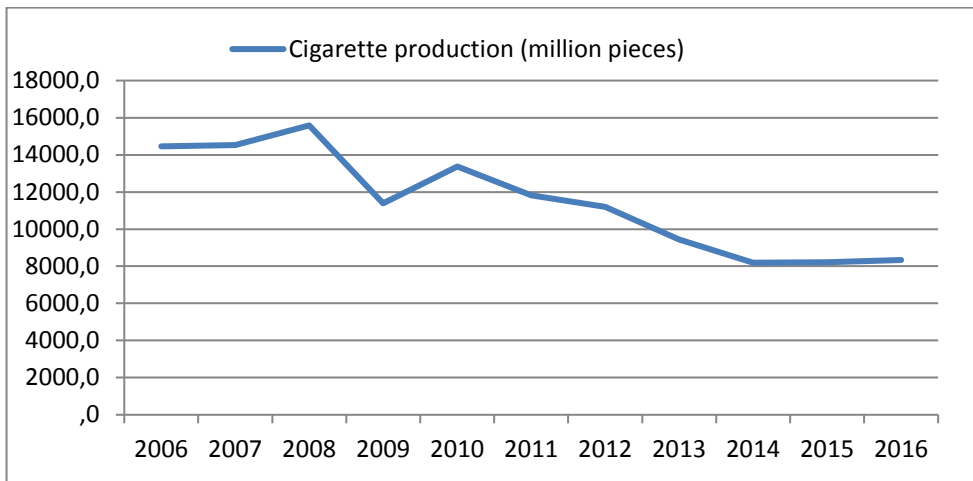


Figure 2.4. Cigarette production (million pieces) in Croatia, 2006-2016

Source: Euromonitor International (2017)

In the observed period, the tobacco market is attracted to the largest multinational tobacco companies, especially after 2015 when British American Tobacco (BAT) bought the domestic company *Tvornica duhana Rovinj* (TDR). From 2006 to 2015, TDR reduced its market share from 85 to 54.8 percent, while in the same period Philip Morris International increased its share from 13.8 percent to 30 percent (Figure 2.5).

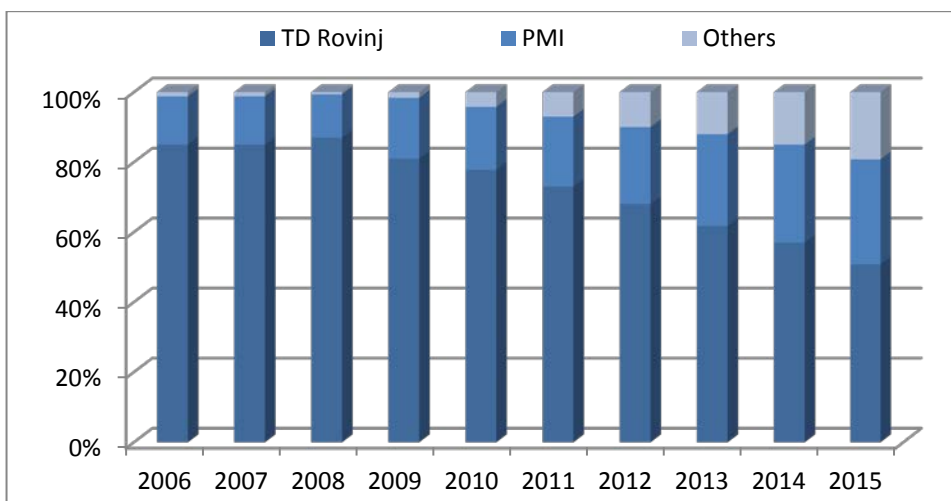


Figure 2.5. Manufacturer Percentage Share (%) Volume in Croatia, 2006-2016

Source: Euromonitor International (2017)

After a formal takeover in October 2015, BAT became the market leader with a share of 58.5 percent, and together with Philip Morris may affect market conditions. As a consequence, *BAT Hrvatska ltd* is the major producer in the country and is also a major exporter to other Balkans countries (and increasingly to EU countries such as Slovenia, Austria and Italy). About 70 percent of products from the Kanfanar facility are exported, with the factory being Croatia's largest exporter of agricultural products. BAT also owns the only significant producer of raw tobacco - *Hrvatski Duhani* in Virovitica - and produces in three locations, all in Eastern Croatia – Virovitica, Kutjevo and Pitomaca. It is estimated that two thirds of tobacco are used for domestic production and one third is exported, with buyers being renowned global tobacco producers.

2.3. Employment in the sector

Tobacco is a labor-intensive crop that provides work and income to millions of people in the major tobacco-producing countries. However, estimating the number of people working in tobacco growing and the extent of their dependence on this employment is challenging, and data to support such estimates are limited, especially in less developed countries such as Croatia.

The tobacco industry generates jobs in many economic sectors. One way to classify these jobs is by their level of dependence on the tobacco industry: jobs that are directly related to tobacco, jobs that are partially related to tobacco, and jobs that are indirectly related to tobacco, referred to as tobacco-expenditure-induced jobs. Employment in tobacco growing and manufacturing falls into the first category (The Economics of Tobacco and Tobacco Control, 2016, p. 546). Tobacco growing is a labor-intensive enterprise, which encompasses all aspects of tobacco work on farms, including initial land preparation, delivery of cured tobacco, and preliminary leaf processing. Tobacco manufacturing is less labor intensive but also involves a range of activities, including reordering, blending, and cutting tobacco leaf and delivering packaged tobacco products to the wholesaler.

Employment that is partially related to tobacco includes tobacco wholesaling and retailing, specifically jobs such as transporting tobacco products, doing warehouse work, and selling tobacco products to the end consumer. These kinds of jobs, although related to the tobacco industry, are less dependent on the industry because many wholesalers and retailers derive only a small portion of their revenues from the distribution of tobacco products. The number of stores that sell tobacco products exclusively is small in some countries, and relatively large in

others. However, the equipment and resources that specialty stores use for tobacco products are not unique and can be shifted to nontobacco alternatives.

Indirect employment, or employment that is supported indirectly by tobacco expenditures, includes jobs in sectors that supply inputs and materials (e.g., agricultural chemicals, machinery) to the core tobacco sectors, and jobs in other sectors of the economy that are supported by what tobacco industry workers spend on consumer goods and services with the income earned in their tobacco-dependent jobs. Tobacco use also generates employment in the health care industry because of illnesses caused by tobacco.

Jobs in tobacco growing and manufacturing, often referred to as core-sector employment, are the primary focus of this part of the chapter. As with tobacco farming, employment in tobacco product manufacturing is concentrated in a few countries. Based on data from the years 2010–2014 (*The Economics of Tobacco and Tobacco Control*, 2016), about 80 percent of tobacco-manufacturing employment was concentrated in three countries: India (34.7 percent), Indonesia (27.2 percent), and China (16.9 percent). In most countries, the share of tobacco-manufacturing employment as a percentage of total employment was less than 0.5 percent; this was true in Croatia where tobacco product manufacturing employment reaches 0.1 percent of total employment (Croatian Bureau of Statistics, 2018).

In line with the trends described above in tobacco production as well as in the number of tobacco producers, the trend of decline is also present in the direct employment of tobacco producers in Croatia (Figure 2.6). The highest number of employees was recorded in 2004, amounted to 1,329, after which this figure declined continuously until 2011 when it amounts to 683, after which employment stabilized. It should be noted that employment in the manufacturing of tobacco products has never exceeded 1 percent of total employment in the manufacturing sector.

After 2011 the number of employees in the tobacco industry recorded a slight increase, with the largest increase in 2016 when the number of employees grew by 17.7 percent (CBS, 2017). Average paid off net earnings in the tobacco manufacturing amounted to 911 EUR in 2014, which is 20 percent more than the average net wage in Croatia.

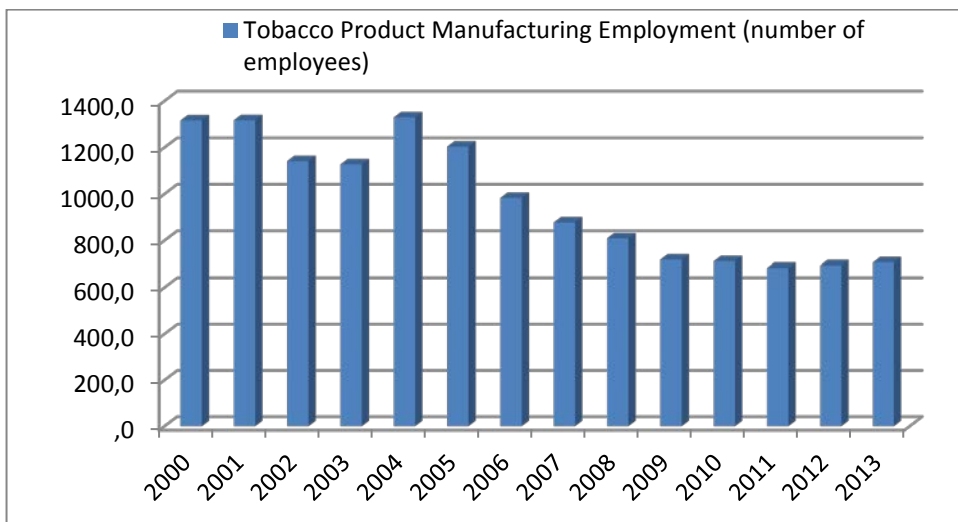


Figure 2.6. Tobacco product manufacturing employment (number of employees), 2000-2013

Source: Euromonitor International (2017)

Apart from the high costs of tobacco production, which include seedling costs, land lease, soil treatment, sowing, crop cultivation and tobacco drying, a high share of costs is currently occupied by seasonal workers. Seasonal workers are hired for sowing, harvesting crops, slicing flowers, tearing crops and harvesting. Fifteen years ago, the minimum wage of seasonal worker amounted to 6.7-10.7 EUR per day (Tušek, 2016, p. 10). Today, the price is almost three times higher. Under the new law, the manufacturer is also obliged to buy and give so-called stamps with the price of 2,7 EUR and pay an additional tax on workers, about 4 EUR per payer per day. It is expected that a significant part of the shadow labor market will be legalized in this way. Temporary and occasional employment on seasonal jobs in agriculture is governed by the Employment Promotion Act (Official Gazette, 57/12), the Ordinance on the content and form of seasonal labor contracts in agriculture and the Decree on the Lowest Salary of Seasonal Workers in Agriculture for 2012 (Official Gazette, 64/12). The longest term of seasonal work in agriculture is 90 days in one calendar year, regardless of whether the worker has worked continuously or with breaks. Unfortunately, there are no official estimates for Croatia of how many seasonal workers are engaged annually in manufacturing of tobacco products.

2.4. Export and import for tobacco products

The export of tobacco products (measured in tons) in Croatia in the analyzed period stabilized after the maximum reached in 2010 (17,506) and in 2016 it amounted to 12,348 tons. Imports in the same period were constantly lower than exports, and in 2016 amounted to 5,967 tons (Figure 2.7).

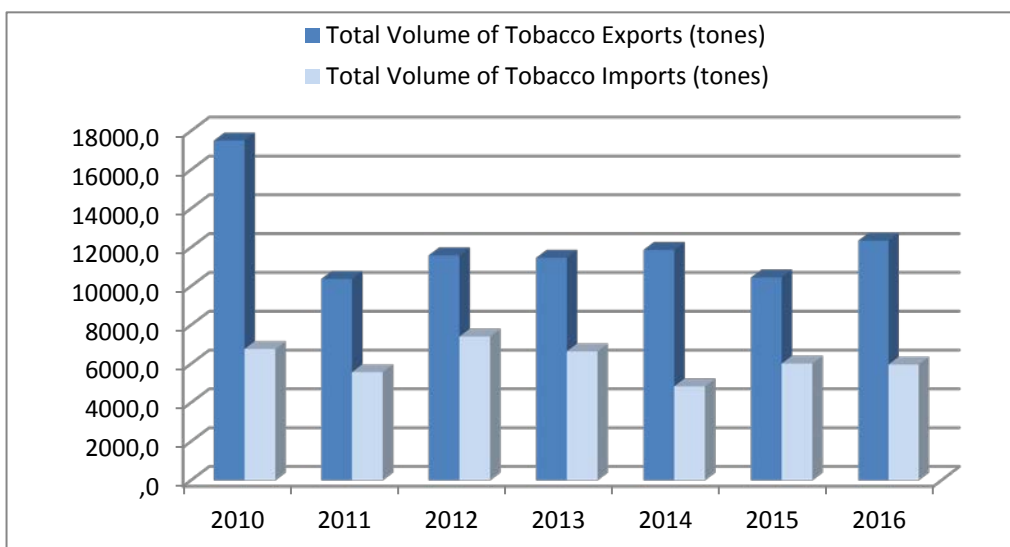


Figure 2.7. Total volume of tobacco export and import (tones) in Croatia, 2010-2016

Source: Croatian Bureau of Statistics

Trends are different if we look at the amount of cigarettes. Exports recorded a constant decline since 2010 when it was 7,226 million sticks till 2016 when it amounted to 4,500 million pieces. In the same period, imports have grown steadily and reached 3,500 million units in 2016, when net exports were the smallest in the whole period (Figure 2.8).

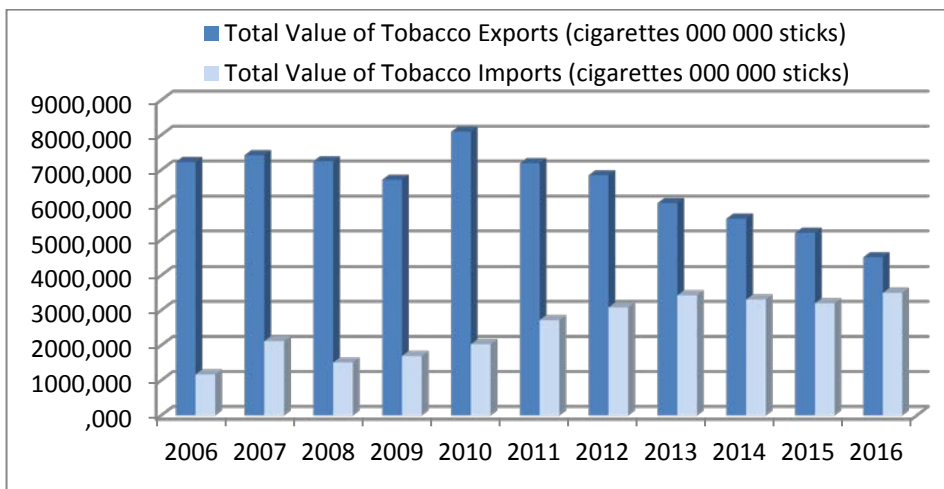


Figure 2.8. Total volume of tobacco export and import (cigarettes mil. sticks) in Croatia, 2006-2016

Source: Euromonitor International (2017)

The most accurate insight into the state of export and import of tobacco products, i.e. the balance of foreign trade, will be obtained if we observe the values in euros (Figure 2.9). In 2016, the export of tobacco products from Croatia was 59,030 million EUR, which is 17 percent higher than in 2015, while tobacco imports amounted to 66,089 million EUR in 2016, which represents decrease of 3.5 percent compared to 2015. So, the total foreign trade of tobacco products of the Republic of Croatia amounted to 0.3 percent of GDP in 2016. In the analyzed period, Croatia recorded the trend of declining exports (with the exception of 2016). The highest export of tobacco products from Croatia was recorded in 2010 (93,537 million EUR), while the smallest export was recorded in 2015 (49,047million EUR). On the other hand, Croatia recorded a steady trend of increasing imports of tobacco products, where the highest import was in 2015 (68,488 million EUR). Based on the data presented, it can be seen that Croatia recorded a negative foreign trade balance of tobacco products in the period from 2013 to 2016, while the positive foreign trade balance was recorded in the 2010-2013 period, when exports surpassed imports. Some of the possible reasons for the negative foreign trade balance of tobacco products in the last three years are: reduction of tobacco production, i.e. surfaces under tobacco and declined tobacco yields. Possible reason for the reduction of exports is the intensive harmonization of excise duties since 2013 with the European excise systems. At that stage, Croatia had to significantly increase excise taxes, which also reflected on tobacco products sales.

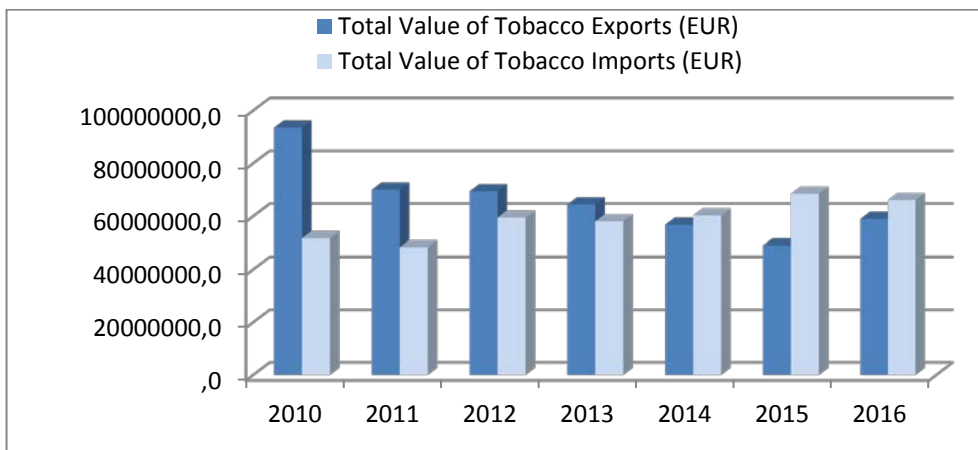


Figure 2.9. Total value of tobacco export and import (EUR) in Croatia, 2010-2016

Source: Croatian Bureau of Statistics

The structure of cigarette imports in Croatia by country of origin significantly changed in the analyzed period (Figure 2.10). In the period from 2010 to 2012, the highest number of cigarettes in Croatia were imported from the Netherlands (54.8 percent in 2010) and Poland (35.4 percent in 2010), while in 2016 the largest imports was from Poland (55.9 percent) and Germany (38.3 percent). Croatia has maintained a high share of imports of cigarettes from Poland in the whole observed period, which amounted to 80.4 percent of total cigarette imports in 2015.

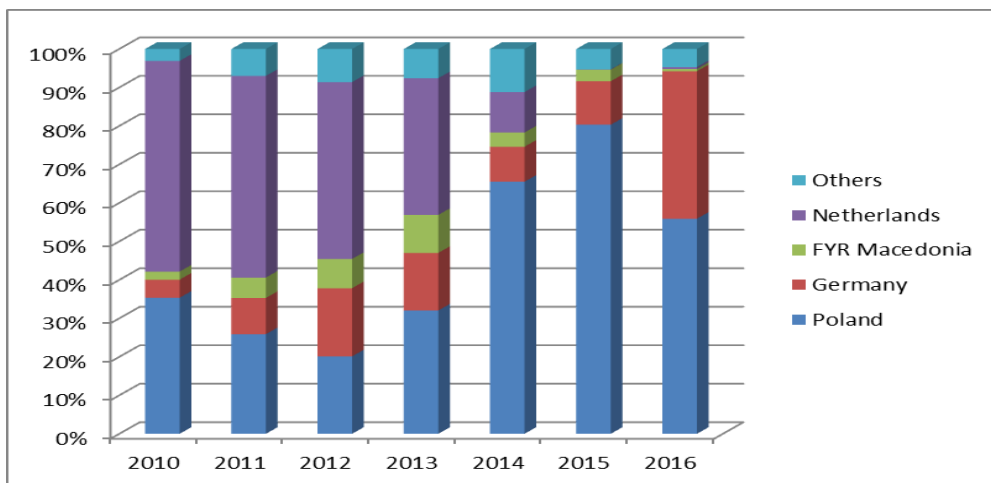


Figure 2.10. Imports of cigarettes in Croatia by country of origin (percentage shares, %) 2010-2016

Source: Euromonitor International (2017)

Major tobacco importers are: Philip Morris International, Japan Tobacco International, Imperial Tobacco Group and British American Tobacco.

The structure of cigarette exports from Croatia by country of destination showed to be much more stable in the analyzed period (Figure 2.11). Bosnia and Herzegovina is the main export market for tobacco products. The share of exports to that country was 44.7 percent in 2010, and 28 percent of total exports of cigarettes in 2016. The share of exports to the German market has increased significantly, from 6.9 percent in 2010 to 24.5 percent in 2016. Of other foreign trade partners, Croatia records significant exports to the markets of former Yugoslavia, so in 2016, 14.4 percent of total tobacco products was exported on the Serbian market, 12.6 percent in FYR of Macedonia, 6.9 percent in Kosovo, 2.7 percent in Montenegro and 2.5 percent in Slovenia. It should be noted one more time that major Croatian tobacco exporter is *Tvornica duhana Rovinj*.

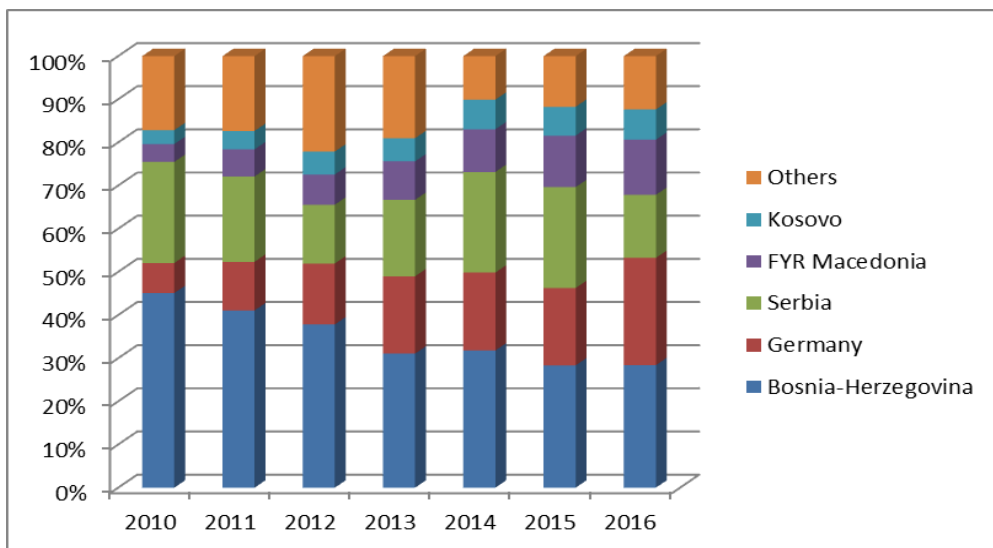


Figure 2.11. Exports of cigarettes from Croatia by country of destination (percentage shares, %) 2010 -2016

Source: Euromonitor International (2017)

2.5. Most recent trends in tobacco industry

According to the latest data from the Financial Agency (FINA), tobacco entrepreneurs completed 2017 with a total net loss of almost 10.7 million EUR, compared to 2016 when they had a total net profit of 2.2 million EUR (*Lider* magazine, May 2018).

The 2017 financial report was submitted by three tobacco product entrepreneurs employing 672 workers and two entrepreneurs mainly engaged in tobacco cultivation and employing 70 workers.

Entrepreneurs operating in the tobacco production sector for the first time since 2008 recorded a negative operating result. Most of this was affected by the *TDR*'s loss. These entrepreneurs realized consolidated total revenues of 182.7 million EUR, which is by 38.7 million EUR less than in 2016. The average monthly net salaries of employees in this sector last year amounted to 1,623 EUR. The largest tobacco producer in Croatia- *TDR*, recorded gross revenues of 158.7 million EUR in 2017 and operated at a loss of 11.7 million EUR. It employed 498 workers. Second largest entrepreneur was *Hrvatski duhani*, with a revenue of 22.4 million EUR and a net profit of 1.1 million EUR, and employing 154 workers. *Tvornica duhana Udbina* achieved 1 million EUR in total revenue and loss of 46,400 EUR, while employing 20 employees.

In 2017, entrepreneurs whose main activity was tobacco cultivation accounted for 7.1 million EUR of total revenue, which is 34.2 percent more than in the previous year, and they operated with a net profit of 85,333 EUR.

In the period from 2008 to 2017, major impact on the financial results of a very small number of entrepreneurs in this business, had the Act on Restrictions on the Use of Tobacco and Related Products (Official Gazette, No. 45/2017) which has been in use since March 2009. This is confirmed by the fact that in 2008 there was a total of four entrepreneurs/companies in Croatia, who reported total net profit of 81.7 million EUR at the end of the year, but in 2009 there were three entrepreneurs with total net profit of 67.4 million EUR. Their total profits continued to decline each year, so for the first time in the past 10 years, they had a negative result in 2017.

Between 2008 and 2017, the total income of entrepreneurs in tobacco industry recorded a steady 10-year decline of 40.3 percent, from 306.7 million EUR in 2008 to 173.3 million EUR in 2017. Similarly, their reported total expenditures followed the same trend, aside from an increase in 2016, returning in 2017 to an almost equal level as in 2008.

The causes of such business movements in the tobacco business and the reduction of revenues are in various regulatory and tax changes, i.e. increases in excise duties. In addition, this is affected by changes in consumer habits, rising tobacco prices, and health education.

3. Demand for tobacco products (Željana Aljinović Baračić, PhD)

In the latest decades, the prevalence of smoking in Croatia measured by a number of smokers has stabilized and showed a slight decline. As smoking prevalence is slowly weakening, volume sales also show a downward trend. However, demand for tobacco products measured by value sales is rising at the same time while volume sales decline because of increased prices, as well as number of the smokers-to-population ratio is increasing while the number of smokers show opposite trends. Although public opinion on smoking in Croatia has changed over time, with growing number of smokers looking to quit and decreasing social acceptance of smoking, the smoking rates of about 30 percent or one-third of the total adult population are still quite high.

3.1. Smoking prevalence

According to Special Eurobarometer 458 survey (2017) on attitudes of Europeans towards tobacco and electronic cigarettes, more than one third, or more precisely 35 percent, of the adult population in Croatia are smokers. The results of Padjen et al. (2012) research show that the overall smoking prevalence in Croatia decreased by 5.2 percentage points during 1994-2005, from 32.6 percent in 1994-1998 to 30.3 percent in 1999-2001 and 27.4 percent in the 2002-2005 period. The decrease in smoking among women by almost 10 percentage points (31.6 percent, 26.6 percent, and 21.7 percent, respectively) primarily contributed to this trend, while the prevalence rate among men in this period remained almost the same with a slight decline of 0.3 percent. In the period from 2002 to 2017, the average percentage of smokers in adult population was less than one third, ranging from the lowest 27.70 percent in 2016 to the highest 37 percent in 2005. However, these numbers should be interpreted with caution, because they are collected from different sources (stated below the table) and thus may vary because of differences in collection and calculation methodology.

Smoking trends can also be tracked through the number of tobacco smokers, but changes in the number of smokers are not aligned with changes in smokers-to-population ratio. Besides the discrepancy because of different methodology and sources, the possible reason could be depopulation in Croatia. However, the number of 1,046 thousand smokers that stands for 29.8 percent of smokers in adult population in 2002 was higher than 1 million and the percentage was increasing during the years till 2012. The fact is that the total number of smokers has been reduced by 100,000 in the observed period of fifteen years, especially since 2013 when a number of smokers has been constantly decreasing. Legislation contributed to these trends with policy measures that have been implemented and strengthening of tobacco controls (e.g. tobacco restrictions, smoking ban, etc.), especially after the Croatian access to the EU in 2013.

Detailed information about the total number of smokers in Croatia in the 2002-2017 period is presented in Table 3.1.

Table 3.1. Tobacco smoking status and prevalence in Croatia in 2002-2017 period

| year | 2002 | 2003 | 2004 | 2005 | 2006 | |
|--|----------|----------|----------|----------|----------|--------|
| Number of Tobacco Smokers (in 000) | 1,046.10 | 1,055.30 | 1,064.60 | 1,079.20 | 1,099.60 | |
| Smokers as Percentage of Adult Population (%) | 29.80% | 31.40%** | 30.30% | 37.00%# | 33.00%# | |
| year | 2007 | 2008 | 2009 | 2010 | 2011 | |
| Number of Tobacco Smokers (in 000) | 1,140.60 | 1,127.60 | 1,095.30 | 1,075.20 | 1,051.10 | |
| Smokers as Percentage of Adult Population (%) | 32.40% | 32.10% | 33.00%# | 30.70% | 30.10% | |
| year | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
| Number of Tobacco Smokers (in 000) | 1,028.10 | 985.30 | 971.30 | 965.20 | 954.90 | n/a |
| Smokers as Percentage of Adult Population (%) | 29.50% | 28.30% | 33.00%## | 31.10%## | 27.70% | 35.00% |

Source: Euromonitor International; **Croatian Institute of Public Health; #Eurostat; ##WHO; 2017

Euromonitor International report (2017) has documented that smoking prevalence is higher among men with 585 thousand smokers or 36 percent of adult men, rather than women (370 thousand or 20 percent of adult women) smoking in 2016. These results are in compliance with European Commission

(2010) findings that in all European Union countries, except Sweden, smoking prevalence is higher among men than among women. Furthermore, data from Latvia show the widest gender gap of 29 percentage points, while a small difference between male and female smoking prevalence of less than 10 percentage points can be found in 11 mostly Western European countries.

Tobacco smoking status and prevalence of men and women in Croatia in the 2011-2016 period is presented in Table 3.2.

Table 3.2. Smoking prevalence by gender in Croatia in 2011-2016 period

| MALE year | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|--|-------------|-------------|-------------|-------------|-------------|-------------|
| Number of Tobacco Smokers (in 000) | 615.4 | 609.7 | 605.8 | 593.9 | 591.1 | 585.4 |
| Smokers as Percentage of Adult Population (%) | 37.1% | 36.8% | 36.7% | 36.0% | 35.9% | 35.7% |
| | | | | | | |
| FEMALE year | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
| Number of Tobacco Smokers (in 000) | 435.7 | 418.4 | 379.6 | 377.4 | 374.0 | 369.5 |
| Smokers as Percentage of Adult Population (%) | 23.8% | 22.9% | 20.8% | 20.7% | 20.6% | 20.5% |

Source: Euromonitor International (2017) from official statistics

Presented results show that the number of female smokers was lower than among man, with both declining over the observed period. Euromonitor International (2017) reports that the number of female smokers has been declining faster than the number of male smokers (3 percent negative compound annual growth rate in the female group over the review period, vs. 2 percent negative compound annual growth rate in the male group).

However, if the new law restricts more the sales of flavored tobacco products it would decrease the smoking prevalence among women because women were a particular target for “light” and “mild” cigarettes usually flavored, especially when delivered as “slim” or “thin” cigarettes (Hirschhorn, N. & WHO Tobacco Free Initiative, 2005). The study of Carpenter (2005) provides evidence that the tobacco industry has conducted extensive research on female smoking patterns, needs, and product preferences, and has intentionally modified product design for promotion of cigarette smoking among women. According to U.S. Department of Health and Human Services (2012) cigarettes with brand names containing words such as

“thins” and “slims” have been manufactured to be longer and slimmer than traditional cigarettes to appeal directly to women. Moreover, Rosenbloom et al. (2012) found that women menthol smokers showed signs of greater tobacco dependence than non-menthol smokers.

In explanation, Croatia was supposed to introduce new legislation on flavor tobacco ban by 20 May 2016 to comply with the regulations imposed by the EU directive. Article 7 paragraph 1 of the Directive 2014/40 prescribes that member states shall prohibit the placing on the market of tobacco products with a characterizing flavor. But, in the preamble paragraph 17, it is stated that this requirement does not preclude the use of individual additives outright but does oblige manufacturers to reduce the additive or the combination of additives to such an extent that the additives no longer result in a characterizing flavor. However, the ban on flavor affects only cigarettes and smoking tobacco, with other tobacco categories being excluded for now and there is no evident impact of the flavor ban on the number of smokers yet.

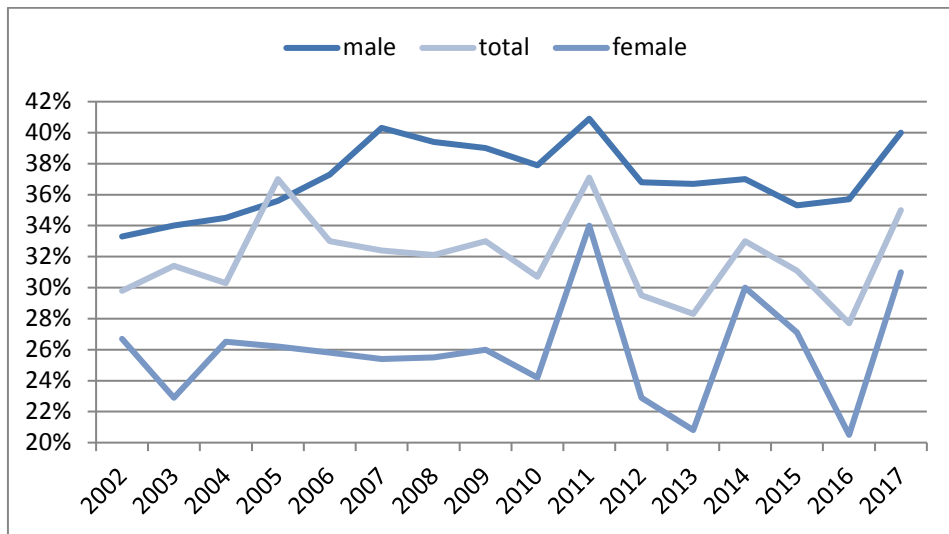


Figure 3.1. Smokers-to-population ratio by gender in Croatia in 2002-2017 period

Source: Euromonitor; Croatian Institute of Public Health; Eurostat; WHO (2018)

Besides the significant difference in absolute numbers of male and female smokers, it can be noticed that between 2002 and 2017 smokers-to-population ratio of women was always lower than the value of the ratio of total smoker’s

number in Croatia. The trend line of female prevalence ratio is aligned with the trend line of total prevalence ratio, with exception of 2003, where the smokers-to-population ratio of women group had the opposite direction than male and total ratio. Interesting, the results of research on tobacco use in sports coaches (Matkovic et al., 2014) have shown some very serious nicotine addicts (more among women than among men), which is quite surprising taking into account that sport coaches are certainly a population with specific healthy lifestyle habits. On the other hand, male prevalence ratio exceeds the value of total smokers in all years reported and its trend line does not follow the other two lines.

The latest survey by the Croatian Institute of Public Health on the use of tobacco in the adult population of Croatia has provided more detailed insights in characteristics of smokers in 2015 (Dečković-Vukres et al., 2016):

- The percentage of 31.1 of smokers in population can be divided into 27.5 percent of daily smokers and 3.6 percent of occasional smokers. Out of occasional smokers, 43.9 percent are former daily smokers, while 56.1 percent have never been daily smokers.
- There are 35.3 percent smokers among men (31.8 percent daily smokers and 3.5 percent occasional smokers), while among women there are 27.1 percent smokers (23.4 percent daily smokers and 3.7 percent occasional smokers).
- According to the age, the share of smokers is the highest in the age group 25-44 years (38.9 percent), followed by the age group 45-64 years (36.5 percent), 15-24 years (30.0 percent) and 65+ years (11.5 percent).
- According to the educational level, the share of smokers is the highest among respondents with completed high school or short-term secondary education after primary school (36.4 percent), followed by respondents with completed primary school or less (26.0 percent) and respondents with completed college or education higher than that (25.0 percent).

These findings are presented in Figure 3.2, Figure 3.3. and Figure 3.4.

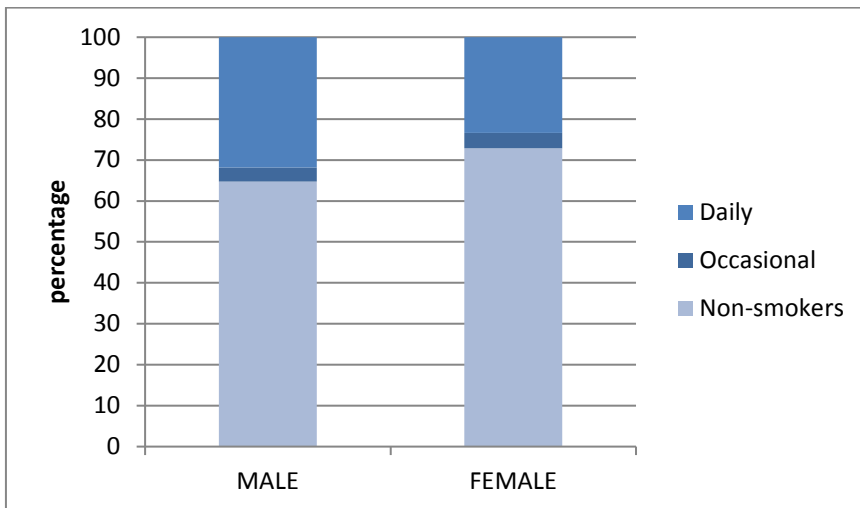


Figure 3.2. Current smoking status according to gender

Source: Croatian Institute of Public Health survey (Dečković-Vukres et al, 2016)

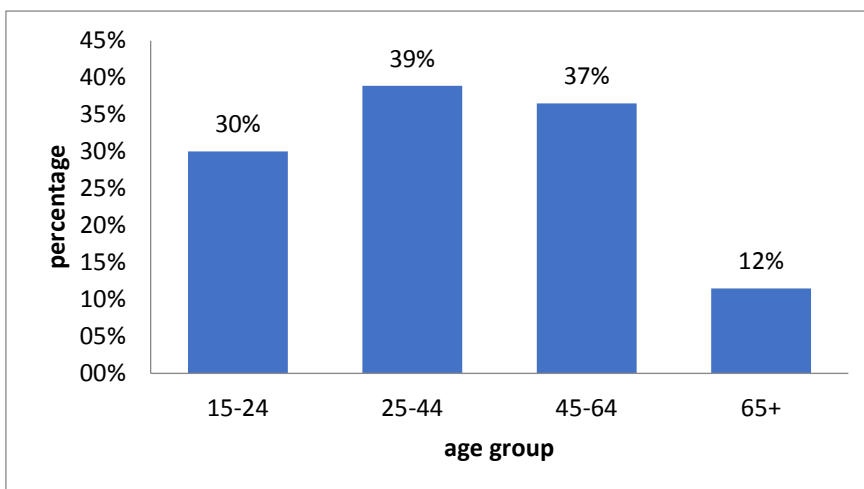


Figure 3.3. Current smoking status according to the percentage in age group

Source: Croatian Institute of Public Health survey (Dečković-Vukres et al, 2016)

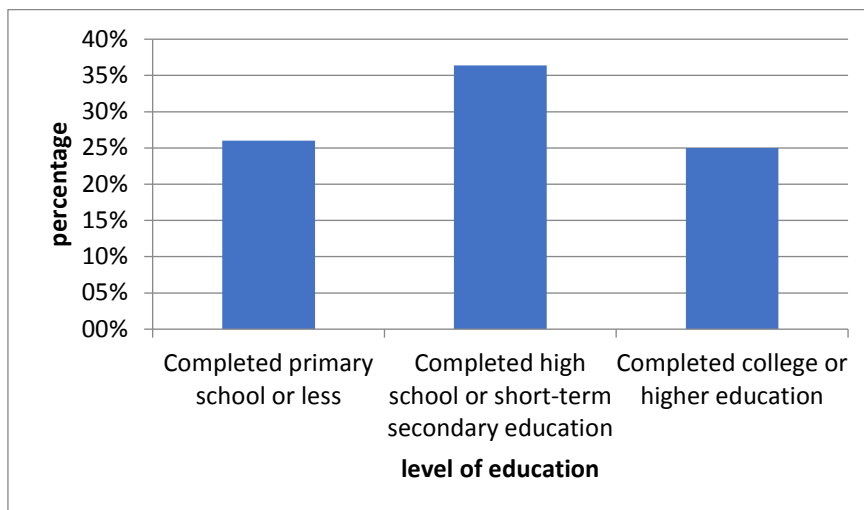


Figure 3.4. Current smoking status according to the percentage in educational level group

Source: Croatian Institute of Public Health survey (Dečković-Vukres et al, 2016)

3.2. Youth tobacco use

Young people's well-being is of special concern in all societies, so there are constant efforts to analyze and reduce tobacco consumption by young people. In 2016, another survey of Croatian Institute of Public Health was conducted on the sample of younger students in the age group between 13 and 15 years in Croatia as a part of Global Youth Tobacco Survey (GYTS). The results show that (Mayer et al, 2017):

- 47.2 percent of scholars aged 13-15 years have used tobacco products at least once
- 15.9 percent currently use tobacco products (they have used tobacco products at least once in the last month) and 16.7 percent of them are boys and 15.1 are girls
- 14.6 percent of scholars that currently use tobacco products is using cigarette while 3.8 percent use other tobacco products (usually e-cigarettes)
- 60.9 percent of scholars are exposed to second-hand smoke in public places and 60.1 percent are exposed to second-hand smoke at home.

- 61.8 percent of scholars who smoke buy cigarettes at the store and 56.9 percent of those were not prevented from buying because of their age despite the legal obligation.

By comparing the results of the surveys conducted in 2003, 2007, 2011 and 2016 authors noticed that the percentage of scholars who have tried cigarettes is decreasing.

In 2015, a survey of the European Monitoring Centre for Drugs and Drug Addiction (2015) on alcohol and other drugs was conducted. It is one of the largest empirical researches in Europe, providing data on 96,043 students from 35 European countries who turn 16 in the calendar year of survey. With regard to Croatia, results from the research show that:

- With the proportion of 33 percent, Croatia has the almost highest rate of the students in the ESPAD countries that had used cigarettes during the last 30 days.
- Lifetime prevalence rate is 62 percent and puts Croatia in the third position among 35 countries by the number of students who had tried smoking at least once.
- Croatia has the second highest number of daily smokers among students (23 percent, ESPAD countries average 12 percent).
- The proportion of Croatian students who have tried cigarettes at the age of 13 or younger is 32 percent (ESPAD countries average is 23 percent).

In general, it can be concluded that Croatian students reported considerably higher prevalence rates compared to the ESPAD countries average for the most number of key variables. With regard to national patterns, Croatia stands out with the second highest prevalence of current smoking (33 percent), indicating that every third student is currently smoking. This is particularly concerning in the proportion of students who have tried cigarettes at the age of 13 or younger because of the relatively high addictive potential of nicotine. Moreover, according to Epstein et al (2007), perceived peer smoking norms, siblings' smoking, and high risk-taking also showed significant main effects for increasing future smoking. Klein et al (2008) found that uniquely flavored cigarettes brands are most attractive to the youngest smokers, aged between 17 and 19.

Prohibition of sale tobacco and related products, including smokeless tobacco products and herbal products for smoking, electronic cigarettes, refill containers and single-use cartridges to persons under 18 years of age and increases in tobacco prices are making tobacco products less accessible to young people, and consequently should have positive impact on number of adolescent smokers.

3.3. Tobacco product consumption

Euromonitor International (2017) data on the value of retail sale of tobacco products by category in Croatia in 2002-2016 period documents that cigarettes were the main tobacco product used in Croatia, accounting for more than 95 percent of overall tobacco products volume sales in all years. Thus, trend lines of the retail sale value of cigarettes and overall tobacco product are narrow related and have generally upward direction, as it can be seen from the Figure 3.6.

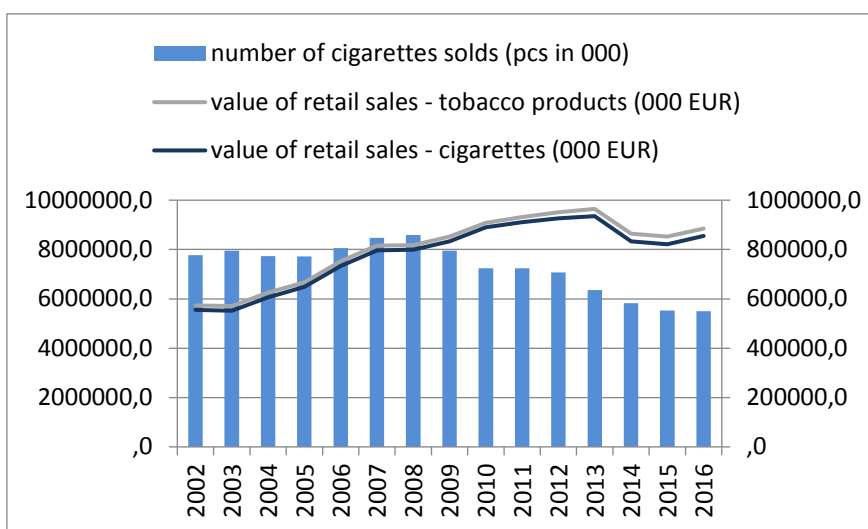


Figure 3.6. Volume and value of sales of tobacco products and cigarettes in 2002-2016 period

Source: Euromonitor International (2017)

However, rising trends in cigarettes value sales with descending trends in volume sales at the same time can be explained with increasing cigarettes prices as a result of taxation and excise duties. Also, a tourist seasonal migration is a very important contributor to the volume and value of sales of tobacco products. In 2017, 18.5 million tourists visited Croatia and generated a total of 102 million overnight stays. Although most tourists bring their own cigarettes, some buy cigarettes in Croatia, mostly global well-known brands as they are not familiar with local brands.

The National Survey on the use of tobacco in the adult population of Croatia from 2015 conducted by Croatian Institute of Public Health has documented that 27.8 percent of all respondents smoke manufactured cigarettes (31.1 percent of male and 24.8 percent of female) while hand-rolled cigarettes are smoked by 2.7 percent of all respondents only (31.1 percent of male and 24.8 percent of female). This survey provided more insights into the habits of smokers of manufactured cigarettes as follows (Dečković-Vukres et al, 2016):

- A number of manufactured cigarettes smoked on average per day among those respondents who smoke at least one cigarette per day or more is 15.9. The number of manufactured cigarettes smoked on average per day among male smokers is 18.9 and among female 12.6.
- According to the age, smokers in the age group 15-24 years smoke the lowest number of manufactured cigarettes on average per day (11.2), while smokers in the age group 45-64 years smoke the highest number (17.7), very close to average number per day of smokers in the age group 65+ (17.3). In the age group 25-44 years number of manufactured cigarettes on average per day is 15.4. These findings are presented in Figure 3.5.
- According to the average number of manufactured cigarettes smoked per day, almost half of smokers (i.e. 46 percent) smoke 15-24 cigarettes per day, similar as the share of this group among men (52 percent). Women reported rather lower share of smokers of more than 15 cigarettes per day (39 percent in 15-24 group and 5 percent in the +25 group), so they can be generally tag as light smokers - daily smokers with a level of consumption lower than one packaging, i.e. 20 cigarettes. The share of 20.6 percent are smokers that daily smoke between 10 and 14 cigarettes and approximately 10 percent of smokers smoke less than 5, between 5 and 9 or more than 25 cigarettes per day. Detailed structure with regard to gender and the number of cigarettes smoked per day is presented in Figure 3.6.

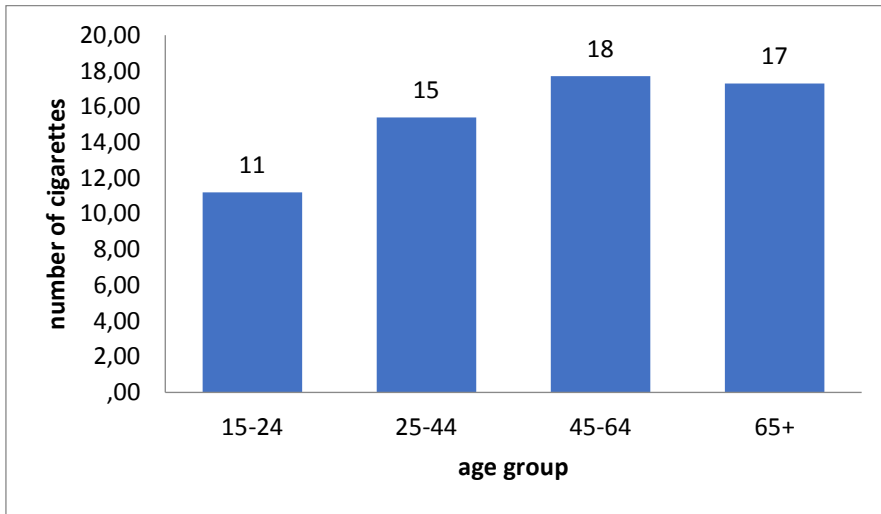


Figure 3.5. Number of cigarettes smoked according to the percentage in age group

Source: Croatian Institute of Public Health survey (Dečković-Vukres et al, 2016)

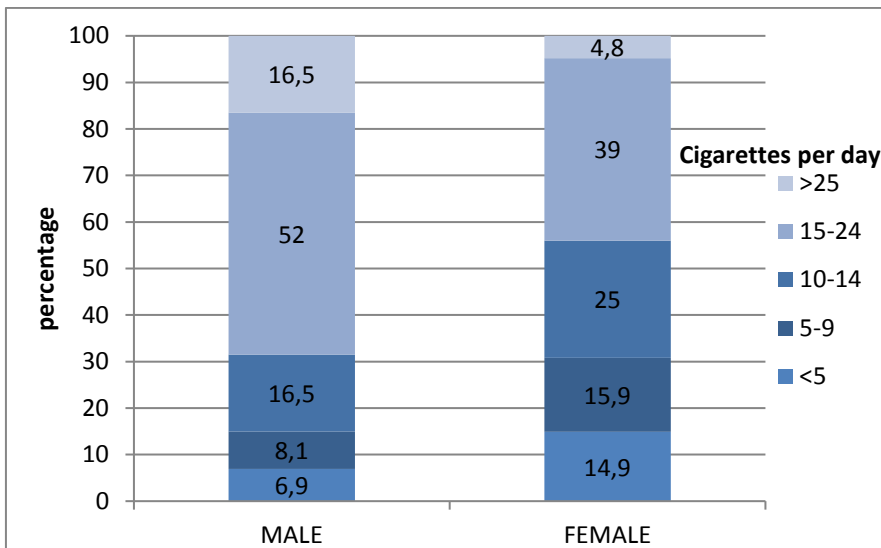


Figure 3.6. Structure of number of cigarettes smoked per day according to gender

Source: Croatian Institute of Public Health survey (Dečković-Vukres et al, 2016)

The measure of yearly per capita consumption of cigarette sticks presented in Figure 3.7. shows that annual consumption of cigarettes in Croatia increased from 1.8 thousand sticks in 2002 to a high of 2 thousand sticks in 2008 and has consistently declined since then, reaching 1.3 thousand sticks in 2016.

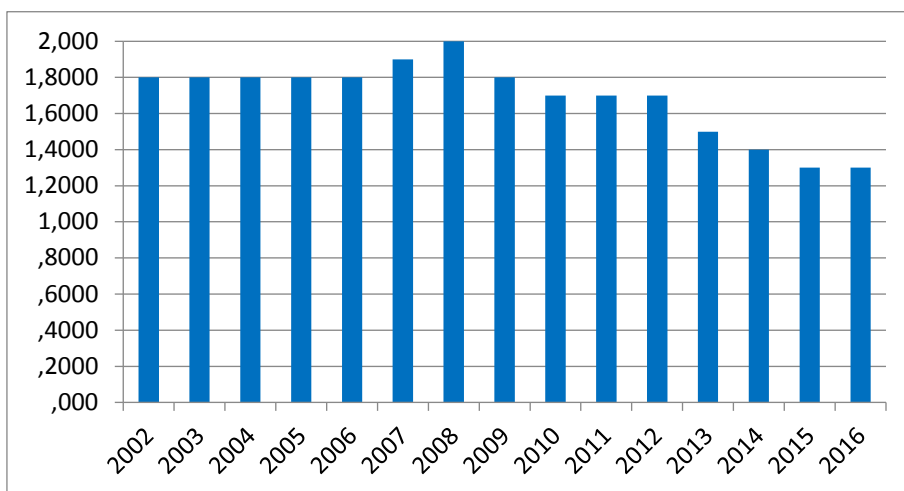


Figure 3.7. Yearly Per Capita Consumption of Cigarette Sticks (000 pcs) in 2002-2016 period

Source: Euromonitor International (2017)

More detailed information on the value of retail sale of tobacco products by category in Croatia in the 2002-2016 period is presented in Table 3.3.

Table 3.3. Value of retail sales of tobacco products by category in Croatia in 2002-2016 period

| Value of retail sales (000 EUR) | 2002 | 2003 | 2004 | 2005 | 2006 |
|---------------------------------|------------|------------|------------|------------|------------|
| Tobacco products | 573,359.90 | 570,772.50 | 625,296.90 | 666,743.30 | 752,962.00 |
| Cigarettes | 555,285.60 | 551,819.40 | 606,169.40 | 648,405.70 | 733,332.80 |
| Cigars & Cigarillos | 6,503.40 | 7,708.10 | 7,349.90 | 8,020.20 | 8,492.00 |
| Smoking tobacco | 11,570.90 | 11,245.00 | 11,777.60 | 10,317.40 | 11,137.20 |

| Value of retail sales (000 EUR) | 2007 | 2008 | 2009 | 2010 | 2011 |
|---------------------------------|------------|------------|------------|------------|------------|
| Tobacco products | 816,258.50 | 817,306.10 | 852,038.90 | 908,585.00 | 931,254.90 |
| Cigarettes | 796,536.50 | 798,761.50 | 833,395.00 | 889,768.40 | 911,264.70 |
| Cigars & Cigarillos | 8,488.20 | 8,441.40 | 8,242.20 | 7,654.00 | 8,428.60 |
| Smoking tobacco | 11,233.80 | 10,103.20 | 10,401.70 | 11,162.60 | 11,561.60 |
| | | | | | |
| Value of retail sales (000 EUR) | 2012 | 2013 | 2014 | 2015 | 2016 |
| Tobacco products | 951,386.40 | 964,483.60 | 863,564.40 | 851,811.10 | 884,915.00 |
| Cigarettes | 926,639.30 | 935,233.30 | 833,324.30 | 821,824.90 | 855,161.10 |
| Cigars & Cigarillos | 9,154.10 | 10,902.00 | 11,401.40 | 11,790.90 | 12,142.00 |
| Smoking tobacco | 15,593.00 | 18,348.30 | 18,838.70 | 18,195.30 | 17,611.90 |

Source: Euromonitor International (2017) from official statistics, trade associations, trade press, company research, store checks, trade interviews, trade sources

A significant increase in the value of retail sale of smoking tobacco is evident, especially in the last six years, i.e. from 2011. In the context of a decline in the number of cigarettes sold, this growth can be assigned to the group of smokers who substituted cigarettes with smoking tobacco as roll-your-own due to cost purposes. Cigars and cigarillos have the smallest and stable value of sales, as they have a different target consumer group and are not popular in Croatian national smoking pattern. The number of cigars and cigarillos smokers in Croatia is scarce and these tobacco products are treated more like a status symbol or sign of sophistication and authority.

Trends value of retail sales cigars and cigarillos and smoking tobacco in the 2002-2016 period are presented in Figure 3.8.

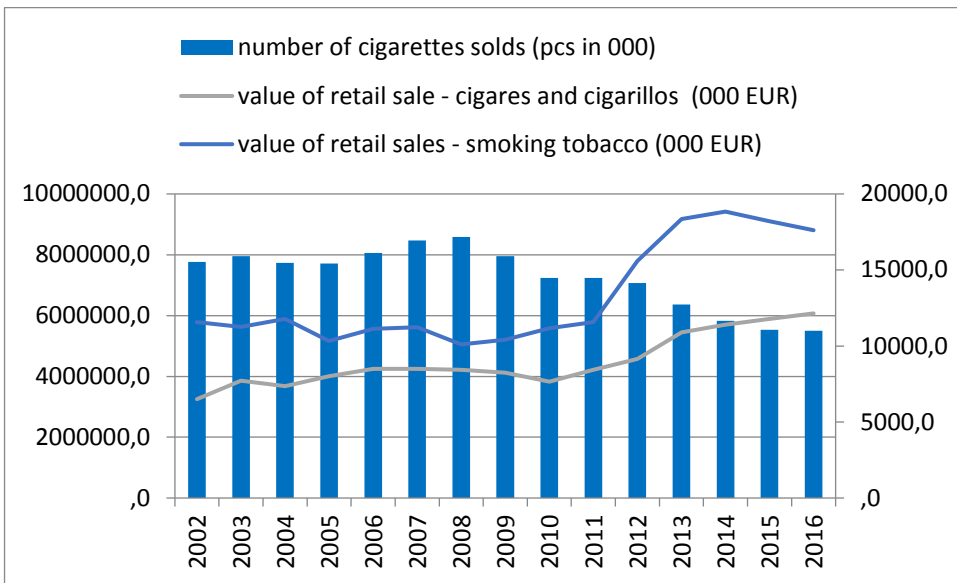


Figure 3.8. Value of retail sales cigars and cigarillos and smoking tobacco in 2002-2016 period

Source: Euromonitor International (2017)

Smoking and consequently demand for tobacco products are slowly declining in popularity in Croatia due to continuously more restrictive tobacco regulations. Tobacco bans in public places will be introduced more and more in the future, with graphic warnings on tobacco packaging set to contribute to the decline in volume sales. While value sales of tobacco companies in Croatia are expected to grow at a healthy rate, almost all of the increase will go to the state in the form of elevated excises.

4. Tobacco taxation and pricing policies (Andrijana Rogošić, PhD)

Last decades witness growing awareness of the harmful effects of smoking worldwide. In order to reduce tobacco consumption, World Health Organization (WHO) set the guidelines known as The Framework Convention on Tobacco Control (FCTC) which was adopted by the World Health Assembly in May 2003 and entered into force on 27th February 2005. Croatia ratified WHO FCTS on 14th July 2008, and it entered into force in same year, on 12th October.

4.1. Institutional setting and policy framework for tobacco control

By joining EU in 2013, Croatia adopted EU regulations so the Directive 2014/40/EU was incorporated in the Act on Restrictions on the Use of Tobacco and Related Products (Official Gazette, No. 45/2017), Excise Duty Act (Official Gazette, No. 22/2013 to 115/2016) and Ordinance on Excise Duties (Official Gazette, No. 1/2017, 14/2017). While preparing to become an EU Member State, Croatia started to harmonize the other tobacco related regulations long ago.

Although tobacco regulations (especially in EU) are well set there are obstacles in their implementation as well as criticism. According to Liberman (2006) no country in the world has not genuinely comprehensive regulation of tobacco products and the tobacco industry—covering all aspects of manufacture, communication and availability. Croatian government through Ministry of Finance - Customs Administration provides the framework for the effective tobacco taxation which is an important element of tobacco control. Besides government, many different institutions should be involved in tobacco control activities. Although there are visible efforts by non-government organizations to make an impact on the tobacco market, their reach is limited in Croatia. It can also be said that the government is not showing much initiative, but is instead responding to incentives from the EU and WHO.

The medical profession is one of the most important interest groups exerting pressure on the government to act while, on the other hand, the hospitality industry (one of the main industries in Croatia) is strongly opposing the smoking ban due to its impact on sales. Among the institutions with the greatest influence on tobacco control in Croatia the most prominent are Croatian Institute of Public Health (CIPH) and Andrija Štampar Teaching Institute of Public Health. Croatian Institute of Public Health is a central public health institute in Croatia. It was founded in 1893 with the aim of promoting health and welfare of the population. Andrija Štampar Teaching Institute of Public Health (AŠTI) was founded in 1949 as Public Hygiene Institute, a professional and research institution covering all issues in the field of hygiene and preventive medicine. Several valuable initiatives came from those institutions. Since CIPH deals with public health, health promotion and education, disease prevention, microbiology, environmental health, school medicine, mental health care and addiction prevention, their researchers study the effects of tobacco use and promote cessation regularly on their website. The program “Non-smoking School” implemented by experts from AŠTI - Department of Mental Health and Addiction Prevention is fighting against addiction and promotes healthy lifestyles. The School is based on the application of psychotherapeutic and educational models of quitting smoking with the aim to help participants to stop smoking. The School is being conducted continuously throughout the year in the AŠTI in Zagreb. Also, they established Croatian Non-smoking Day which is celebrated since 2003 to remind the public of the importance to stop smoking. With World No Tobacco Day (WHO), celebrated around the world every year on May 31, Croatia also celebrates the national Non-smoking Day which falls on the first day of Catholic holiday of fasting. Since this is a specific period of the year when a lot of people think about giving up of something that they enjoy during the year, a day without smoking is the day to urge smokers to quit.

Although the mentioned institutions in Croatia promote smoking cessation the overall institutional support should be more comprehensive and newly adopted regulation - the Act on Restrictions on the Use of Tobacco and Related Products (Official Gazette, No. 45/2017) leads to the improved tobacco control involving much more institutions and providing supervision (sanitary inspectors, health inspectors, education inspectors, labor inspectors, market inspectors, electricity and heating inspectors and authorized customs officers), within the respective powers vested in them by the law.

According to Loubeau (2009) tobacco control has gained prominence at the European Union level and the rest of the world due to the serious medical effects of smoking. A “smoke-free Europe” is one of the priorities of the European Commission’s public health, environment, employment and research policy. EU

legislation directly and indirectly influenced public attitudes, raised awareness about the health consequences of smoking among the public and medical establishment, elevated the visibility of medical and health NGOs, and altered the institutional venue of policy making (Kurzer and Cooper, 2016).

In line with the European Strategy for Tobacco Control (ESTC) (which reflects the increased political commitment to, and public health expectations of, tobacco control in WHO's European Region) Croatian Ministry of Health has developed an Action Plan for Strengthening Tobacco Control. The main activities according to this plan are:

- Informing, educating, raising public awareness of non-smoking as a better way of life and awareness of harmful consequences of smoking,
- Encouraging smoking cessation by providing expert and other help to people who want to stop smoking,
- Reduction in exposure to tobacco smoke and protection against passive smoking,
- Ban on advertising, promotion and sponsorship,
- Reducing the availability of tobacco products,
- Reducing the demand and supply of tobacco products,
- Reducing public exposure to smoke-promoting messages,
- Supervision of tobacco products, consumer information and health warnings,
- Supervision of law implementation,
- Tax policy and price policy,
- Strengthening the capacity for tobacco control,
- International cooperation in monitoring, evaluation and reporting of the prevention and suppression of smoking.

The EU anti-smoking strategy includes a wide spectrum of smoking prevention and cessation activities, such as health education measures, improved consumer information and assistance as well as restrictions on tobacco advertising and marketing (Padjen et al, 2012). The aims of Croatian National Health Care Strategy 2012-2020 regarding smoking are as follows (Mayer, 2017):

- Adopting non-smoking habits as a healthier lifestyle, while reducing prevalence smoking as a risk factor for a number of chronic diseases,
- Preventing smoking,
- Encouragement and assistance in smoking cessation,

- Protection of tobacco smoke from the environment.

The effects of tobacco control activities have been studied worldwide. Havard et al. (2017) pointed out that both mass media and rising cigarette cost were effective in reducing the prevalence of smoking in Australia's general population. Many scholars have based their studies on the role of tobacco taxation increase in smoking cessation (Bader, Boisclair and Ferrence, 2011; Guindon et al, 2014; Cobiac et al, 2015; Aljinović Barać et al, 2018; Shang et al, 2018). The extensive literature review of Bader, Boisclair and Ferrence (2011) show that young people are two to three times more price-responsive than the general population, although price elasticity vary across studies. As the authors concluded, it is complicated to separate the effects of policies when several are in place at the same time.

4.2. Tobacco control measures

All the activities listed in the Action Plan for Strengthening Tobacco Control by Croatian Ministry of Health should be operationalized. Most of them are prescribed by the law (Restrictions on the Use of Tobacco and Related Products) but some of them are covered by specific programs and initiatives.

According to Mayer (2017) Croatia is involved in three international tobacco control programs: the World No Tobacco Day, Health care campaign "Quit and Win" and the WHO FTCT. Croatia also has several national health care initiatives for smoking cessation: "Say YES to non-smoking", "White Phone", "Non-smoking School", "Dentists against smoking- education of the educators" and several mass media campaigns. Also Croatian Ministry of Health supports physicians to advice the patients to stop smoking.

National projects that encourage smoking cessation had some positive impacts. Program "Say YES to non-smoking" was highly promoted by mass media and resulted in several positive outcomes. Ministry of Health has established a project known as "White Phone". Since January 2017, on every box of cigarettes, as well as other tobacco products, the number of White Phone: 0800 7999 is printed. This phone line can be used by citizens who want to stop smoking. Dialing this number, people can get basic information on smoking hazards, counselling and psychological support for smoking cessation. Also "Non-smoking School" was established by the experts from AŠTI.

In order to evaluate all the efforts to achieve smoking cessation several models were developed. With the aim to assist in country-level implementation of the

WHO FCTC the 'MPOWER' was introduced in 2008 as a package of six evidence-based tobacco control demand reduction measures:

- **M**onitor tobacco use and prevention policies
- **P**rotect people from tobacco smoke
- **O**ffer help to quit tobacco use
- **W**arn about the dangers of tobacco
- **E**nforce bans on tobacco advertising, promotion and sponsorship
- **R**aise taxes on tobacco.

Aljinović Barać et al. (2018) investigated tobacco control activities in Croatia. They used two well framed international measures which quantify the implementation of tobacco control policies at the country level: MPOWER and Tobacco Control Scale (TCS). The MPOWER report showed Croatia has excelled in monitoring (by providing representative and periodic data on tobacco consumption of adults and youth) and in taxation (since more than 75 percent of retail price is tax), both expressed by dark blue color in Figure 4.2. Much effort is made for treatment of tobacco dependence (cessation programs) and enforcing bans on tobacco advertising, promotion and sponsorship (expressed by blue color in Figure 4.2.) but Croatia has to do more regarding policies on smoke-free environments, health warnings on tobacco packages, organizing national anti-tobacco campaigns (light blue color in Figure 4.2.). Grey color in mass media cell means that no national campaign was conducted between July 2014 and July 2016 with duration of at least three weeks.

Summary of Croatian achievement according MPOWER requirements is graphically illustrated in the Figure 4.2.

| M | P | O | W | E | R |
|------------|---------------------|----------------------|-------------------------------|------------------|---|
| MONITORING | SMOKE-FREE POLICIES | CESSATION PROGRAMMES | HEALTH WARNINGS MASS MEDIA | ADVERTISING BANS | TAXATION CIGARETTES LESS AFFORDABLE SINCE 2008 |
| | | | | | |
| | | | | | YES |

Figure 4.2: Summary of MPOWER measures for Croatia

Source: World Health Organization Report on the Global Tobacco Epidemic (2017)

Aljinović Barać et al. (2018) noticed that when first introduced in the TCS report (for the year 2013), Croatia gained TCS score of 40 and in 2016 that score was 45 so the progress was detected. According to the TCS report in 2016, first ranked was United

Kingdom with score of 81 (maximum is 100 points). Among 35 European countries that were assessed, Croatia was ranked 23rd (Joossens and Raw, 2017). The analysis shows that tobacco control spending per capita by the government, expressed in Power Purchasing Standards, is quite low in Croatia (scoring 1 of 15). Large direct health warnings are also low rated (scoring 1 of 10). According to this methodology of assessing tobacco control activities, Croatia is best rated when comprehensive bans on tobacco advertising and promotion are concerned (scoring 12 of 13). The weighted average price for cigarettes, taking into account Purchasing Power Standards, gained 16 out of 30 points. Croatia has much to do regarding treatment to help smokers to stop smoking (scored 4 out of 10 points). Also, smoke-free public places, especially bars and restaurants as well as work place need to be more regulated in order to comply with the European Council Recommendation of 30 November 2009 on Smoke-free Environments (2009/C 296/02). To sum up, tobacco control activities are in progress and Croatia should be able to improve its tobacco control score in the coming years (Joossens and Raw, 2017).

When evaluating tobacco control in Croatia, Aljinović Barać et al. (2018) came to a conclusion that Croatia is making progress but still has much to do in order to achieve better results in smoking cessation and tobacco consumption prevention.

4.3. Relevant legislation for tobacco control

Strong legislation is one of the main components to curb the tobacco epidemic and associated health damage (Sebrić et al., 2005). Effective tobacco control needs to be comprehensively regulated (Donnelly and Whittle, 2008; Mons et al., 2013; Brose et al., 2017; Nanninga et al., 2018). There are few regulations regarding tobacco control in Croatia. Tobacco and related products are covered under several laws and regulations: Tobacco Act (Official Gazette, No. 69/1999, 14/2014), Act on Restrictions on the Use of Tobacco and Related Products (Official Gazette, No. 45/2017), Occupational Safety Act (Official Gazette, No. 71/2014), Excise Duty Act (Official Gazette, No. 22/2013 to 115/2016), Ordinance on Excise Duties (Official Gazette, No. 1/2017, 14/2017) and Ordinance on Processing of Tobacco, Manufacturing and Branding Tobacco Products (Official Gazette, No. 69/2006).

Tobacco production in Croatia is regulated by the **Tobacco Act** (Official Gazette, No. 69/1999, 14/2014). It also regulates the purchase, processing and the trade of tobacco and tobacco products in Croatia. Tobacco products are non-aromatic tobacco types: Virginia warm air-dried, burley dried in shade and Herzegovina tobacco dried in the sun. The other tobacco types can exceptionally be produced in Croatia under conditions and in the manner prescribed by Tobacco Act. According

to this Act, production of tobacco is considered to be the production of tobacco crops, tobacco production in the field, harvesting, drying, sorting and packaging of tobacco at the producers while the production of tobacco products refers to industrial processes of manufacturing and packaging of tobacco products intended for smoking, chewing or sniffing. Tobacco treatment is considered to be industrial sorting and industrial fermentation of tobacco, and other activities in the technological processing and packaging of tobacco. This act also regulates the tobacco production contract (concluded between tobacco producers and tobacco processors) which must include: data on the cadastral plot and the area of agricultural land on which to sow tobacco, the name of the type and variety of tobacco to be sown, the way in which the Contracting Parties provide seed or tobacco seedlings, obligations regarding the application of measures to control plant diseases and pests on tobacco, and the application of other mandatory breeding measures, the price of manufactured tobacco per class which the tobacco processor will pay to the producer, the producer's obligation to deliver the manufactured tobacco to the tobacco processor within the contractual period, and the obligation of the tobacco processor to take over and pay for the manufactured tobacco, and the tobacco producer's declaration that he did not conclude tobacco production contract with the other tobacco processor for the same area and the same period.

Ordinance on Processing of Tobacco, Manufacturing and Branding Tobacco Products (Official Gazette, No. 69/2006) defines the conditions to be met by tobacco processors, and the content, form and manner of keeping the Tobacco Developer's Record, the conditions to be met by tobacco product manufacturers, and the content, form and manner of keeping the Tobacco Producers' Record, the manner of establishing and verifying the characteristics of tobacco products on the basis of the criteria laid down in the Tobacco Act where cigarettes are grouped and the content, form and manner of keeping the Register of Marks on Tobacco Products Placed on the Market in Croatia, the content, form and manner of keeping the Register of Importers and Exporters of Tobacco and Tobacco Products, the content, form and manner of keeping records as well as the report on the changes that have been made in the course of the year, which are mandatory for tobacco manufacturers, producers of tobacco products and importers of tobacco and tobacco products.

Tobacco consumption in Croatia is prohibited on the working place according to the ***Occupational Safety Act*** (Official Gazette, No. 71/2014) which is in line with the ***Act on Restrictions on the Use of Tobacco and Related Products***.

Few Directives of the European Union are transposed into the legal order of Croatia by Occupational Safety Act. Its purpose is a systematical improvement of safety and health protection of employees and persons at work, prevention of injuries at work, occupational diseases and other work-related diseases. In article 57 this act prescribes the protection of non-smokers in the workplace in the way that employer shall implement measures protecting non-smokers from tobacco smoke. Smoking in the workplace and during work-related meetings shall be prohibited. By way of derogation from those provisions, employer may allow smoking only in a designated room or area with a smoking permitted sign.

Act on Restrictions on the Use of Tobacco and Related Products (Official Gazette, No. 45/2017) lays down measures to reduce and restrict the use of tobacco and related products, harmful ingredients of tobacco and related products, and mandatory marks to appear on the packaging of tobacco and related products, preventive measures against smoking, and supervision of the implementation of this Act, with a view to protecting human health, especially for young people, and meeting the obligations under the WHO Framework Convention for Tobacco Control. This Act is in line with the Directive 2014/40/EU of the European Parliament and of the Council of 3 April 2014 on the approximation of the laws, regulations and administrative provisions of the Member States concerning the manufacture, presentation and sale of tobacco and related products and other EU related regulations. This Act prescribes maximum emission levels for tar, nicotine, carbon monoxide and other substances. Health warnings (a warning concerning the adverse effects on human health of a product or other undesired consequences of its consumption, including text warnings, combined health warnings, general warnings and information messages) are also regulated and this Act prescribes that each unit packet of a tobacco product and any outside packaging must carry the health warnings (in the Croatian language and Latin script). These health warnings must cover the entire surface of the unit packet or outside packaging that is reserved for them and they cannot be commented on, paraphrased or referred to in any form. According to the Act on Restrictions on the Use of Tobacco and Related Products (Article 9, Paragraph 3), the health warnings on a unit packet and any outside packaging must be irremovably printed, indelible and fully visible, including not being partially or totally hidden or interrupted by tax stamps, price marks, security features, wrappers, jackets, boxes, or other items. On unit packets of tobacco products other than cigarettes and roll-your-own tobacco in pouches, the health warnings may be affixed by means of stickers, provided that such stickers are irremovable. The health warnings must remain intact when opening the unit packet other than packets with a flip-top lid, where the health warnings may be split when opening the packet, but only in a manner that ensures the graphical

integrity and visibility of the text, photographs and cessation information. Thus, the health warnings must not hide or interrupt the tax stamps, price marks, tracking and tracing marks, or security features on unit packets. On the other hand, the health warnings can be combined (made of a combination of a text warning and a corresponding photograph or illustration) following many details prescribed by this Act regarding dimensions, content and layout. Thus, the manufactures must ensure that the text warning and cessation information are left aligned and centered vertically and printed in *Neue Frutiger* using uniform font size. The text of the health warnings is clearly defined as follows: Smoking causes 9 out of 10 lung cancers; Smoking causes mouth and throat cancer; Smoking damages your lungs; Smoking causes heart attacks; Smoking causes strokes and disability; Smoking clogs your arteries; Smoking increases the risk of blindness; Smoking damages your teeth and gums; Smoking can kill your unborn child; Your smoke harms your children, family and friends; Smokers' children are more likely to start smoking; Quit smoking – stay alive for those close to you; Smoking reduces fertility; Smoking increases the risk of impotence.

Layout and shape of the combined health warnings is strictly prescribed. The photograph (from the picture library set by this Act) must occupy at least 50 percent of the surface area of the combined health warning, the text warning at least 30 percent and the cessation information at least 10 percent but no more than 12 percent of the surface area of the combined health warning inside the outer black border. Manufacturers are obliged to ensure that none of the three elements of the combined health warning is split upon opening of the unit packet.

In Croatia it is strongly forbidden to directly or indirectly **promote and advertise tobacco and tobacco products**. According to the Act on Restrictions on the Use of Tobacco and Related Products (Official Gazette, No. 45/2017), it is prohibited to sponsor the events, activities or individuals with the aim, effect or likely effect of, directly or indirectly, promoting tobacco and related products, including smokeless tobacco products and herbal products for smoking, electronic cigarettes, refill containers and single use cartridges. Needless to say, it is forbidden to sell tobacco and related products, including smokeless tobacco products and herbal products for smoking, electronic cigarettes, refill containers and single use cartridges to persons under 18 years of age.

Many different measures for the tobacco related products restriction and reduction are defined. On the aforementioned, it is prohibited to smoke and consume tobacco and related products, including smokeless tobacco products, electronic cigarettes and herbal products for smoking, during public performances or to show persons smoking or consuming the products referred to in this paragraph on

television. Also, publishing photographs or drawings of persons smoking in the press (for promotional purposes) is banned. This Act strongly forbids smoking of tobacco and related products or herbal products, and to use nicotine-containing or non-nicotine-containing electronic cigarettes and water pipes in all indoor public places and in the area situated less than 20 meters away from the entrance to a healthcare facility and educational establishment.

In order to enhance the prevention against smoking, Croatian government has set different measures. Act on Restrictions on the Use of Tobacco and Related Products (Official Gazette, No. 45/2017) prescribes that educational institutions (during their regular education activities) should promote awareness of the harmful effects of use of tobacco and related products on the health of children and youth of all ages. Inspectional supervision of the implementation of this Act shall be carried out by sanitary inspectors, health inspectors, education inspectors, labor inspectors, market inspectors, electricity and heating inspectors and authorized customs officers, within the respective powers vested in them by the law.

Tracking tobacco and tobacco products is quite strict in Croatia. The Ordinance on Excise Duties (Official Gazette, No. 1/2017 and 14/2017) prescribes the records of tobacco and tobacco products import and sale. Those records are kept to ensure all the data on tobacco products required for the calculation and payment of excise duty, in particular the data on: quantities produced, quantities in production, warehouses or other business premises, quantities of raw tobacco and tobacco products received in warehouses from another EU Member State and/or third country or third territory, the quantities of products released for consumption for which the obligation to calculate and pay excise duties has been incurred according to the prescribed heights and amounts, the quantities of tobacco products dispatched to exports or to another Member State, the quantities of tobacco products for own consumption within the warehouse, dispatched quantities of tobacco products in the system of postponement of excise duty between the warehouse of the same producer or excise warehouse of the same authorized excise warehouse keeper, amounts charged and paid excise, and stock status.

Taxation of tobacco products in Croatia is regulated by Excise Duty Act (Official Gazette, No. 22/2013, 32/2013, 81/2013, 100/2015, 120/2015 and 115/2016) and Ordinance on excise duties (Official Gazette, No. 1/17 and 14/17). Those regulations mainly incorporate European excise institutes into the legislation of Croatia and harmonize Croatian excise duties with the minimum amounts of excise rates prescribed in EU directives. According to Excise Duty Act (Official Gazette, No. 22/2013 to 115/2016) the subject of taxation is tobacco products that are consumed in the territory of Croatia, which are considered cigarettes, cigarettes,

cigarillos and smoking tobacco (fine cut smoking tobacco and other smoking tobacco). Economic entities wishing to carry out the activity of production, import, receipt and delivery of tobacco products should be registered in Croatia as an authorized warehouse-keeper, registered consignee or occasionally registered consignee and importer or obtain the approval of the competent customs office for one of these statuses, depending on the business needs. Tobacco products between EU Member States can only move in the system of postponement of excise duty payments using the EMCS system. In addition, the consignor and the consignee must have the appropriate approval for dispatch or receipt of tobacco products in the system of postponement of excise duty.

To sum up, laws and regulations in Croatia set to reduce and restrict the consumption of tobacco related products are in line with the latest global trends in tobacco control. Since the main tobacco control legislative framework is prescribed in 2017 by the Act on Restrictions on the Use of Tobacco and Related Products (Official Gazette, No. 45/2017), the real effects are yet to be determined.

4.4. Impact of tobacco taxation on the price of the tobacco products

4.4.1. Tax structure types

In order to instigate the smoking cessation various international initiatives highly recommend increased tobacco taxation as a significant tool of tobacco control (Bader, Boisclair and Ferrence, 2011; Guindon et al., 2014; Cobiac et al., 2015; Aljinović Barać et al., 2018; Shang et al., 2018).

Besides the excise tax increase, it is crucial to implement an effective tax structure. Shang et al. (2018) noted that there are in total six different types of tax structures: specific uniform (quantity based, a single rate), specific tiered (quantity based, multiple rates), ad valorem uniform (value based, a single rate), ad valorem tiered (value based, multiple rates), mixed uniform (both quantity based and value based, single rates) and mixed tiered (both quantity based and value based, multiple rates). This study shows that complicated tax structures, particularly tiered structures, are associated with a 6 percent–11 percent higher cigarette consumption among smokers. In addition, a greater share of ad valorem component among total excise taxes is also positively associated with cigarette consumption (34 percent–65 percent). These findings indicate that the effectiveness of increasing taxes in decreasing cigarette demand may be undermined by complicated tax structures that deviate from a specific uniform one.

Empirical results of their study (Shang et al., 2018) are supporting the WHO FCTC's recommendation of simplifying tax structures since it may increase the effectiveness of taxes in reducing cigarette consumption.

Croatia joined the EU on July, 1st 2013 so the taxation harmonization (with the EU regulations) process continued. Croatia implemented the EU Directive 2011/64 that defined the tobacco product categories, structure and minimum rates for excise duties on manufactured tobacco. EU countries use mixed uniform excise tax structure. EU excise duty rules broadly differentiate between cigarettes and other tobacco products. According to the mentioned EU Directive, excise duty on cigarettes must consist of two components: a specific component i.e. a fixed amount per 1000 cigarettes and an ad valorem component i.e. a percentage of the retail selling price. These two components must be the same for cigarettes of all price categories. The Directive prescribes the minimum rates which Member States must respect but they can set greater rates as well. For the other tobacco products (cigars, cigarillos, fine cut smoking tobacco) Member States can choose between a specific duty or an ad valorem duty, or may apply a mixture of the two. Minimum rates for cigars, cigarillos and fine cut smoking tobacco are set out by the same Directive and Member States are free to apply national rates above these minima.

4.4.2. Tobacco tax structure and effects on prices

Member States have to levy a minimum rate of excise duties on cigarettes and this minimum rate must consist of a specific component of between 7.5 percent and 76.5 percent of the total tax burden (TTB) - expressed as a fixed amount per 1000 cigarettes, and an ad valorem component - expressed as a percentage of the maximum retail selling price.

In addition, the overall excise rate must be at least EUR 90 per 1000 cigarettes and at least 60 percent of the weighted average retail selling price. It must be pointed out that EU Member State that applies excise duty of EUR 115 or more, however, does not need to comply with the 60 percent criterion mentioned above¹.

Taxation of cigarettes in Croatia is presented in Table 4.1 while the taxation of cigars and cigarillos, fine cut smoking tobacco (intended for rolling the cigarettes) and other smoking tobacco is shown in Table 4.2.

¹ Note: EU legislation only sets harmonised *minimum* rates. Member States are free to apply excise duty rates above these minima, according to their own national needs.

Taxation of tobacco products in Croatia is completely in accordance with EU Directive 2011/64 and according to Excise Duty Act (Official Gazette, No. 22/2013, 32/2013, 81/2013, 100/2015, 120/2015 and 115/2016), excisable products and amounts of excise duties on tobacco products are:

- Cigarettes - Specific excise: approx. 41 EUR (310 HRK) /1,000 items + Ad valorem excise: 34 percent of retail selling price; Minimum excise approx. 93 EUR (696 HRK)/1,000 pieces.²
- Cigars and cigarillos – Specific excise: approx. 80 EUR (600 HRK) /1,000 items
- Fine cut smoking tobacco and other smoking tobacco - Specific excise: approx. 80 EUR (600 HRK) /1 kg of product

All tobacco products that have been taxed are marked with fiscal control stamps of the Ministry of Finance (MF). The printed stamps are kept in the main vault of the MF in the Central Office of the Tax Administration and are delivered to the auxiliary vaults of the producers or directly taken over by the taxpayers. The person who took over the stamps is excise taxpayer and is obliged to pay the calculated excise amount to customs within a period of 30 days.

Although it is not in compliance with the EU acquis, the following tobacco products are subject to excise duties from the beginning of 2017 in Croatia:

- E-liquids - Specific excise: approx. 0 EUR (0 HRK) /1 ml of product
- Heated tobacco products (e.g. IQOS-heat sticks, Ploom tobacco capsules) - Specific excise: approx. 80 EUR (600 HRK) /1 kg of product
- New tobacco products (e.g. Hookah Squeeze steam paste, Ice Rockz steam stone, Ice Frutz Hookah gel) - Specific excise: approx. 80 EUR (600 HRK) /1 kg of product.

² Note: In the calculation of the specific excise, a cigarette is deemed to be a role of tobacco the length of which exclusive of tip or filter is up to 8 cm, two cigarettes will be deemed to be constituted by cigarettes from 8 to 11 cm, and three from 11 to 14 cm, i.e. every additional 3 cm of length of a roll of tobacco without a filter will represent an increase of one cigarette.

Table 4.1. Taxation of cigarettes

| Specific excise (per 1000 cigarettes) | | | Ad valorem excise in % (as % of TIRSP) | VAT in % (as % of TIRSP) | Ad valorem excise +VAT (as % of TIRSP) | Total tax (as % of WAP) | Current MPPC per 1000 cigarette (EUR) | WAP per 1000 cigarette (EUR) | Excise yield (EUR per 1000 cigarettes of the WAP) | Minimum excise duty (EUR per 1000 cigarette) | Overall minimum excise duty (Specific +ad valorem) (as % of WAP) |
|---------------------------------------|-------------|---|--|--------------------------|--|-------------------------|---------------------------------------|------------------------------|---|--|--|
| EUR | As % of WAP | As % of total tax (specific +ad valorem +VAT) | | | | | | | | | |
| 41.35 | 27.1 | 33.41 | 34 | 20 | 54 | 81.1 | 180.07 | 152.59 | 93.23 | 92.84 | 61.1 |

Source: European Commission (2018), Excise Duty Tables (Part III- Manufactured Tobacco)

Note: TIRSP = Tax included retail selling price (all taxes included); MPPC = Most popular price category; WAP = Weighted average price (where WAP is calculated as: Total value of all cigarettes released for consumption (TIRSP) in 2017 / Total quantity of cigarettes released for consumption in 2017)

Table 4.2. Taxation of cigars and cigarillos, fine cut smoking tobacco (intended for rolling the cigarettes) and other smoking tobacco

| Specific Excise per 1,000 (EUR) | Specific Excise per kg (EUR) | Ad Valorem Excise (as % of TIRSP) | VAT % (as % of TIRSP) | Ad Valorem Excise + VAT (as % of TIRSP) | Minimum Duty | |
|---------------------------------|------------------------------|-----------------------------------|-----------------------|---|--------------|---|
| 80.03 | - | 0 | 20 | 20 | - | - |

Source: European Commission (2018), Excise Duty Tables (Part III- Manufactured Tobacco)

The changes in taxation of tobacco products can be seen in Table 4.3 where the data regarding specific and ad valorem excise duties, VAT, total tax burden and the average retail prices are indicated for the years 2012, 2014 and 2017.

From the year 2013 significant changes in tobacco taxation occurred which resulted in higher tax burden especially when cigarettes are concerned. In the year 2012 specific excise duty per 1,000 cigarettes in Croatia was 23.93 EUR while in 2017 it was 41.55 EUR (increased approx. 73 percent). This increase affected the average retail price of the pack of cigarettes which was 2.50 EUR in 2012, 2.90 EUR in 2014 and 3.21 EUR in 2017.

Table 4.3. The changes in taxation of tobacco products and their retail prices

| Tobacco product | Tax structure and retail price | 2017 | 2014 | 2012 |
|--------------------------|--|-------------|-------------|----------------|
| Cigarettes | Specific excise (value) (EUR per 1,000) | 41.55 | 27.52 | 23.94 |
| | Specific excise (value) (EUR per pack of 20) | 0.83 | 0.55 | 0.48 |
| | Specific excise (as a % of retail price) | 26 | 19 | 19 |
| | Ad valorem excise (%) | 34 | 37 | 33 |
| | VAT (as a % of retail price) | 20 | 20 | 20 |
| | Total Tax Burden, as a % of Price ("premium price band") | 80 | 76 | 72 |
| | <i>Weighted Average Price</i> | 3.21 | 2.90 | 2.50 |
| Cigars and cigarillos | Specific excise (value) (EUR per 1,000) | 80.43 | 78.64 | 146.33; 29.27* |
| | Specific excise (value) (EUR per 1 unit) | 0.08 | 0.08 | 0.15; 0.03 |
| | Specific excise (as a % of retail price -cigars) | n/a | n/a | n/a |
| | Specific excise (as a % of retail price - cigarillos) | n/a | n/a | n/a |
| | Ad valorem excise (%) | | | |
| | VAT (as a % of retail price) | 20 | 20 | 20 |
| | Total Tax Burden, as a % of Price of cigars | n/a | n/a | n/a |
| | Total Tax Burden, as a % of Price of cigarillos | n/a | n/a | n/a |
| | <i>Average price of cigars</i> | n/a | n/a | n/a |
| | <i>Average price of cigarillos</i> | n/a | n/a | n/a |
| Fine cut smoking tobacco | Specific excise (value) (EUR per 1 kg) | 80.43 | 68.15 | 31.13 |
| | Specific excise (as a % of retail price) | 55 | n/a | n/a |
| | Ad valorem excise (%) | | | |
| | VAT (as a % of retail price) | 20 | 20 | 20 |
| | Total Tax Burden, as a % of Price | 75 | n/a | n/a |
| | <i>Average price EUR per 1 kg</i> | 146.91 | n/a | n/a |
| Other smoking tobaccos | Specific excise (value) (EUR per 1 kg) | 80.43 | 58.98 | 19.42 |
| | Specific excise (as a % of retail price) | 36 | n/a | n/a |
| | Ad valorem excise (%) | | | |
| | VAT (as a % of retail price) | 20 | 20 | 20 |
| | Total Tax Burden, as a % of Price | 56 | n/a | n/a |
| | <i>Average price EUR per 1 kg</i> | 223.19 | n/a | n/a |

Note: *different excise amounts for cigars and cigarillos in the year 2012

Source: Croatian customs administration (2018)

During the period of last 18 years (between 2000 and 2017), the retail selling price of cigarettes (using the price of one pack containing 20 sticks of the most popular type) increased 2.229 times (from 1.44 EUR to 3.21 EUR) and the main reason was taxation. The changes in tobacco taxation policies (during the observed period) with the emphasis to taxation harmonization to the EU regulation resulted in significant increase of cigarettes prices as shown in Figure 4.4.

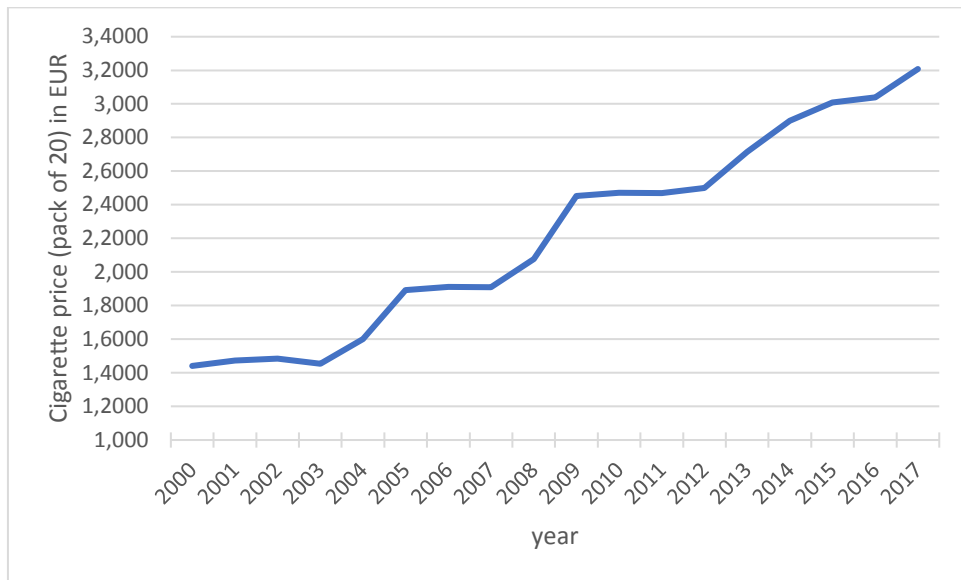


Figure 4.4: Retail selling price of the most popular pack of cigarettes in 2000-2017 period

Source: Statista and Croatian customs administration (2018)

The most prominent tobacco control system - MPOWER (introduced by World Health Organization in 2008), developed for demand reduction purposes, presented in its report that tobacco taxation in Croatia is at the highest level which means that more than 75 percent of the retail price is tax. The latest MPOWER report shows that cigarettes are less affordable. This is estimated by GDP per capita needed to buy 2000 cigarettes of the most sold brand (increased on average between 2008 and 2016).

According to the latest data issued by European Commission in 2018 - Excise Duty Tables (Part III- Manufactured Tobacco) Croatia applies all taxation regulation regarding tobacco related products according to the EU Directive 2011/64. Overall tobacco control regulation in Croatia is well assessed as shown in Table 4.4.

Table 4.4. CROATIA - Legislation summary

| FCTC ratification (year) | Minimum smoking age (years) | Tar cap (max mg) | Verbal pack health warning | Graphic pack health warning | Advertising ban or restriction | Retail point-of-sale restrictions | Public smoking ban | Restaurant/bar public smoking ban |
|--------------------------|-----------------------------|------------------|----------------------------|-----------------------------|--------------------------------|-----------------------------------|--------------------|-----------------------------------|
| Yes (2008) | Yes (18) | Yes (10mg) | Yes | Yes | Yes | Yes | Yes | Yes |

Source: Euromonitor International (2018)

Although regulation regarding tobacco taxation in Croatia is harmonized with the EU legislation further improvement regarding pricing policies should result in decrease of tobacco products consumption.

4.5. Tobacco tax revenues

Tax revenues deriving from tobacco products have been an important source for financing a variety of governmental projects and activities. For centuries, governments around the world have heeded Adam Smith's advice, imposing a variety of taxes on tobacco leaf and tobacco products. Governments have used these taxes in the pursuit of multiple goals. Historically, and still the case in many countries, the primary motivation for taxing tobacco has been revenue generation (Chaloupka, Yurekli and Fong, 2012). Taxes on tobacco products are usually easy to collect because in most of the countries there are only few producers. Revenue potential of tobacco taxes is not insignificant and many authors suggest that taxes should be increased on a regular basis.

Value added tax (VAT) in Croatia was introduced in 1998 and the standard VAT rate was 22 percent until August 1st 2009 when it increased to 23 percent. The latest change of the standard VAT rate (which is also used for tobacco products taxation) was in 2012 when it increased to 25 percent. These changes reflected on the increase of tobacco VAT revenues presented in the Figure 4.5. The rise of the standard VAT rate in 2009 and further increase in 2012 corresponds with the growth of tobacco tax revenues from VAT which peaks in 2013 (192,8 million EUR). Although governmental tobacco revenues from VAT decreased after 2013, the overall tobacco revenues slightly increased because of the new regulation regarding excise duties (Excise Duty Act, Official Gazette, No. 22/2013 to 115/2016). From the year 2013 (when Croatia joined EU), excise duty tax on tobacco products became more efficient fiscal tool in generating governmental revenues than VAT.

Excise duty tax on tobacco products was 447.8 mil EUR in 2013 while in 2016 Croatian government collected 32.7 percent more (594.3 mil EUR).

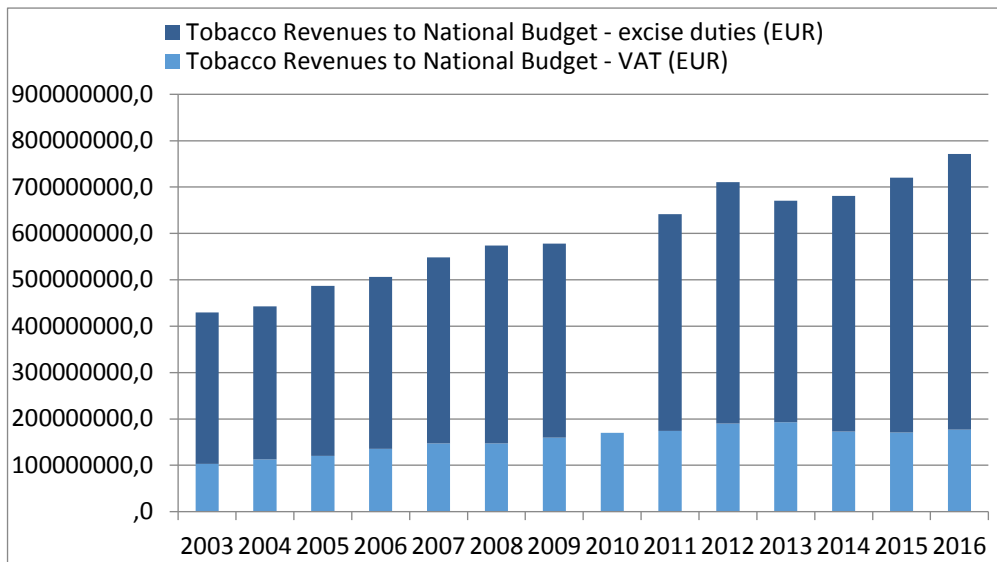


Figure 4.5. Tobacco tax revenues from VAT and excise duties, 2003-2016

Source: Authors' calculation according to data from Ministry of Finance of Republic of Croatia (2018)

Note: 2010 year data (excise duties) is missing

The total amount of budget revenues gained from the sale of tobacco products and the share of the total tobacco tax as a percentage of revenues of Croatian national budget is shown in the Figure 4.6. Although the data for year 2010 is missing, it can be noticed that amount of total tobacco tax revenues has increased from 2003 to 2016, while the share of tobacco revenues in national budget has not followed this trend. During the observed period the share of tobacco tax revenues in national budget varied from the lowest 3.77 percent in 2008 to 5.29 percent in 2015. Last recorded percentage in 2016 remains at similar level of 5.26 percent.

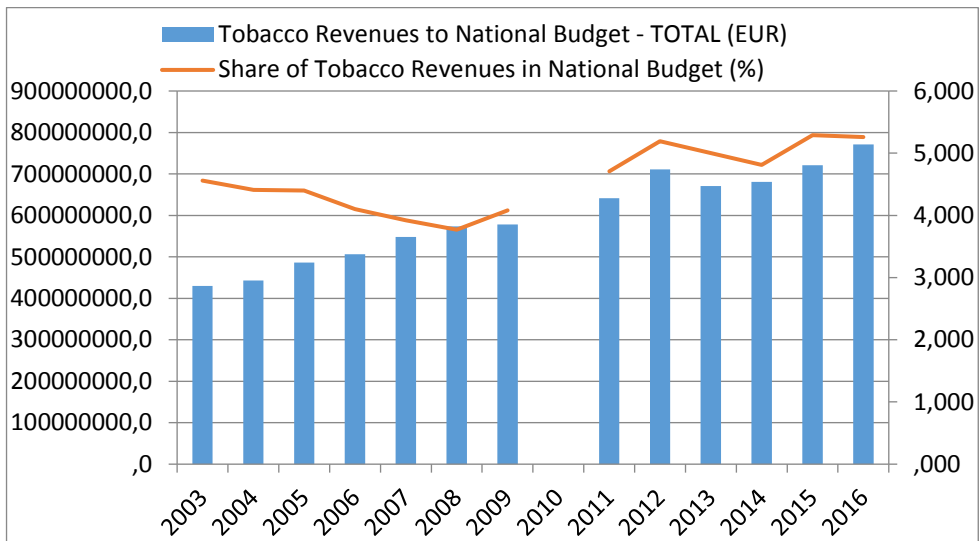


Figure 4.6. Total Tobacco tax revenues and share of tobacco tax revenues in national budget, 2003-2016

Source: Authors' calculation according to data from Ministry of Finance of Republic of Croatia (2018)

Note: 2010 year data is missing

High taxes on tobacco products are widely promoted. The double dividend from tobacco taxation can be achieved through investing of collected revenue into social and environmental spending, including on the provision of universal health coverage. Article 6 of the WHO FCTC and its guidelines for implementation recommend that countries dedicate revenue to fund tobacco control and other health promotional activities. More than 700 million of EUR collected in Croatia from taxation of tobacco products is not negligible and can be wisely used for tobacco control activities.

5. Elasticity of tobacco products – time series analysis (Tina Vuko, PhD)

Tobacco use has devastating global impact on health and economic prosperity. Although global smoking rate decreased in the past 30 years, especially in high-income countries, many smokers in low- and middle- income countries do not have access to education, prevention or assistance. This has led to the fact that low- and middle- income countries have been targeted by the tobacco industry through marketing and political lobbying (Walters et al., 2018).

Tobacco taxes are the most effective measure for preventing initiation and reducing tobacco consumption. Even though many factors influence the final price of cigarettes, the most important policy-related determinants of cigarette prices are taxes (Chaloupka et al., 2010). Measuring the responsiveness of tobacco demand to the changes in the price of cigarettes and income has been of a great interest to researchers, policy makers, industry specialists etc. A large number of studies provide consistent evidence that higher tobacco prices lead to significant reductions in cigarette smoking. Most of these studies estimate the price elasticity of demand in the range from -0.25 to -0.50, and findings from low and middle income countries imply even larger elasticity coefficients (Chaloupka et al., 2010). Ross and Al-Sadat (2007) state that international research shows that 10 percent increase in cigarette price can reduce cigarette consumption by 4 percent-8 percent and most countries fall into this range. However, some countries can show different price elasticity because of specific cultural or social factors. Having an estimated cigarette price elasticity of demand for a specific country is very useful for planning purposes and it enables precise estimation of how much tobacco tax increase will affect government revenues and tobacco use.

Although there are many studies on this topic globally, there is no similar research for Croatia or for countries in Western Balkans. Smoking is a serious public health problem in Croatia. The aim of this study is to assess the responsiveness of Croatians to a change in cigarette prices.

In this study, we estimate price and income elasticities of cigarette demand in Croatia using secondary aggregate time-series data from 2000 to 2017. We apply

an Autoregressive Distributed Lag (ARDL) cointegration framework to examine the short-run and long-run characteristics of cigarettes demand in Croatia.

5.1. Demand model and data

The starting point in estimating the price and income elasticities of demand for cigarettes is to specify a demand equation. According to the standard economic theory of demand, quantity of cigarettes consumed is a function of the price of cigarettes, income, prices of complements and substitutes and other specific factors.

In this study, demand model specification is defined as simple as possible (i.e. we used only the most important variables suggested by the economic theory) for several reasons. First, we use annual time-series data covering the period of 18 years (2000-2017) and because of small number of observations we need to limit the number of independent variables in order to conserve degrees of freedom. Second, variables selection is also influenced by the availability of a sufficiently long data series for each of the possible variables that may be included in the demand model. Third, there is likely to be high degree of collinearity between independent variables in the aggregate time-series data (Wilkins, Yurekli and Hu).

To estimate the demand for cigarettes, we used the following annual conventional model in linear functional form:

$$cons_ap_t = b_0 + b_1rcpi_t + b_2rb_wag_t + b_3tpi_t + \varepsilon_t \quad (5.1)$$

Data variables are as follows:

$cons_ap_t$ = consumption of cigarettes in year t per adult

$rcpi_t$ = real tobacco consumer price index in year t ;

rb_wag_t = real gross wages per person employed in EUR in year t ;

TPI_t = index of smoking restrictions in year t ;

ε_t = error term.

Dependent variable - **the annual cigarette consumption per adult ($cons_ap$)** is used as a measure of smoking prevalence and smoking intensity. It was calculated using the Croatian Ministry of Finance - Customs Administration data on cigarettes production and foreign trade, defined as the number of cigarettes sticks produced minus the number of cigarettes sticks exported plus the number of cigarettes sticks

imported. A per adult consumption measure is obtained by dividing total cigarettes consumption by the size of adult population (i.e. population of age 15 and older) per year. Data on the number of adults is collected from the World Bank World Development Indicators (WDI) database. The size of the adult population is used to control for the influence of population growth on aggregate sales of tobacco products. We consider cigarette consumption per adult to be a better proxy of cigarette demand than consumption per capita because smoking prevalence is much higher among adults and the proportion of adults in total population has been changing over the observed time period. Figure 5.1 shows annual number of cigarette sticks consumed per adult in Croatia 2000-2017.

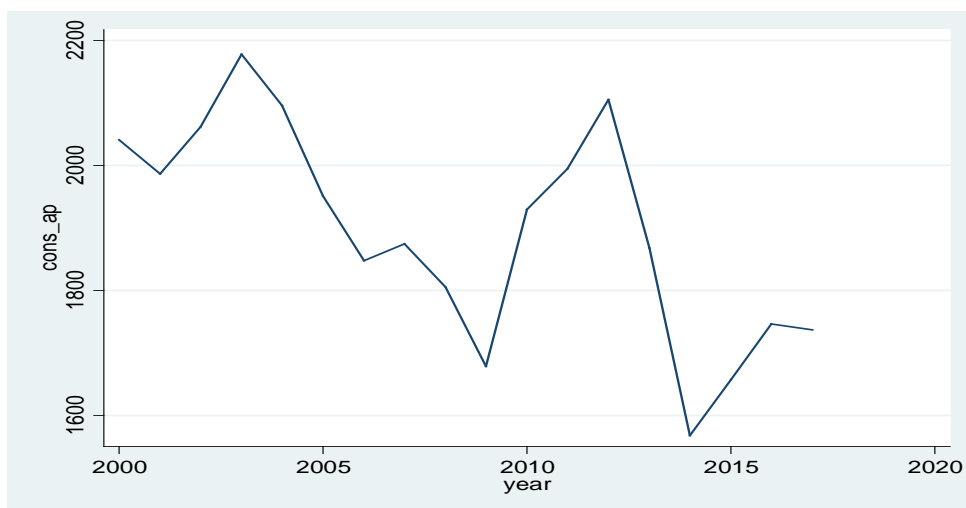


Figure 5.1. Annual number of cigarette sticks consumption per adult in Croatia 2000-2017

Source: Croatian Ministry of Finance, Customs Administrations

Notes: cons_ap indicates official cigarette consumption data from the Croatian Ministry of Finance, Customs Administrations

The real tobacco consumer price index (rcpi) measures prices of tobacco products acquired, used or paid over one year by the private households in Croatia for consumption purposes in real terms. Nominal tobacco consumer price indexes are publicly available in the Croatian Bureau of Statistics database. However, they are given as chain indexes for 2000-2004 periods and as cumulative index using 2015 as a reference year for years afterwards. Therefore, we first converted them into the cumulative index (2015=100) for the whole period and then divided them with

general consumer price index of all goods in order to calculate the real tobacco CPI. The real tobacco consumer price index is presented graphically in Figure 5.2.

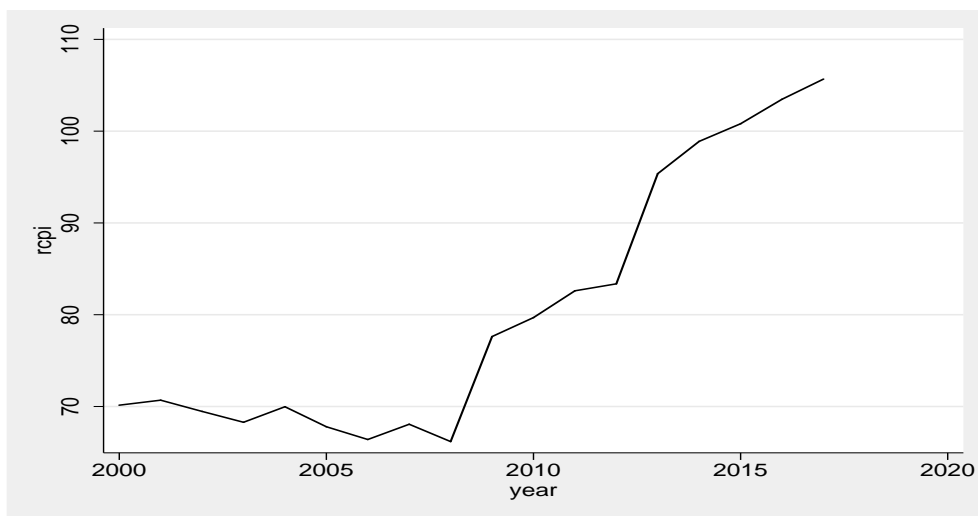


Figure 5.2. Real tobacco consumer price index (rcpi) in Croatia from 2000 to 2017

Source: Croatian Bureau of Statistics

Beside *rcpi* variable, we use two additional measures of cigarette prices: **real weighted-average retail cigarette prices (rcp_wap)** and **real cigarette prices of the most sold cigarette brand (rcp_ms)**. Weighted-average prices (*rcp_wap*) are calculated using the official Croatian Ministry of Finance - Customs Administration data on weighted-average retail price of a pack containing 20 cigarettes. They are deflated to real terms using the general Consumer Price Index provided by the Croatian Bureau of Statistics and converted from Croatian national currency (HRK – Croatian kunas) to Euros (EUR) using average annual exchange rates provided by the Croatian National Bank. However, the official data on weighted-average retail price of cigarettes were not available for years before 2011, so instead of official weighted-average prices, prices for 2000-2010 are based on the price of the most popular cigarette brand in Croatia - Ronhill (Croatian competition Agency, 2007) collected from Zigsam database (www.zigsam.at). It is important to note that for 2011 we did not have any data for the average cigarette price or for the most sold brand price, so we estimated the price for 2011 using interpolation. Real cigarette prices of the most sold cigarette brand (*rcp_ms*) are based on the data provided by

Croatian Ministry of Finance - Customs Administration and on data from Zigsaw database for 2000-2010 period. Data in 2011, 2013 and 2015 were missing, so we estimated the price using interpolation. We used the same procedure to convert prices into Euros and deflate them to real terms as for rcp_wap.

The rcp_wap and rcp_ms are presented graphically in Figure 5.3.

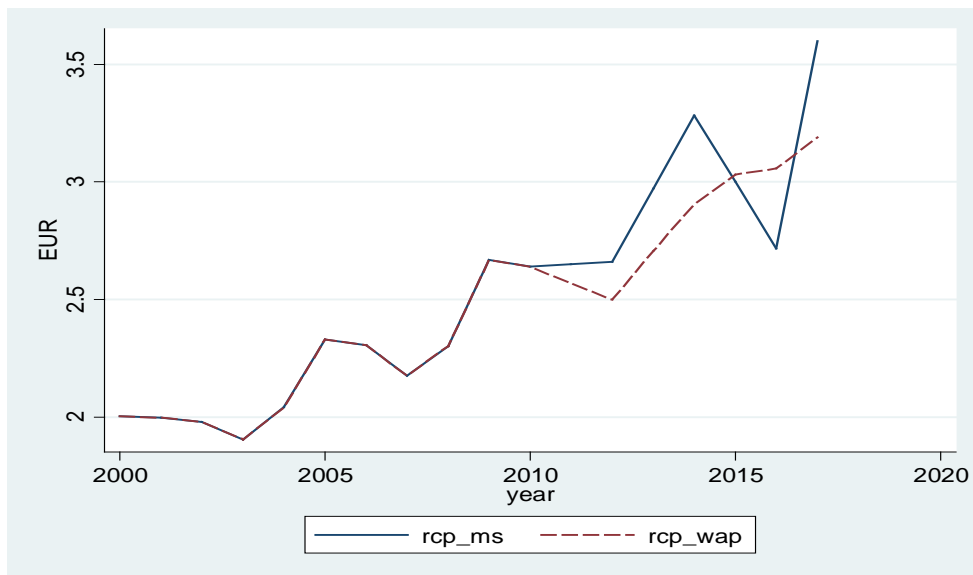


Figure 5.3. Real weighted-average cigarette prices (rcp_wap) and real prices of the most sold brand (rcp_ms) in EUR in Croatia from 2000 to 2017

Source: Croatian Ministry of Finance, Customs Administrations; Zigsaw database

Nominal prices of pack of cigarettes in national currency have not decreased in any year during the observed time period. Even though real prices of cigarettes generally have steady upward trend as well, they have slightly decreased in 2001-2003, 2006-2007 and 2012 time periods. It is important to emphasize that changes in the cigarette prices of the most sold cigarette brand can also be affected by the shifts in consumption from the more expensive to the less expensive brand. This can cause a decrease or increase in the value of variable rcp_ms even when the overall prices of cigarette brands remain the same, as it was the case in our data for year 2016.

As we can see from Figure 5.2. and Figure 5.3, there is a sharp increase in prices since 2009. This sharp increase in all three measures of tobacco prices could be attributed to the beginning of the process of Croatian tax legislation alignment with the EU *acquis communautaire*. Namely, the negotiations on Chapter 16 – Taxation were opened on 2 October 2009.

Similar pattern of price trends is also confirmed by correlation coefficients. All three proxies of tobacco prices are highly correlated ($r_{rcpi,rcp_ms} = 0.88$, $r_{rcpi,rcp_wap} = 0.91$, $r_{rcp_ms,rcp_wap} = 0.94$) indicating that selected measures are consistent and, therefore, reliable. However, we place the highest reliance on the rcpi price proxy because there were no gaps in the data during the observed period and all the data were provided by Croatian Bureau of Statistics, so our preferred model estimation is the one using real tobacco price index (rcpi) as cigarette price proxy.

Our model of cigarette demand is controlled for the impact of income and tobacco regulatory environment. We used **average real gross wages (rbwag)** as a proxy of available income. The data on average monthly nominal gross wages have been collected from the Croatian Bureau of Statistics³. Based on this data, we calculated annual gross wages, deflated them to real terms using the general Consumer Price Index and converted them into Euros. Figure 5.4. shows average real gross wages (rbwag) from 2000 to 2017 in Croatia.

³ The data on average monthly gross wages are based on regular monthly survey covering 70 percent of persons in employment in each NACE Rev2. (2007) division. Data on wages are collected by the report form (RAD-1) to be filled in by legal entities on the basis of their respective payrolls in legal entities of all types of ownership, on the territory of the Republic of Croatia.

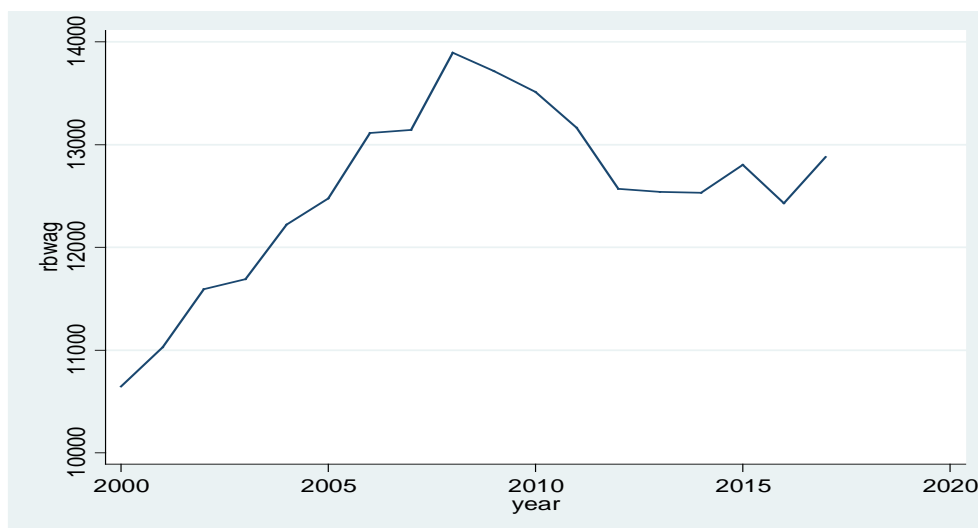


Figure 5.4. Average real gross wages (rbwag) in EUR in Croatia 2000-2017

Source: Croatian Bureau of Statistics

To control for smoking restrictions, a set of policy or event variables that capture the tobacco control environment in Croatia was created, for each of the time periods under analysis. Government measures for smoking restrictions are mainly regulated by Act on Restrictions on the Use of Tobacco and Related Products (Official gazette, No.45/2017) and by Occupational Safety Act (Official gazette, No.71/2014). Therefore, we constructed the variable ARUT, which takes the value of 1 for 2000-2008, the value of 2 for 2009, the value of 3 for 2010-2012, the value of 4 for 2013-2016 and the value of 5 for 2017 to reflect the adoption of Act on Restrictions on the Use of Tobacco and its amendments⁴. Also, new variable OSA is assigned the value of 1 for 2000-2013 and the value of 2 for 2014-2017 to reflect amendments of Occupational Safety Act regarding smoking restrictions. Finally, we constructed variable **Tobacco policy index (TPI)** as the sum of variables ARUT and OSA to measure the overall intensity of smoking restrictions.

The time-series data used in this study are summarized in Table 5.1.

⁴ Tobacco control variables capture the strength of tobacco control policies. Each new amendment to the law increases the level of tobacco use restrictions.

Table 5.1. Cigarette consumption, prices of cigarettes and real income in Croatia, 2000-2017

| Year | cons_ap | tpi | rcp_ms | rcpi | rcp_wap | rbwag |
|-------------|----------|--------|--------|---------|---------|-----------|
| 2000 | 2041.399 | 2 | 2.004 | 70.144 | 2.004 | 10645.067 |
| 2001 | 1986.970 | 2 | 1.998 | 70.690 | 1.998 | 11029.886 |
| 2002 | 2062.138 | 2 | 1.980 | 69.464 | 1.980 | 11591.235 |
| 2003 | 2178.387 | 2 | 1.906 | 68.281 | 1.906 | 11691.198 |
| 2004 | 2096.329 | 2 | 2.042 | 69.974 | 2.042 | 12221.325 |
| 2005 | 1951.298 | 2 | 2.330 | 67.795 | 2.330 | 12477.620 |
| 2006 | 1847.788 | 2 | 2.306 | 66.405 | 2.306 | 13113.605 |
| 2007 | 1874.840 | 2 | 2.176 | 68.066 | 2.176 | 13143.937 |
| 2008 | 1805.838 | 2 | 2.302 | 66.179 | 2.302 | 13894.665 |
| 2009 | 1678.738 | 3 | 2.669 | 77.622 | 2.669 | 13718.504 |
| 2010 | 1930.039 | 4 | 2.639 | 79.687 | 2.639 | 13511.613 |
| 2011 | 1995.140 | 4 | 2.650 | 82.606 | 2.569 | 13163.177 |
| 2012 | 2105.644 | 4 | 2.661 | 83.365 | 2.500 | 12570.936 |
| 2013 | 1868.294 | 5 | 2.972 | 95.370 | 2.707 | 12541.421 |
| 2014 | 1568.105 | 6 | 3.283 | 98.887 | 2.905 | 12533.038 |
| 2015 | 1657.113 | 6 | 3.000 | 100.806 | 3.032 | 12804.813 |
| 2016 | 1746.764 | 6 | 2.717 | 103.473 | 3.057 | 12429.373 |
| 2017 | 1737.493 | 7 | 3.598 | 105.672 | 3.189 | 12879.653 |
| Mean | 1896.24 | 3.50 | 2.51 | 80.25 | 2.46 | 12553.39 |
| (SD) | (172.48) | (1.74) | (0.48) | (14.26) | (0.41) | (875.92) |

Notes: *cons_ap* indicates official cigarette consumption data from the Croatian Ministry of Finance, Customs Administrations; *tpi* indicates tobacco policy index as rank variable measuring overall intensity of smoking restrictions; *rcp_ms* indicates real prices of the most sold brand; *rcpi* indicates real tobacco consumer price index; *rcp_wap* indicates weighted-average cigarette prices; *rbwag* indicates average real gross wages.

5.2. Empirical analysis

To estimate cigarette demand model as specified in the previous section, first it was necessary to determine individual time series properties of the selected variables. If the dependent variable and some or all of the covariates are nonstationary, then statistical inference of parameter estimates in the model using ordinary least squares (OLS) might not be efficient and consistent. Nevertheless, if this is a case, simple correction may be applied to the standard OLS by using appropriate cointegration techniques. Therefore, we began our empirical analysis by testing variables for non-stationarity in order to determine the order of integration of each time series using Augmented Dickey-Fuller (ADF) test. We applied a sequential testing procedure with intercept, trend, and lagged variables. The lag length is defined using appropriate information criteria (i.e. final prediction error (FPE), Akaike's information criterion (AIC), Schwarz's Bayesian information criterion (SBIC), and the Hannan and Quinn information criterion (HQIC). The results of unit root testing are presented in Table 5.2.

Table 5.2. ADF Test Results for Croatian Cigarette Demand Data, 2000–2017

| Variable | Testing whether Stationary in: | Trend | Intercept | Number of Lags | Z (t) value | Order of Integration |
|-------------------------------------|--------------------------------|-------|-----------|----------------|-------------|----------------------|
| Consumption (cons_ap) | Levels | Yes | Yes | 1 | -3.690** | I(0) |
| Real tobacco CPI (rcpi) | Levels | No | No | 0 | 2.250 | I(1) |
| Real tobacco CPI (rcpi) | First differences | Yes | No | 0 | -4.564*** | I(0) |
| Real retail price of cig. (rcp_ms) | Levels | Yes | Yes | 1 | -6.120*** | I(0) |
| Real retail price of cig. (rcp_wap) | Levels | No | No | 3 | -4.54*** | I(0) |
| Real gross wages (rbwag) | Levels | Yes | No | 2 | -0.954 | I(1) |
| Real gross wages (rbwag) | First differences | No | No | 1 | -1.675* | I(0) |

*Note: Z(t) is compared with adequate test critical values; *indicates significance at the 10% level; **indicates significance at 5% level; ***indicates significance at 1% level; critical values of Dickey-Fuller t statistics (τ_t , τ_μ and τ) and F statistics (ϕ_1 , ϕ_2 and ϕ_3) at the 1%, 5%, and 10% significance level is used*

The test results indicate that our measure of consumption (cons_ap) is integrated at zero order, that is, it is stationary in levels I(0). Regarding the cigarette price measures, we have different situations. The real tobacco CPI (rcpi) is integrated at first order, that is, it is stationary at first differences I(1). However, both real cigarette prices of the most sold cigarette brand (rcp_ms) and real weighted-average retail cigarette prices (rcp_wap) are stationary at their levels I(0), so we can reject the null hypothesis that variables have a unit root. Finally, income variable (rbwag) is not stationary at levels, but it is stationary at first differences I(1) since the 10 percent critical value for the reported Z(t) test statistic is -1.600. However, since a structural change in time series can influence the results of test for unit roots, we have also conducted Zivot-Andrews unit root test (see Appendix – Table A). The results of the Zivot-Andrews test have confirmed that consumption variables, real cigarette prices of the most sold cigarette brand and real weighted-average retail cigarette prices are stationary at levels or I(0), while real tobacco CPI and income variable are stationary at first differences, that is they are integrated at first order or I(1).

Before estimating the demand function, we tested cointegration relationship among the variables. We used Autoregressive distributive lag (ARDL) or Bounds cointegration technique. ARDL cointegration technique is preferable when variables are integrated of different order (I(0), I(1)).

According to Pesaran, Shin and Smith (2001) the ARDL approach to cointegration analysis has an advantage of yielding consistent estimates of the long-run coefficients that are asymptotically normal irrespective of whether the underlying regressors are I(1) or I(0). The ARDL is likely to have better statistical properties because it does not push the short-run dynamics into the residual term as in the Engle-Granger (1987) technique (Pattichis, 1999). It is robust when there is a single long run relationship between the underlying variables in the case of sample and finite sample data sizes. Finally, since each of the underlying variables stands as a single equation, endogeneity is less of a problem in the ARDL technique because it is free of residual correlation (Nkoro and Uko, 2016).

The ARDL model (p,q,...q) in general form is defined as follows:

$$y_t = c_0 + c_1 t + \sum_{i=1}^p \phi_i y_{t-1} + \sum_{i=0}^q \hat{\beta}_i x_{t-1} + u_t \quad (5.3)$$

$t = \max (p,q), \dots, T$, for simplicity assuming that the lag order q is the same for all variables in the $K \times 1$ vector x_t .

If one cointegrating vector is identified, the ARDL model of the cointegrating vector is reparametrized into ECM and the reparametrized results give short-run dynamics

and long run relationship of the variables of a single model. The ARDL is a dynamic single model equation of the same form as the ECM, while distributed lag model simply means the inclusion of unrestricted lag of the regressors in a regression function (Nkoro and Uko, 2016).

$$\Delta y_t = c_0 + c_1 t - \alpha(y_{t-1} - \theta x_t) + \sum_{i=1}^{p-1} \psi_{yi} \Delta y_{t-1} + \sum_{i=0}^{q-1} \psi_{xi} \Delta x_{t-1} + u_t \quad (5.4)$$

Following Pearsan, Shin and Smith (2001) approach, first we have obtained optimal lag orders p and q based on model selection criteria: Akaike information criteria (AIC) and Bayesian information criteria (BIC). Because ARDL allows mixed orders of integration, we estimated four versions of our conventional model using all available proxies of cigarette prices. Namely, in Model 1 (2,0,2)⁵ we used real tobacco CPI (rcpi), in Model 2 (1,1,2) and in Model 3 (3,3,2) we used real cigarette prices of the most sold cigarette brand (rcp_ms) and in the Model 4 (2, 0, 2) we used real weighted-average retail cigarette prices (rcp_wap). We estimated only those dynamic versions of the models for which we found an evidence of cointegration applying Bound test. Since our correlation analysis indicated that tobacco policy index variable (tpi) is highly correlated with the real CPI and other price proxies ($r_{rcpi,tpi}=0.989$, $r_{rcp_wap,tpi}=0.937$, $r_{rcp_ms,tpi}=0.926$), we left it out of our analysis. In all models we used as dependent variable consumption per adult person that was calculated using official data from Ministry of Finance, Customs Administration. Although we have estimated the model using different price proxies, our preferred model estimation is the one using rcpi measure, because we find it the most reliable price proxy in our case, as explained previously in the Chapter 5.1.

After we estimated our cigarette demand ARDL models, we tested the existence of the long-run relation in the cigarette demand functions by computing the Bound F-statistic for the joint null hypothesis:

$$H_0^F: (\alpha = 0) \cap (\sum_{j=0}^q \beta_j = 0) \quad (5.5.)$$

The F-statistics is compared to the critical values. If H_0^F is rejected, we need to compute the t-statistic for the single null hypothesis $H_0^t: \alpha = 0$ and compare it to the critical values. When the computed F-statistic is greater than the upper bound critical value, then the H_0 is rejected (i.e. the variables are cointegrated). If the F-statistic is below the lower bound critical value, then the H_0 cannot be rejected (i.e.

⁵ The numbers in the brackets indicate the lag lengths of dependent and regressors variables that are selected using the AIC and BIC criteria.

there is no cointegration among the variables). When the computed F-statistics falls between the lower and upper bound, then the results are inconclusive. The results of Bound test are presented in Table 5.5.

Table 5.5. Bound test results

| | Model 1 | Model 2 | Model 3 | Model 4 |
|---------------------|----------------|----------------|----------------|----------------|
| F-statistics | 34.702 | 15.561 | 16.027 | 14.207 |
| t-statistics | -10.032 | -6.731 | -6.782 | -6.406 |

Notes: Bottom critical value for F-statistics (t-statistics) is 3.17 (-2.57) and top critical value for F-statistic (t-statistic) is 6.36 (-4.10).

Since results from Bound test confirmed a long run relationship between the underlying variables, we applied ARDL approach to cointegration analysis. The results of the long run effects are presented in Table 5.6.

Table 5.6. The Long Run Effects of Cigarette Prices and Income on Consumption

| Variable | Model 1 | Model 2 | Model 3 | Model 4 |
|-------------------------------|-----------------------|-------------------------|-------------------------|-------------------------|
| Dynamic specification | (2, 0, 2) | (1, 1, 2) | (3, 3, 2) | (2, 0, 2) |
| Long- Run Coefficients | | | | |
| rcpi | -10.443*** (0.898) | | | |
| rcp_ms | | -455.340*** (41.176) | -456.892*** (36.901) | |
| rcp_wap | | | | -372.294*** (54.141) |
| rbwag | -0.138*** (0.015) | -0.076*** (0.020) | -0.0883*** (0.020) | -0.059** (0.253) |
| ADJ | -1.384*** (0.138) | -1.324*** (1.197) | -1.438*** (0.211) | -1.247*** (0.195) |

Notes: *Indicates significance at the 10% level; **indicates significance at 5% level; ***indicates significance at 1% level. Variables are defined in Chapter 5.2.

Table 5.6. summarises the results of the ARDL models for the long-run cigarette demand functions. The long-run estimates showed that there is a significant negative price and income effect on the demand for cigarettes in all estimated

models. Based on the results obtained we calculated long-run price and income elasticities that are reported in Table 5.7⁶.

Table 5.7. Long-run price and income elasticities

| | Model 1 | Model 2 | Model 3 | Model 4 |
|--------------------------|----------------|----------------|----------------|----------------|
| Price elasticity | -0.44196 | -0.60324 | -0.60547 | -0.49336 |
| Income elasticity | -0.91472 | -0.50004 | -0.58435 | -0.38809 |

The obtained price elasticities are in line with the most recent conventional models of cigarette demand that estimate price elasticities of consumption in the range from -0.14 to -1.23 , while most results from developed countries fall within the narrower range -0.3 to -0.5 (Wilkins, Yurekli and Hu, 2004). Regarding income elasticity, studies from low- and middle- income countries commonly report results ranging from a statistically significant positive impact on cigarette consumption to a significantly significant negative impact (Wilkins, Yurekli and Hu, 2004). Negative income elasticity can be explained by increased awareness and appreciation of the health risk of smoking among those in higher income groups (Wilkins, Yurekli and Hu, 2004).

The estimated speed-of-adjustment coefficient in all the cases was significant and negative, confirming the existence of cointegration relationship in the model. The high value of the coefficient means that once deviated from the steady (i.e. equilibrium) state, the model adjusts at a fast rate of approximately 138 percent towards a long-run (i.e. stable) relationship. Although our adjustment coefficient is greater than 1 this can be acceptable. For example, some researchers state that error-correction term should be negative and not lower than -2 (Loayza and Ranciere, 2005). Coefficient of -1.2 could imply that instead of monotonically converging to the equilibrium path directly, the error correction process fluctuates around the long-run value in a dampening manner (Narayan and Smyth, 2006). This can suggest that the discrepancies between shocks and the trend are reduced in less than one year.

In Table 5.8. we report the results of the short run effects of estimated cigarette demand ARDL models, as well as their diagnostic and specification tests.

⁶ We used corresponding fitted values of price (income) and consumption to calculate elasticities.

Table 5.8. The Short Run Effects of Cigarette Prices and Income on Consumption

| Variable | Model 1 | Model 2 | Model 3 | Model 4 |
|--|----------------------------|---------------------------|---------------------------|---------------------------|
| Dynamic specification | (2, 0, 2) | (1, 1, 2) | (3, 3, 2) | (2, 0, 2) |
| Short- Run Coefficients | | | | |
| LD.cons_ap | 0.428*** (0.111) | | | 0.351* (0.164) |
| D1.rcpi/rcp_ms/ rcp_wap | | 367.179** (113.028) | 415.016*** (116.409) | |
| D1.rbwag | -0.122*** (0.037) | -0.186*** (0.049) | -0.180*** (0.0482) | -0.103* (0.054) |
| LD.rbwag | -0.231*** (0.049) | -0.321*** (0.064) | -0.0341*** (0.064) | -0.150** (0.065) |
| intercept | 6276.458*** (661.064) | 5348.244*** (851.700) | 6049.114*** (1002.465) | 4488.561*** (778.047) |
| No. Observations | 16 | 16 | 15 | 16 |
| Adj R- squared | 0.879 | 0.813 | 0.831 | 0.734 |
| Ramsey's RESET | F- stat: 4.69 (0.05) | F- stat: 1.22 (0.38) | F- stat: 0.96 (0.48) | F- stat: 4.24 (0.06) |
| Jarque-Bera test | Chi2-stat: 0.87 (0.65) | Chi2-stat: 0.36 (0.83) | Chi2-stat: 0.48 (0.78) | Chi2-stat: 1.20 (0.55) |
| Breusch-Godfrey LM test | Chi2-stat: 2.67 (0.102) | Chi2-stat: 1.22 (0.27) | Chi2-stat: 1.58 (0.21) | Chi2-stat: 0.01 (0.92) |
| Breusch-Pagan/ Cook-Weisberg test | Chi2-stat: 0.33 (0.57) | Chi2-stat: 0.20 (0.65) | Chi2-stat: 0.02 (0.89) | Chi2-stat: 3.33 (0.07) |
| LM test for autoregressive conditional heteroscedacity (ARCH) | Chi2-stat: 0.01 (0.93) | Chi2-stat: 1.32 (0.25) | Chi2-stat: 0.02 (0.89) | Chi2-stat: 0.85 (0.36) |
| Mean VIF | 2.33 | 2.65 | 4.02 | 2.04 |

Notes: *Indicates significance at the 10% level; **indicates significance at 5% level; ***indicates significance at 1% level. Variables are defined in Chapter 5.2.

As we can see from Table 5.8. the price coefficients were only reported for the Model 2 and Model 3 when using real cigarette price of the most sold cigarette brand (rcp_ms), and not for our preferred model, the one using rcpi measure. In addition, the short run model was difficult to estimate due to further reduction in the degrees of freedom. Because of operating with lagged and differenced variables in the short run, number of observations dropped from 18 to 15. Therefore, both

the price and the income estimated coefficients should be taken with a great caution, so we do not consider them as reliable as the long run coefficients.

Table 5.8. also reports diagnostic and specification tests for the ARDL model. The Ramsey RESET test does not reject the null hypothesis of no misspecification in the functional form for all models at 5 percent level of significance. The Jarque-Bera test confirms the normality of the residuals in all models. The Breusch-Godfrey LM test does not reject the null hypothesis of no serial correlation in the residuals for all models. Breusch-Pagan/ Cook-Weisberg test does not reject the null hypothesis of no heteroscedasticity for all models at 5 percent level of significance. The ARCH test confirms that there is no evidence of autoregressive conditional heteroscedasticity in all models. In addition, the mean VIF (i.e. variance inflation factor) indicates that multicollinearity is not a problem in any of the estimated models. Finally, CUSUM of square test was applied to recursive residuals, and indicates no significant evidence of coefficient instability because the plot of the CUSUMSQ statistic falls inside the critical bands of the 5 percent confidence interval of parameter stability.

In addition, to check for the robustness we also estimated our model using double-log functional form for our preferred model, where logarithms are taken of both dependent and independent variables (Appendix A, Table B). The long-term elasticities were similar (i.e. price elasticity was -0.497; income elasticity was -0.959) to the ones calculated from the same - linear model (Model 1).

5.3. Results and discussion

Regardless of the constant government efforts aiming to reduce tobacco consumption and its devastating effects on human health, economy and society, smoking prevalence in Croatia and other Western-Balkan countries is still amongst the highest in Europe. Therefore, in this study we tried to estimate a responsiveness of cigarette demand on price increase, since price policy is considered to be one of the most effective tools for reducing tobacco consumption.

Our results indicate that in Croatia cigarette demand is price sensitive with price elasticity in range with the results of previously conducted studies in middle-income countries. Namely, the estimated long-run price elasticity ranges from -0.44 to -0.61, which suggests that a 10 percent increase in price would result in a 4.4 to 6.1 percent decrease in the long-run cigarette demand. The income elasticity is also negative, ranging from -0.39 to -0.91, which suggests that in the long run a 10 percent increase in income would lead from 3.9 to 9.1 percent decrease in cigarette consumption. The short run model was difficult to estimate because of further

reduction in the degrees of freedom. Namely, the number of observation when using ARDL went down from 18 to 16 and 15. Therefore, we consider short run coefficients less reliable.

Our study has several limitations. First, it is limited by the number of observations because we use annual aggregate time-series data, covering period of only 18 years. This has prevented us from using other potentially influential factors on cigarette demand, such as prices of complements, substitutes, age, gender, race/ethnicity, socioeconomic status, education, etc. Second, because of the severe multicollinearity problem, we could not include the tobacco policy index in our model. Third, our model does not control for important issue of illegal cigarettes sales. Therefore, we may have overestimated the impact of price on cigarette demand.

To conclude, the results obtained in our study show that cigarette price policy could be used as an effective government tool for reducing smoking initiation and prevalence in Croatia.

6. Cigarette price elasticity – analysis of household budget surveys (Slavko Šodan, PhD)

In addition to aggregate time-series analysis, we use data obtained from household budget surveys (HBS) to estimate cigarette price elasticity in Croatia. The individual household responses on cigarette expenditures and purchased quantities can be used to calculate the so-called unit value of a good, which then can be used as a price proxy. At the same time, the amount of data so provided is much greater (i.e. thousands of observations) than from time series (i.e. usually less than 50, and in our case even less than 20). However, while the unit value of a good depends on actual market prices, it cannot be used as direct substitute for prices as it also reflects consumers' quality choices and the measurement error in quantity (John, 2008, p. 202). Exploiting the structure imposed by weak separability, Deaton (1988, 1997) has developed a method for estimating price elasticity using unit values that estimates and compensates for quality effects. Therefore, in this study we apply Deaton's method, also known as the Almost Ideal Demand-System (AIDS), to obtain consistent estimation of the cigarette price elasticity using Croatian household expenditure data.

The concept of a flexible demand system such as AIDS is an extremely useful tool for estimating a demand system with many desirable properties. Namely, according to Deaton and Muellbauer (1980, p. 312) the AIDS methodology "gives an arbitrary first-order approximation to any demand system; it satisfies the axioms of choice exactly; it aggregates perfectly over consumers without invoking parallel linear Engel curves; it has a functional form which is consistent with the known household-budget data; it is simple to estimate, largely avoiding the need for non-linear estimation; and it can be used to test the restriction of homogeneity and symmetry through linear restrictions on fixed parameters." Since the data from household surveys reflect household-level expenditures and quantities for various consumer goods, this method has been widely used to estimate the price elasticity of demand. However, to our best knowledge there are only several studies using Deaton's methodology (i.e. AIDS) to estimate the price elasticities of cigarettes and

tobacco. The results from these studies vary considerably. Some studies concluded that prevalence is quite responsive to price—for example, Nicita (2004) estimate of -0.91 for alcohol and tobacco consumption in Mexico or Chávez (2016) estimate of -0.87 for cigarettes in Ecuador. John (2008) examined the demand for a variety of tobacco products in India and the resulting price elasticities of tobacco products ranged between -0.4 to -0.9 (with bidis and leaf tobacco having elasticities close to unity). Similarly, Chen and Xing (2011) found that the estimated own-price elasticities of cigarettes are in the range of -0.57 and -0.81 in China. Some other studies, like Eozenou and Fishburn (2009) found lower price elasticity for cigarette demand that was centered around -0.53 in Vietnam. Generally, these estimates vary and most range from -0.2 to -0.8. This range is the same range that encompasses most of the estimates obtained for the overall demand from studies in low- and middle-income countries based on aggregate data (U.S. National Cancer Institute and World Health Organization, 2016). However, there is no similar estimation of cigarette price elasticity in Croatia.

In this research, we rely on the data from household surveys conducted in Croatia for three periods (2010, 2011 and 2014 year) provided by the Croatian Bureau of Statistics (CBS) to estimate the price elasticity of cigarette consumption. This is the first time that HBS has been used to estimate own- and cross-price elasticities of household consumption of cigarettes in Croatia using Deaton's model. The results show that the cigarette own-price elasticity in Croatia is -1.06. The reason behind such relatively high demand elasticity could be due to downward substitution to cut tobacco that has been a regional trend. However, we could not control for this effect due to the lack of data on cut tobacco.

6.1. Economic model and methods

The Almost Ideal Demand System (Deaton and Muellbauer, 1980) is one of the most popular demand system because of its generality and because it satisfies many properties of standard utility functions (Eozenou and Fishburn, 2009). The idea is to combine the cross-sectional structure of the household budget surveys with a model for the simultaneous choice of quantity and quality. Deaton's (1988) basic assumption is that all households in the same cluster have the same market price. However, market price is not observed by itself, but makes its presence felt through quantities purchased and their unit values, which are both observed. Clusters are typically small territory units such as municipalities or villages with dozens or so households living in the same place and surveyed over the same period. Within-cluster variations in purchases and unit values depend only on income and

household characteristics while between-clusters variations in purchases are at least partly dependent on between-clusters market price variations. Namely, spatial price-variation can be reasonably justified if markets are not perfectly integrated, for example because of high transport costs.

The estimation of the model consists of two stages. In the first stage, within-clusters variations are used to budget share and unit value equations. In the second stage, between-clusters variations are used to estimate spatial price elasticities of demand (Eozenou and Fishburn, 2009). A detailed explanation of the estimation methodology can be found in Deaton (1988, 1997) and only brief introduction to the model is given here.

6.1.1. Identification of parameters

Deaton (1988) uses unit values of cigarettes as a proxy for price and a structure imposed by the weak separability assumption to impute the extent of the quality substitution in estimating price elasticity. The following equations connect the budget shares and unit values to household expenditures, household characteristics and the underlying prices of commodities:

$$w_{hc} = \alpha^0 + \beta^0 \ln x_{hc} + \gamma^0 \cdot z_{hc} + \theta^0 \ln p_c + f_c + u_{ch}^0 \quad (6.1)$$

$$\ln v_{hc} = \alpha^1 + \beta^1 \ln x_{hc} + \gamma^1 \cdot z_{hc} + \psi^1 \ln p_c + u_{hc}^1 \quad (6.2)$$

where indices h and c represent households and clusters respectively. The left-side variables in the model are w_{hc} – share of the household budget spent on cigarettes and v_{hc} – calculated unit values. The right-side variables of both equations are: x_{hc} – total expenditures of the household h in cluster c , z_{hc} – other household characteristics, p_c – price of the cigarettes in cluster c , f_c – cluster fixed-effect, while u_{ch}^0 and u_{hc}^1 represent the error term.

The market price is not observed, so parameters θ and ψ cannot be directly estimated from the equations (1) and (2). However, since it is assumed that the market prices do not vary within the cluster, the remaining parameters can be consistently estimated by using cluster deviation-from-the-mean approach. Thus, the effect of prices will be removed from the equations as they do not vary within cluster.

The second equation shows unit value as the sum of quality and price, where coefficient β^1 represents “quality elasticity” or expenditure elasticity of quality, while ψ represents the changes in the unit value of cigarettes as a function of the changes in the prices. If there were no quality effects, unit values would move proportionally with the price, and the value of ψ should be equal to one and β^1

approximately equal to zero. However, prices, income and household characteristics all affect the choice of quality and so all appear in the unit-value equation (Deaton, 1990, p.203).

Even though, parameters θ and ψ cannot be directly estimated from the equations (6.1) and (6.2) as market prices are not observed, it is possible to consistently estimate the ratio:

$$\phi = \psi^{-1}\theta \quad (6.3)$$

Namely, equation (6.2) can be re-written in order to express prices ($\ln p_c$) as a function of unit values ($\ln v_{hc}$), household expenditure ($\ln x_{hc}$), other household characteristics (z_{hc}) and the error term (u_{hc}) and then plugged into the equation (6.1) to obtain a linear relationship between the budget share as the dependent variable, and unit values and other variables as the independent variables:

$$w_{hc} = \alpha^2 + \beta^2 \ln x_{hc} + \gamma^2 \cdot z_{hc} + \phi \ln v_{hc} + u_{ch}^2 \quad (6.4)$$

Estimated parameter $\hat{\phi}$ is a hybrid of price and quality elasticity and it can be shown to equal to $\psi^{-1}\theta$ (Deaton, 1990). If there is no quality shading, the unit values will represent the market prices, ψ will equal one and the parameter $\hat{\phi}$ will represent the unbiased estimate of price semi-elasticity (θ). However, estimated parameter $\hat{\phi}$ will be larger than θ if there is quality shading and it needs to be corrected. The price and quality effects are separated later relying on a weak separability assumption.

6.1.2. Estimating the model

The model estimation procedure is performed in two stages. In the first stage, equations (6.1) and (6.2) are estimated by using the deviation-from-the-mean approach and cluster regression estimates. Hence, the estimated parameters $\beta^0, \beta^1, \gamma^0, \gamma^1$ and the error terms in these equations are unbiased.

In the second stage, the effects of total household expenditure and other household characteristics are removed from the data on budget shares and unit values:

$$\tilde{y}_{hc}^0 = w_{hc} - \tilde{\beta}^0 \ln x_{hc} - \tilde{\gamma}^0 z_{hc} \quad (6.5)$$

$$\tilde{y}_{hc}^1 = \ln v_{hc} - \tilde{\beta}^1 \ln x_{hc} - \tilde{\gamma}^1 z_{hc} \quad (6.6)$$

These results are then used to create cluster averages of budget shares and unit values, so their true values will be:

$$y_c^0 = \alpha^0 + \theta \ln p_c + f_c + u_c^0 \quad (6.7)$$

$$y_c^1 = \alpha^1 + \psi \ln p_c + u_c^1 \quad (6.8)$$

Variance-covariance matrix of residuals from equations (6.1) and (6.2) is:

$$\hat{\sigma}^{00} = e_0' e_0 (n - k - C)^{-1} \quad (6.9)$$

$$\hat{\sigma}^{11} = e_1' e_1 (n_1 - k - C)^{-1} \quad (6.10)$$

$$\hat{\sigma}^{01} = e_1' e_0^+ (n_1 - k - C)^{-1} \quad (6.11)$$

where n is the total number of households, n_1 is the number of households which have recorded purchases of cigarettes, C is total number of clusters, k is the number of explanatory variables; and e_1 and e_0 are the residuals from equations (6.1) and (6.2).

As earlier mentioned, parameters θ and ψ cannot be directly estimated, because market prices are not observed. However, their ratio $\phi = \psi^{-1}\theta$ can be consistently estimated:

$$\hat{\phi} = \frac{\text{cov}(\hat{y}_c^0, \hat{y}_c^1) - \hat{\sigma}^{01}/n_c}{\text{var}(\hat{y}_c^1) - \hat{\sigma}^{11}/n_c^+} \quad (6.12)$$

where n_c is the number of all the households per cluster and n_c^+ is number of households with cigarette purchases.

Finally, weak separability assumption is used to disentangle the price and the quality effects. Namely, if commodity groups are weakly separable, then the relationship between quality and price can be imputed from the expenditure elasticity of quality and quantity and the price elasticity of quantity (John, 2018). Thus, the parameter θ can be calculated as (Deaton, 1990):

$$\theta = \phi / [1 + (w - \phi) \frac{\beta^1}{\beta^0 + w(1 - \beta^1)}] \quad (6.13)$$

where β^1 and β^0 are estimated from the equations (6.1) and (6.2), while w is the average value of the budget share. If β^1 is close to zero there is no quality shading and price semi-elasticity represents an unbiased estimate of ϕ . However, if there is quality shading, θ has to be corrected downwards.

Also, since budget shares in the equation (6.1) are not in log form, the final formula for price elasticity of demand is (Deaton, 1997):

$$\epsilon_p = \left(\frac{\theta}{w} \right) - \psi \quad (6.14)$$

Additionally, the parameter β^0 does not estimate the expenditure elasticity of demand because on the left hand side of the equation (6.1) is the budget share and not logarithm of quantity. However, as the budget shares can be defined as the product of quantity and quality divided by total expenditure $w = q \cdot v / x$, after taking the log, the first derivative and rearranging the equations (6.1) and (6.2), the total elasticity of expenditure can be estimated as (Deaton, 1997):

$$\epsilon_x = 1 - \beta^1 + \left(\frac{\beta^0}{w}\right) \quad (6.15)$$

In order to increase the precision of the parameter estimates, symmetry restrictions are imposed as suggested by John (2008). Bootstrapping procedure with 1000 replications is used in order to estimate standard error of the estimated price elasticity because standard errors cannot be taken directly from the regression analyses.

6.2. Sample and data description

Empirical part of the study is based on HBS data provided by the CBS. The Survey is carried out on the random sample of private households and it is separately defined for each year. Until 2011, the Survey was conducted as an annual survey, and since then it was changed into a multiyear survey. Therefore, in this study we use the Survey data for years 2010, 2011 and 2014.

Table 6.1. HBS sample selection methodology

| Description | Year | | |
|---|-------|-------|-------|
| | 2010 | 2011 | 2014 |
| Total sample (number of addresses) | 6,500 | 4,160 | 4,160 |
| Number of surveyed households | 3,461 | 2,335 | 2,029 |
| Response rate | 61 | 64 | 54 |
| Framework for the sample selection: | | | |
| Census of Population, Households and Dwellings | 2001 | 2001 | 2011 |

Source: The Croatian Bureau of Statistics (<https://www.dzs.hr/>)

The Survey collects data on household consumption expenditures, socio-economic characteristics, data on housing conditions, availability of durables, etc. It is in line with the Eurostat's methodological recommendations and international standards and classifications. The structure of the household consumption expenditures is

observed according to the international classification COICOP (Classification of Individual Consumption by Purpose).⁷

Using the data provided by the CBS, first we calculated unit values of cigarettes by dividing household expenditure on cigarettes with the number of cigarette packs purchased during the same period. The unit values are expressed in Croatian HRK per cigarette pack. Similarly, we have calculated cigarette budget share as a ratio of household expenditure on cigarettes and total expenditure for the observed period. We used the same procedure to calculate unit values and budget shares for coffee, which was necessary to estimate cross-price elasticity. All variables measured in monetary values were deflated to their real values from 2010, by using Consumer Price Index⁸. The mean unit value of cigarette (budget share) was 16.52 HRK per pack (0.02) in 2010, 17.19 HRK per pack (0.02) in 2011 and 22.00 HRK per pack (0.01) in 2014. The mean unit value of coffee (budget share) was 56.93 HRK (0.08) in 2010, 61.03 HRK (0.08) in 2011 and 60.76 HRK (0.08) in 2014, while the mean value of total households' expenditure was 91,484 HRK, 90,509 HRK and 97,785 HRK, respectively. Descriptive statistic for other household characteristics is given in the Table 6.2.

Table 6.2. Descriptive statistics of other household characteristics

| Variable | Obs. | Mean | Std dev. | Min | Max |
|--------------------------|-------|-------|----------|-----|-----|
| Household size | 7,825 | 2.81 | 1.56 | 1 | 10 |
| Male ratio | 7,825 | 0.44 | 0.28 | 0 | 1 |
| Adult ratio | 7,825 | 0.92 | 0.17 | 0.2 | 1 |
| Mean education | 7,825 | 11.52 | 2.21 | 0 | 20 |
| Maximum education | 7,825 | 12.19 | 2.38 | 0 | 20 |
| Household type | 7,825 | 2.07 | 1.05 | 0 | 3 |

Table 6.3. presents the results of the regression analyses exploring the time and regional variation of the real cigarettes unit values and budget shares. Regions are defined in accordance with the NUTS-2 level as Continental and Adriatic Croatia.

⁷ Access to the HBS data was provided in the CBSs' safe room with excluded direct identifiers for individuals. Hereby, we declare that all results and conclusions from this research are of our own and not of the Croatian Bureau of Statistics.

⁸ Available online from the CBS website <http://www.dzs.hr/>

Table 6.3. Regional and time variation of cigarettes unit values and budget shares

| Variable | Unit Value (per cigarette pack) | | Cigarettes budget share | |
|----------------------------|------------------------------------|-----------|----------------------------|-----------|
| | Coef. | Std. Err. | Coef. | Std. Err. |
| Continental Croatia | Omitted | | | |
| Adriatic Croatia | 0.680** | (0.337) | -0.000 | (0.001) |
| Year 2010 | Omitted | | | |
| 2011 | 0.645* | (0.001) | -0.000 | (0.001) |
| 2014 | 5.442*** | (0.398) | -0.003*** | (0.001) |
| Constant | 16.332*** | (0.246) | 0.018*** | (0.001) |
| Observations | 2,461 | | 7,825 | |
| R-squared | 0.077 | | 0.002 | |
| F -test | 68.47*** | | 4.62*** | |

Notes: *Indicates significance at the 10% level; **indicates significance at 5% level; ***indicates significance at 1% level.

Table 6.3. shows that the number of observations for unit value is smaller than for budget share because unit value is calculated only for households that report cigarettes consumption (i.e. non-zero observations). Thus, it can be concluded that approximately 31 percent of the observed households purchase cigarettes. The results indicate that unit values have significant time and regional variation, while budget shares significantly vary only over time dimension. The constant term in the unit value regression indicates that the average price for cigarette pack paid by the household in Continental Croatia in 2010 was approximately 16 HRK. Households in Adriatic region usually pay higher prices of cigarettes by about 0.7 HRK compared to Continental Croatia, while the average price of the cigarettes has been increasing throughout the observed period, and especially in 2014. These results are in line with our expectations. Adriatic region is characterized by a coastal area in which most of the Croatian tourist activity takes part. This leads to higher demand and consequently to higher cigarette prices. In addition, 2014 increase in cigarette price can be attributed to the Croatia joining the EU in 2013 and related tax legislation alignment with the EU *acquis communautaire*. The budget share regression indicates that households in the Continental Croatia in 2010 spent about 2 percent of their budget on cigarettes and that this budget share does not significantly differ from the Adriatic region. The analysis also indicates that the budget share spent on cigarettes has significantly decreased in 2014.

6.3. Results and discussion

Since Deaton model assumes that the prices of commodities do not vary within each cluster, we started our empirical analysis by defining clusters as combination of municipality – year (i.e. the cluster is defined as a municipality x in the year t). According to this definition, we have generated 652 clusters which on average included about 12 households⁹.

Beside unit value and budget share variables on the left-hand side, the first stage regression included the set of household socio-economic characteristics on the right-hand side: total expenditures (ln), household size (ln), region, age and gender composition of the household, as well as the mean and maximum level of education of the household members. We have also controlled for the type of household economic activity. According to the “maximum” activity of a household member¹⁰, we have defined following household types: 1) employed, 2) self-employed, 3) pensioner and 4) unemployed. Beside total expenditure variable, all other household characteristics are represented with the vector Z_{hc} in equations (1) and (2). All expenditure variables, and consequently the unit value of cigarettes, are deflated to 2010 values. Descriptive statistics of the variables used in the first-stage regression for the subsample of households that purchase cigarettes is presented in the Table 6.3.¹¹

⁹ We excluded 11 observations for clusters that had less than two households, which is necessary condition to estimate the Deaton’s model. Full sample consisted of 7,825 households.

¹⁰ We rank the labour market activity of the household members in the following order (i.e. from “maximum” to “minimum” activity): 1) employed, 2) self-employed, 3) pensioner, and 4) unemployed. If any member of the household is employed, then the household is labelled as "employed". If there are no employees, in the household, but there are self-employed, the household type is "self-employed". If there are no employees or self-employed, but there is a pensioner in the household, the household is marked as "pensioner, and finally if the adult household members are all inactive or unemployed the household is labelled as "unemployed".

¹¹ The descriptive statistics for the whole sample is already provided in the Chapter 6.2.

Table 6.3. Descriptive statistics of variables for the subsample of households that purchase cigarettes

| | Obs. | Mean | Std dev. | Min | Max |
|------------------------------------|-------------|-------------|-----------------|------------|------------|
| Unit Value, Cigarettes (ln) | 2,458 | 2.85 | 0.27 | 1.38 | 5.34 |
| Budget share, Cigarettes | 2,458 | 0.05 | 0.04 | 0.00 | 0.49 |
| Total expenditure (ln) | 2,458 | 11.46 | 0.49 | 9.07 | 13.37 |
| Household size (ln) | 2,458 | 1.06 | 0.52 | 0 | 2.30 |
| Male ratio | 2,458 | 0.51 | 0.24 | 0 | 1 |
| Adult ratio | 2,458 | 0.89 | 0.18 | 0.2 | 1 |
| Mean education | 2,458 | 11.80 | 1.54 | 0 | 18 |
| Maximum education | 2,458 | 12.54 | 1.66 | 0 | 20 |
| Continental Croatia | 2,458 | 0.70 | 0.46 | 0 | 1 |
| Household type - Employed | 2,458 | 0.69 | 0.46 | 0 | 1 |
| Self-employed | 2,458 | 0.04 | 0.20 | 0 | 1 |
| Pensioners | 2,458 | 0.22 | 0.41 | 0 | 1 |
| Unemployed | 2,458 | 0.05 | 0.22 | 0 | 1 |

The households that reported cigarette consumption have an average male ratio around 50 percent and approximately 90 percent adult members (i.e. those over age of 14). From the mean and maximum years of education (11.8 and 12.54) it can be concluded that adult household members on average have secondary level of education. The majority of analyzed households (70%) are from Continental Croatia. Finally, there are approximately 69 percent households with at least one person employed and 4% households with at least one person self-employed. Households without employed or self-employed members, having at least one pensioner make about 22 percent, while households with only unemployed members make around 5 percent.

Next, we apply the two-stage procedure based on the Deaton’s model to estimate the price, quality, and income elasticity of cigarette consumption in Croatia. In the first stage, within-cluster information on household demand, income, and unit value is used to obtain estimates of the quality effect, while other household characteristics are controlled for. The estimates of the regression models (1) and (2) are presented in Table 6.4.

Table 6.4. First-stage regression results

| VARIABLES | Unit Value (per pack, ln) | | Cigarettes budget share | |
|----------------------------------|------------------------------|---------|----------------------------|---------|
| Total expenditure (ln) | 0.069*** | (0.015) | -0.000 | (0.001) |
| Household size (ln) | -0.032** | (0.015) | -0.000 | (0.001) |
| Male ratio | -0.016 | (0.022) | 0.017*** | (0.002) |
| Adult ratio | -0.010 | (0.034) | 0.006* | (0.003) |
| Mean education | -0.002 | (0.006) | 0.001 | (0.000) |
| Maximum education | 0.011** | (0.005) | -0.001 | (0.000) |
| Continental Croatia | 0 (omitted) | | 0 (omitted) | |
| Household type – Employed | omitted | | | |
| Self-employed | 0.007 | (0.025) | 0.008*** | (0.002) |
| Pensioners | -0.026* | (0.014) | -0.007*** | (0.001) |
| Unemployed | -0.055* | (0.030) | -0.002 | (0.002) |
| Cluster dummies | F(568, 1180) 2.585*** | | F(651, 7153) 1.286*** | |
| Constant | 2.009*** | (0.164) | 0.012 | (0.013) |
| Observations | 2,458 | | 7,814 | |
| R-squared | 0.47 | | 0.14 | |

Notes: *Indicates significance at the 10% level; **indicates significance at 5% level; ***indicates significance at 1% level.

Estimated coefficients from the unit value equation suggest the following conclusions. First, the coefficient on total expenditure shows that the expenditure elasticity of quality is 0.07. This implies that a doubling of the household total expenditure would increase the average price paid for cigarettes by approximately 7 percent. The significant and positive coefficient of total expenditure provides an evidence of quality shading in Croatia, so the use of AIDS model is necessary in order to obtain an unbiased estimate of cigarette price elasticity. Second, household size, education and household type also have a significant effect on unit value. The negative sign on household size coefficient suggests that an increase in the household size has a similar effect as a reduction in total expenditure. That is, an increase in household size has significant effect of decreasing the average price paid by the household. The positive sign on maximum education implies that households with more educated members purchase cigarettes with higher unit value. Households without employed or self-employed members on average pay

lower price for cigarettes compared to the households with employed. This is also an evidence that these types of households spend more on lower quality cigarettes. Finally, cluster fixed effects are statistically significant showing that both spatial and time variation are pronounced.

Regarding the results from the budget share equation, following conclusions can be derived. First, only male ratio, adult ratio and household type are significantly related to the cigarettes budget share, while it seems that total expenditure and household size variables do not have a significant impact. Namely, households with the higher proportion of men and adults spend larger budget share on cigarettes. Secondly, for the self-employed household type the budget share spent on cigarettes is higher, while for pensioners household type the budget share spent on cigarettes is lower than for the employed households type. Finally, cluster fixed effects are significant and come from both spatial and time variation, similar as in the unit value regression.

The second stage of AIDS model uses between-clusters variations and exploits the information obtained from the variables at cluster-means (Eq. (7) and (8)) to derive a consistent estimate of ϕ (Eq. 12). Regions dummies for NUTS-2 regions are also used in these regressions to remove any regional differences that may affect the estimated coefficients. In the final stage of the estimation following the equations (13) to (14) we obtain the symmetry restricted estimates of cigarette price elasticity. Results indicate negative own-price elasticity of -1.07. This means that if cigarette prices in Croatia increase by 10 percent, the demand for cigarettes will decrease by 10.7 percent. Standard error of the elasticity, calculated via bootstrapping procedure (1000 replications) indicates that the value of the price elasticity is significantly different from and lower than zero ($\xi = -1.067$; $SE_{\xi} = 0.368$, $t = -2.899$).¹²

The cross-price elasticity is estimated at -0.45 meaning that c.p. if price of coffee increases by 10 percent, the cigarette consumption will decrease by 4.5 percent. However, this coefficient is not statistically significant ($SE_{\xi} = 0.732$, $t = -0.609$).¹³

Finally, estimated values of the coefficients of $\ln X$ from equations (1) and (2) are plugged into equation (15) to derive the total expenditure elasticity of demand. According to our expectations, the estimated total expenditure elasticity is positive

¹² Symmetry unrestricted estimates of cigarette price elasticity provide similar results ($\xi = -0.984$; $SE_{\xi} = 0.368$, $t = -2.674$).

¹³ Symmetry unrestricted estimates of cross price elasticity are statistically significant ($\xi = -1.948$; $SE_{\xi} = 0.733$, $t = -2.658$), indicating that coffee and cigarettes act like complements.

and it takes value of 0.91. In other words, a 10 percent increase in total expenditure would lead to a 9.1 percent increase in cigarettes consumption.

To summarize, obtained results indicate that cigarette price elasticity in Croatia is -1.07 and cigarette income elasticity is 0.91. This means that a 10 percent increase in cigarette price would lead to a 10.7 percent decrease in cigarette consumption and that a 10 percent income increase would raise cigarette consumption by 9.1 percent, respectively. This result is in line with previous estimates in low- and middle-income countries (U.S. National Cancer Institute and World Health Organization, 2016).

For example, annual consumption of cigarettes in Croatia in 2017 was estimated to be 309,329,614 cigarette packs and the weighted average price of a pack of cigarettes was 3.60 EUR. Specific excise was 26 percent of the average retail price, ad valorem excise 34 percent and VAT 20 percent of retail price. Accordingly, if we assume that in the next year Croatian GDP will increase by 2.8 percent and cigarette prices will stay unchanged, then we can expect an increase in cigarette consumption by 2.55 percent and the same percentage increase in tax revenues. However, according to our model estimations if a specific excise increases by 10 percent, this would lead to a 0.51 percent decrease in cigarette consumption, but total tax revenues would increase by 3.2 percent (total excise revenues growth of 3.50 percent and VAT revenues growth of 2.34 percent).

Despite valuable research contributions and practical implications, our study has several limitations. First, price elasticity is estimated only for cigarettes and not for other tobacco products. Second, this study uses data on household level, while it would be more relevant to use individual level data. Finally, our data time-frame was limited to only three years (2010, 2011 and 2014) and it would be useful to have more recent data, especially for policy purposes. Also, to our best knowledge, this is the first estimate of the price elasticity of cigarettes demand of Croatian households. It provides evidence that the cigarette demand is responsive to their prices. Consequently, this implies that tobacco tax policy can be used as an efficient tool for reducing cigarette consumption in Croatia.

7. Science - policy dialogue on tobacco taxation issues (Ljerka Markota, PhD)

Smoking prevalence in Croatia and other surrounding countries remains among the highest in Europe (Padjen et al., 2012). It has been scientifically proven that the rise in prices and excises reduces consumption of tobacco products, therefore, tax policy that significantly increases the tax burden on tobacco products is the most effective tool for reducing smoking rates. The current dynamics of the increase of excise duties (currently amounting to 60 percent of the retail price, of which 34 percent is *ad valorem* excise, while the share of specific excise is 26 percent) did not lead to the expected reduction in the prevalence of smoking in Croatia and the achievement of objectives defined by the EU guidelines and the WHO Framework Convention on Tobacco Control (WHO FCTC). The research carried out under the project *Accelerating Progress on Effective Tobacco Tax Policies in Low and Middle Income Countries* on data from 2000 to 2017 for Croatia has shown an inelasticity of demand for cigarettes, which means that the increase in the price of tobacco products leads to proportionally lower reduction in their volume. It provides opportunities to improve tax policy, primarily by further increasing excise duties on tobacco products, which should ultimately result in increased tax revenues, healthcare savings, and improving the health of the population.

Despite the recommendations of the Council of Europe, Croatia has still not adopted a comprehensive multi-sectoral tobacco control strategy. Croatia should develop and implement programs that integrate the existing high-quality empirical evidence on the effectiveness of various behavioral, pharmacological, and social interventions for smoking prevention and cessation. This programming should become a part of a continuous national strategy and should be implemented in Croatia.

Policy dialogue should facilitate consensus building on challenges, goals, interests and solutions through its participatory and engaging manner (Ashraf et al., 2015). The goals of the policy dialog in Croatia are short term (to put tobacco taxation issues on the policy agenda, to create dialogue between researchers and policy makers and to produce recommendations that will result in sustainable and

systemic policy impact) as well as long term (to create effective tobacco tax policies and develop a strategic plan for research, policy and communications in order to reduce smoking prevalence and the harm from tobacco use in the Croatia).

7.1. Overview of demand for tobacco products

The prevalence of smoking in the Republic of Croatia shows a slight decrease only in the last few years. In the period from 2002 to 2017, the average proportion of smokers in the adult population was about one-third, from the highest 37 percent in 2005 to the lowest 27.70 percent in 2016, with the number of female smokers decreasing faster than the number of male smokers (Dečković-Vukres et al., 2016). Special efforts are being made to raise awareness and reduce the consumption of tobacco products by younger population. The Ministry of Health and the Ministry of Science and Education support the implementation of ESPAD research in high schools in the Republic of Croatia in order to collect standardized, internationally comparable data on smoking among high school students and to look at the factors that affect such behavior. According to recent results, Croatian students smoke more than their European colleagues, 33.1 percent of them are current smokers (they have smoked in the last 30 days) compared to 21 percent of current smokers in other countries. Despite the legal ban on the sale of tobacco and related products to persons under the age of 18, the students state that cigarettes are easy or very easy to obtain (72.5 percent) (ESPAD, 2015). Therefore, the increase in the price of tobacco products should make them less accessible for young people and should have a positive impact on reducing the number of adolescent smokers.

The trend in cigarette consumption (expressed in the number of cigarette packs sold) and the deflated cigarette price is shown in Figure 6.1. The average retail cigarette price has been increasing steadily from 2002 to 2016. The graph shows that after 2008, the curve takes a negative slope, which means that the rise in the price of a cigarette is followed by a fall in the amount of cigarettes demanded. The main reason for rising prices in the observed period are changes in the taxation policy, i.e. harmonization of taxes and excise duties with the EU regulations.

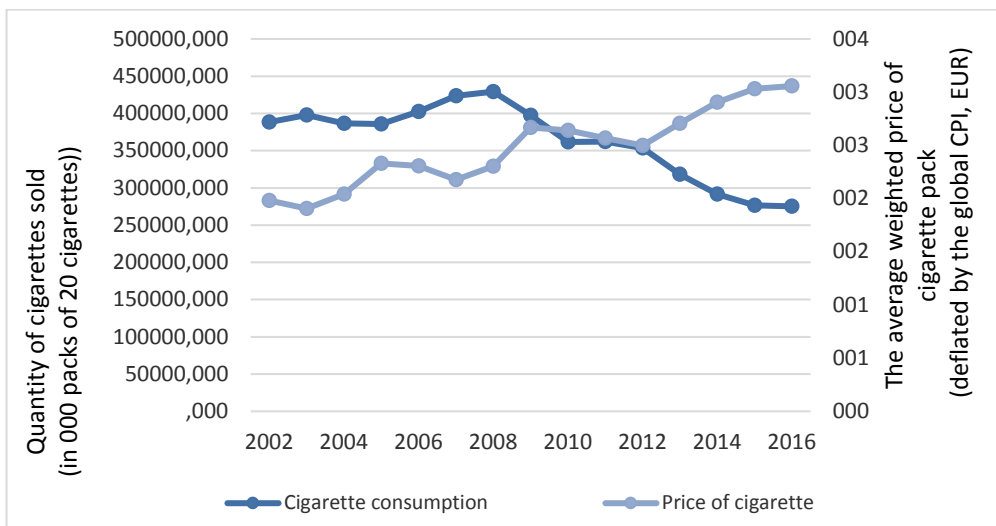


Figure 7.1. Consumption and price of cigarettes, Republic of Croatia, 2002-2016

Source: Statista, Euromonitor and the Customs Administration of the Republic of Croatia (2018)

Apart from the price and the quantity sold, a more precise insight into the demand for tobacco products can be seen if we look at the retail value of cigarettes, since cigarettes account for 95 percent of the total value of all tobacco products sold. Since smoking prevalence is slowly decreasing, the volume of sales also shows a declining trend (Aljinović Barać et al., 2018). However, demand for tobacco products measured by the retail value of cigarettes is increasing, while at the same time the volume of cigarette sales decreases due to rising cigarette prices.

7.2. Regulations and taxation of tobacco products

Ministry of Finance - The Customs Administration provides a framework for effective taxation of tobacco which is an important element of the tobacco control policy. The excise system for taxation of tobacco products in the Republic of Croatia is regulated by the Excise Duty Act and the implementing provisions of the Excise Duty Ordinance. With the EU accession on July 1, 2013, the Republic of Croatia has committed to harmonize the taxation system of tobacco products with EU Directives. As a consequence, a mixed excise system is implemented, according to which excise duty consists of two components: specific components, i.e. fixed amount for a certain quantity of tobacco products and *ad valorem* component, i.e. the percentage of retail price. Tobacco products are also taxed with a standard

value added tax (VAT) of 25 percent. The shares of VAT and excise duties in a retail price of cigarettes in 2017 are given in Table 6.1 while the same structure in years 2012, 2014 and 2017 are presented in Figure 6.1.

Table 7.1. Structure of the tax burden on the retail price of cigarettes in Croatia, 2017

| Year | 2017 |
|--|------------|
| Specific excise (value in EUR per 1000 cigarettes) | 41.55 |
| Specific excise (value in EUR per pack of 20 cigarettes) | 0.83 |
| Specific excise (as a % of retail price) | 26% |
| Ad valorem excise (%) | 34% |
| Total excise (%) | 60% |
| VAT (as a % of retail price) | 20% |
| Total Tax Burden (as a % of retail price) | 80% |
| Average price of cigarette pack (EUR) | 3.21 |

Source: Customs Administration of the Republic of Croatia (2018)

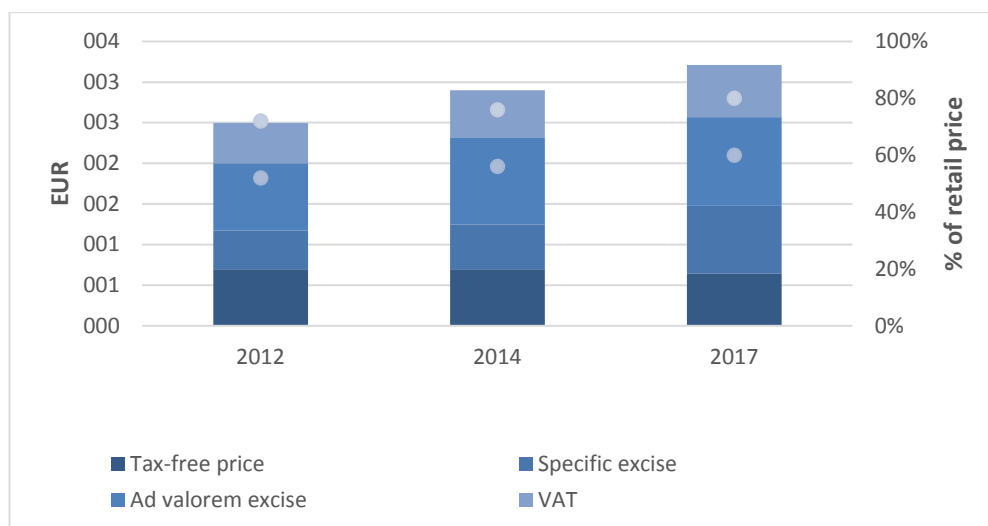


Figure 7.2. Structure of retail price of cigarette in the Republic of Croatia, 2012, 2014 and 2017

Source: Customs Administration of the Republic of Croatia (2018)

7.3. Price elasticity – guidelines for policy dialogue

Since pricing policy is considered to be one of the most effective tools for reducing tobacco consumption (Bader et al., 2011; Guindon et al., 2014; Cobiac et al., 2015; Aljinović Barać et al., 2018; Shang et al., 2018), it is very important to estimate demand for tobacco products depending on the price of tobacco. In microeconomic theory it is called the price elasticity. The results of the research carried out within this project indicate that in Croatia the demand for tobacco is price-sensitive, with price elasticity in line with the results of previously conducted studies for middle-income countries. Namely, the estimated price elasticity suggests that a 10 percent increase in prices would result in a reduction in long-term demand for cigarettes ranging from a minimum of 4.42 percent to a maximum of 6.05 percent, depending on the scope of the tobacco product category. Thus an increase of 10 percent of the price of *all tobacco products* would have led to a reduction in the long-term demand for cigarettes by 4.42 percent (on average). Considering that cigarettes account for 95 percent of tobacco consumption, the calculation is made only for the cigarettes, and the results show that an increase of 10 percent of cigarette prices will have an impact on the average reduction in cigarette consumption of 6.05 percent.

For example, if the retail price of the most-sold cigarette brand had increased from 3.6 EUR to 5.4 EUR, the long run annual cigarette consumption would have decreased from 1,737 cigarettes per adult person to 1,212 cigarettes, *ceteris paribus*.

7.4. Stakeholder analysis

Stakeholder analysis aims to evaluate and understand stakeholders from the perspective of an organization, or to determine their relevance to a project or policy. The growing popularity of stakeholder analysis reflects an increasing recognition of how the characteristics of stakeholders – individuals, groups and organizations – influence decision-making process (Brugha and Varvasovsky, 2000). Taking into account characteristics and specificities of institutional and regulative framework as well as socio-economic situation in the field of tobacco taxation in Croatia described in previous chapters, following relevant stakeholders are identified:

Ministry of Finance - Customs Administration is the main body in charge for tobacco taxation issues. It is the most important stakeholder that is responsible for

legal affairs related to the preparation of regulation for tobacco excise policies. Ministry of Finance has a key role in the implementation of effective tobacco tax policies because it submits legislative proposals to the Parliament. Customs Administration Department supervises calculation and payment of excise duties on tobacco products. It also collaborates with Ministry of the Interior Affairs in order to control the implementation of Croatian legislative acts. Furthermore, authorized customs officers work closely with other inspectors (e.g. sanitary inspectors, health inspectors, education inspectors, labor inspectors, market inspectors, etc.) and provide inspectional supervision of the implementation of Act on restrictions on the use of tobacco and tobacco related products within the respective powers vested in them by the law and in compliance with Article 38 of the Act. Expected intervention of Ministry of Finance that can be effective in achieving progress on effective tobacco tax policies in Croatia may include further increases in the price of tobacco products. No negative contribution to successful implementation of the policy dialogue activities is expected. However, it can be said that the government in Croatia is not showing much initiative, but is instead responding to incentives from the EU and WHO.

Health care professionals are dealing with harmful effects of smoking in the way of occurrences of damage to health and diseases that shorten the life span of smokers as well as non-smokers exposed to smoke. They also provide preventive measures against smoking. In addition, three health care professionals working on raising health awareness are the members the National Anti-Smoking Committee, in accordance with Article 36 of the Act on restrictions on the use of tobacco and tobacco related products. Expected intervention of health care system representatives that can be effective in achieving progress on effective tobacco tax policies in Croatia may include mass media anti-smoking campaigns to raise awareness on harmful effects of smoking. There is a vast literature that have proved positive effects of raising the tax on tobacco products on population health and healthcare cost savings, so no negative contribution to successful implementation of the policy dialogue activities is expected. Contrary, it can be said that in Croatia the medical profession is one of the most important interest groups exerting pressure on the government to act.

Ministry of Science and Education is interested in tobacco taxation issues with the aim of reducing the use of tobacco and related products among young people. Croatia is ranked second of 35 European countries by the number of daily smokers among students. One representative of the ministry responsible for education is the member of the National Anti-Smoking Committee, in accordance with Article 36 of the Act on restrictions on the use of tobacco and tobacco related products. Educations at primary and secondary schools, as well at colleges and universities

are often one of the first approaches mentioned in efforts to reduce youth smokers' number. Early trainings might teach students how to resist the influences that encourage them to experiment with smoking or to resist temptations from their peers to smoke. Also, the introduction of strong smoke-free policies reduces the likelihood of an adolescent becoming a regular smoker. Expected intervention of science and education system representatives that can be effective in achieving progress on effective tobacco tax policies in Croatia may include different measures to reduce social acceptability of smoking, like strong smoke-free policies, smoking curricula in schools and universities, etc. No negative contribution to successful implementation of the policy dialogue activities is expected.

Ministry of Tourism - market inspectors conduct inspectional supervision of the implementation of Act on restrictions on the use of tobacco and tobacco related products within the respective powers vested in them by the law and in compliance with Article 38 of the Act. The subject matter of this Act as defined in Article 1 are measures to reduce and restrict the use of tobacco and related products in catering and hospitality objects, where non-smokers may be exposed to tobacco against their will. In that way, non-smokers are threatened with tobacco consumption and exposure to second-hand smoking on their health. The introduction of strong smoke-free regulations contributes to the denormalization of tobacco in a community. Market inspectors work closely with other inspectors (e.g. authorized customs officers, sanitary inspectors, health inspectors, education inspectors, labor inspectors etc.). Potential negative contribution to successful implementation of the policy dialogue activities may be expected if Ministry of Tourism recognizes the smoking ban as a factor that has negative impact on sales, on-trade socializing and tourism revenues.

Academia – it is common practice in Croatia to include tax specialists, tax advisors and other relevant researchers as members of working groups which create legislative proposals of laws and other regulatory acts because of their experience and area of expertise. Although there are visible efforts by academia experts to make an impact on the tobacco market, their reach is limited. Article 36 of Act on restrictions on the use of tobacco and tobacco related products set forth the establishment of the National Anti-Smoking Committee with representatives of the education sector as members. Academia is involved in tobacco taxation issues indirectly, so negative contribution to successful implementation of the policy dialogue activities is not expected.

Students' Union is a student representative electoral body that protects the interests of students, takes care of student standard, quality of life and study process. Croatia is ranked on the second place out of 35 European countries by the

number of daily smokers among students, so young people are directly or indirectly threatened by tobacco consumption and exposure to second-hand smoking on their health. As tobacco use poses a serious health threat, Students' Union is interested in tobacco taxation issues with the aim of reducing the use of tobacco and related products primarily to protect health. Potential negative contribution to successful implementation of the policy dialogue activities may be students' inertness in implementation of those activities.

7.5. Roundtable conclusions and recommendations

Policy dialogue is recognized as an important aspect of policy-making among several interactive and innovative policy-making models applied in different contexts and sectors (Jones et al., 2008). Policy dialogue of all relevant stakeholders on efficient tax policies is an important aspect of creating a national tobacco control policy. Participative approach and stakeholder collaboration should facilitate consensus-building on objectives and solutions for their achievement. According to Nabyonga-Orem (2016), proper information sharing will ensure that the process is credible and legitimate.

The short-term goal of such co-operation is to put tobacco taxation issues on the political agenda, to create a dialogue between researchers and decision-makers, and to develop recommendations that will result in sustainable and systematic policy change. The long-term goal is to create an effective tobacco control policy and to develop a strategic plan to reduce the damage caused by the use of tobacco in the Republic of Croatia.

The scientific research results show that tax policy, i.e. the excise policy on tobacco products can be used as an effective tool for reducing initiation and prevalence of smoking in the Republic of Croatia. According to the obtained results, an increase in the excise duty which would increase the retail price of the best-selling brand of cigarettes from 3.6 EUR to 5.4 EUR, would reduce cigarette consumption in Croatia by 1.87 billion cigarettes, *ceteris paribus*.

Assuming that the increase in prices resulted only from the increase in excise duty, despite the reduced volume of cigarettes sold, total state revenues would increase by 129.1 million EUR, of which 118.8 million EUR from excise and 10.3 million EUR from the VAT.

Diverse stakeholders were engaged in the discussion in our policy dialogue roundtable with the aim to identify specific barriers and potential solutions for tobacco control policies. They identified three main obstacles:

1. Non-efficiency of the criminal justice system – non-compliance of different laws that regulate the restrictions on the use of tobacco and related products, especially in the part of imposed penalties on those who violate laws;
2. Illicit trade – due to its geo-communication position (Adriatic, Central European country and part of the Danube valley; several pan-European transport corridors and their branches pass through Croatia (e.g. Corridor X and Corridor V); Croatian seaports have traditionally been points of exit for Austria, Hungary, Slovakia, Czech Republic, Bosnia and Herzegovina, etc.) the Republic of Croatia is highly threatened by illicit trade and moreover by illicit import of tobacco and related products.
3. Harmful effects of smoking and passive smoking to children's and youth's health as well as human health in general. As a consequence, the health care system is overburdened with costs of treatment of diseases that are caused by active or passive smoking.

However, there are opportunities to improve tax policy, primarily by further increasing excise duties on tobacco products that should result in increased tax revenues, healthcare savings, and improving the health of the population. Their recommendations could be summarized as follows:

1. Stakeholders support presented research findings and recommend further increase in excise duties that will result in a higher retail price of cigarettes. In their opinion, that kind of tax policy could be an effective tool for reducing initiation and prevalence of smoking in the Republic of Croatia, as it will decrease the prevalence rate of smoking among adults. Moreover, it will make tobacco and related products less accessible for young people and should have a positive impact on reducing the number of adolescent smokers.
2. Following the increased budget revenues from raised excise duties, the stakeholders suggest targeted allocation of collected funds to the healthcare system and education system primarily for the smoking prevention actions, like mass media anti-smoking campaigns to raise awareness on harmful effects of smoking, promotion of strong smoke-free policies, inclusion of smoking curricula in schools and universities, etc.

8. Summary and recommendations

Tobacco use has a devastating global impact on health and economic prosperity. Although global smoking rate decreased in the past 30 years, especially in high-income countries, many smokers in low- and middle- income countries do not have access to education, prevention or assistance. Regardless of the constant government efforts aiming to reduce tobacco consumption and its devastating effects on human health, economy and society, smoking prevalence in Croatia and other Western-Balkan countries is still amongst the highest in Europe.

Practices and policies affecting the production of raw tobacco and the manufacture of cigarettes and other tobacco products can have an important effect on the characteristics and patterns of tobacco product use. In the latest decades, the prevalence of smoking in Croatia measured by the number of smokers has stabilized and shows slight decline in recent years. In the period from 2002 to 2017 average percentage of smokers in adult population is fewer than one third, ranging from the lowest 27.70 percent in 2016 to the highest 37 percent in 2005. Young people's well-being is of special concern in all the societies, so there are constant efforts to reduce tobacco consumption by young people.

Croatian government through Ministry of Finance - Customs Administration provides the framework for effective tobacco taxation which is an important element of tobacco control. Besides government, many different institutions are involved in tobacco control activities. The medical profession is one of the most important interest groups exerting pressure on the government to act, while, on the other hand, the hospitality industry (one of the main industries in Croatia) is strongly opposing the smoking ban due to its impact on sales. Although those institutions promote smoking cessation, the overall institutional support should be more comprehensive and newly adopted regulation - the Act on Restrictions on the Use of Tobacco and Related Products (Official Gazette, No. 45/2017) leads to the improved tobacco control involving much more institutions and providing supervision (sanitary inspectors, health inspectors, education inspectors, labor inspectors, market inspectors, electricity and heating inspectors and authorized customs officers, within the respective powers vested in them by the law). However, it can be concluded that Croatia is making progress but still has much to

do in order to achieve better results in smoking cessation and tobacco consumption prevention.

Since price policy is considered to be one of the most effective tools for reducing tobacco consumption, in this study a responsiveness of cigarette demand on price increase is estimated. Research results indicate that in Croatia cigarette demand is price sensitive, with price elasticity in range with previous estimates in low- and middle-income countries.

In aggregate time-series analysis model, the estimated long-run price elasticity ranges from -0.44 to -0.61, which suggests that a 10 percent increase in price would result in a 4.4 to 6.1 percent decrease in the long-run cigarette demand. The income elasticity is also negative, ranging from -0.39 to -0.91, which suggests that in the long run a 10 percent increase in income would lead from 3.9 to 9.1 percent decrease in cigarette consumption. However, since time series analysis is strongly limited by the number of available annual observations these estimations should be taken with a great caution. Therefore, cigarette price elasticity and income elasticity are also estimated using household budget survey (HBS) data. Results of HBS analysis are considered to be more reliable because the amount of data so provided is much greater (i.e. thousands of observations) than from time series (i.e. eighteen years). Estimated results of the research analysis based on Deaton's (1988) model indicate that cigarette price elasticity in Croatia is -1.07 and cigarette income elasticity is 0.91. This means that a 10 percent increase in cigarette price would lead to a 10.7 percent decrease in cigarette consumption and a 10 percent income increase would raise cigarette consumption by 9.1 percent, respectively. According to this findings, cigarettes are still perceived to be a superior good in Croatia since there is a positive significant impact of income on consumption, which is in contrary to results obtained in aggregate time-series analysis model. However, this could be explained with the difference in time-frame of analyses, as in aggregate time-series model secondary data from 2000 to 2017 were used, while in Deaton's model data for only three years (2010, 2011 and 2014) were available.

Concerning price elasticities results described above, if we assume that GDP in Croatia will increase next year by 2.8 percent and cigarette prices will stay the unchanged, then an increase in cigarette consumption by 2.55 percent and the same percentage of increase of tax revenues can be expected. However, according to our model estimations if specific excise increases by 10 percent, this would lead to 0.51 percent decrease in cigarette consumption but total tax revenues would increase by 3.2 percent (total excise revenues growth of 3.50 percent and VAT revenues growth of 2.34 percent).

In conclusion, referring on facts and evidence presented in previous chapters, this monograph advocates for reducing tobacco use in Croatia in two ways: by reducing smoking initiation, and by reducing smoking prevalence rate. The first goal of reducing smoking initiation is primarily targeted at young people, especially those of school age, whose well-being is of special concern in the society. In order to make tobacco and related products less accessible and less affordable to young people, the following activities can be undertaken: raising the unit price of tobacco and related products, mass media anti-smoking campaigns, education (e.g. smoking curricula in schools and universities), smoke-free policies (e.g. tobacco bans in public places), and more restrictive tracking of law enforcement and imposing penalties on laws violation for retailers who sell tobacco and related products, especially in the part of the prohibition of their sale to persons under 18 years of age. All these activities except the last one, can also be used to achieve the second goal - reducing smoking prevalence rate in Croatia.

Based on the evidence from our research described in previous chapters, as well as on the evidence from other research of low- and middle-income countries (U.S. National Cancer Institute and World Health Organization, 2016), cigarette price policy could be used as a very effective government tool for reducing tobacco use Croatia. To be more specified, **the government should increase taxes on tobacco and related products, especially in the part of specific excise duties (because it has a relatively higher impact on the consumption than valorem tax and it is easier to administer) in order to increase their price.** This is in compliance with the World Health Organization recommendations that countries should establish their tax policies in such a way as to ensure that tobacco products become less affordable over time. Also, World Health Organization (2017) estimates that, on average, tobacco tax revenues are 269 times higher than public expenditure on tobacco control interventions. Increased excise duties on tobacco and related products should, therefore, result in increased budget tax revenues, healthcare savings, and improving the health of the population. Following the increased budget revenues from raised excise duties, our recommendation is **target allocation of collected funds from excise duties to the healthcare system and education system**, primarily for the smoking prevention actions, like mass media anti-smoking campaigns to raise awareness on harmful effects of smoking, promotion of strong smoke-free policies, inclusion of smoking curricula in schools and universities, etc.

Also, due to its geo-communication position (Adriatic, Central European country and part of the Danube valley; several pan-European transport corridors and their branches pass through Croatia (e.g. Corridor X and Corridor V); Croatian seaports have traditionally been points of exit for Austria, Hungary, Slovakia, Czech Republic, Bosnia and Herzegovina, etc.) Croatia is highly threatened by illicit trade and

moreover by the illicit import of tobacco and related products. For this reason, activities for **regional harmonization of fiscal policies** should be undertaken to limit incentives for cross-border transactions, both with European Union countries as well as with western Balkan countries.

The short-term goal of the project Accelerating Progress on Tobacco Taxes in Low-and-Middle Income Countries will be completed with the publication of Croatian national research report: raising awareness on the importance of reducing tobacco use as well as established co-operation and dialogue between decision-makers and academia in order to put tobacco taxation issues on the political agenda. Developed recommendations from the project should result in a sustainable and systematic policy change in order to achieve the long-term goal, which is to create an effective tobacco control policy and to develop a strategic plan to reduce the damage caused by the use of tobacco in the Republic of Croatia.

References

1. Act on Restrictions on the Use of Tobacco and Related Products. (2017). Official Gazette, No. 45/2017
2. Aljinović Barač, Ž., Markota, Lj., Rogošić, A., Vuko, T. (2018). Tobacco Taxation in Croatia – Comparison Within EU Context. Proceedings of the 6th Mediterranean Interdisciplinary Forum on Social Sciences and Humanities, MIFS 2018, 24-25 May 2018, Barcelona, Spain, 59-73.
3. Andrija Štampar Teaching Institute of Public Health. (2018). <http://www.stampar.hr/en/croatian-non-smoking-day-february-14-2018> 16/07/2018 (accessed: 20/08/2018)
4. Ashraf, S., Moore, C., Gupta, V., Chowdhury, A., Azad, A. K., Singh, N., Hagan, D., Labrique, A. B. (2015). Overview of a multi-stakeholder dialogue around Shared Services for Health: the Digital Health Opportunity in Bangladesh. *Health Research Policy and Systems*, 13(1), 74.
5. Bader, P., Boisclair, D., Ferrence, R. (2011). Effects of Tobacco Taxation and Pricing on Smoking Behavior in High Risk Populations: A Knowledge Synthesis. *International Journal of Environmental Research and Public Health*, 8, 4118-4139.
6. Bajo, A., Jurinec, D. (2016). Hrvatsko tržište duhana i trošarine na duhanske proizvode u *Aktualni problemi i izazovi razvoja financijskog sustava* (ur. Stojanović, A., Šimović, H.), Ekonomski fakultet Zagreb, 121-141.
7. British American Tobacco (2018). News Release - British American Tobacco completes acquisition of TDR, <http://www.bat.com/newsrelease> (accessed: 12/06/2018)
8. Brose, L. S., McNeill A., Arnott D., Cheeseman H. (2017). Restrictions on the use of e-cigarettes in public and private places—current practice and support among adults in Great Britain. *The European Journal of Public Health*, 27(4), 729–736.
9. Brugha, R., Varvasovsky, Z. (2000). Stakeholder analysis: a review. *Health Policy and Planning*, 15(3), 239-246.
10. Carpenter, C. M., Wayne, G. F., Connolly, G.N. (2005). Designing cigarettes for women: new findings from the tobacco industry documents. *Addiction*, 100(6), 837-851.
11. Chaloupka, F. J., Peck, R., Tauras, J. A., Xu, X., Yurekli, A. (2010). Cigarette excise taxation: the impact of tax structure on prices, revenues, and cigarette smoking (No. w16287). National Bureau of Economic Research.

12. Chaloupka, F.J., Yurekly, A., Fong, G.T. (2012). Tobacco taxes as a tobacco control strategy. *Tobacco Control*, 21, 172-180.
13. Chavez, R. (2016). Price elasticity of demand for cigarettes and alcohol in Ecuador, based on household data. *Revista panamericana de salud publica= Pan American journal of public health*, 40(4), 222-228.
14. Chen, Y., Xing, W. (2011). Quantity, quality, and regional price variation of cigarettes: Demand analysis based on a household survey in China. *China Economic Review*, 22, 221-232.
15. Cobiac L. J., Ikeda T., Nghiem N., Blakely T., Wilson N. (2015). Modelling the implications of regular increases in tobacco taxation in the tobacco endgame. *Tobacco Control*, 24, e154–e160.
16. Croatian Bureau of Statistics. (2018). https://www.dzs.hr/default_e.htm (accessed: 05/04/2018)
17. Croatian Competition Agency. (2006). *Decision on abuse of dominant position of Adris Group corp. and Ronhil Ltd. on the market*, Official Gazette, No.18/2007.
18. Croatian Ministry of Finance. (2018). State budget. <http://www.mfin.hr/hr/proracun> (accessed: 20/07/2018)
19. Deaton, A. (1988). Quality, quantity, and spatial variation of price. *The American Economic Review*, 78(3), 418-430.
20. Deaton, A. (1990). Price elasticities from survey data: extensions and Indonesian results. *Journal of Econometrics*, 44(3), 281-309.
21. Deaton, A. (1997). *The Analysis of Household Surveys: A Microeconomic Approach to Development Policy*. Johns Hopkins University Press, Baltimore.
22. Deaton, A., Muellbauer, J. (1980). An almost ideal demand system. *The American Economic Review*, 70(3), 312-326.
23. Decree on the Lowest Salary of Seasonal Workers in Agriculture for 2012. (2012). Official Gazette, No. 64/12
24. Dečković-Vukres V., Ivičević Uhernik, A., Mihel, S. (2016). *Survey on the use of tobacco in the adult population of the Republic of Croatia*, Croatian Institute of Public Health, Zagreb (Croatia)
25. Directive 2014/40/EU of the European Parliament and of the Council of 3 April 2014 on the approximation of the laws, regulations and administrative provisions of the Member States concerning the manufacture, presentation and sale of tobacco and related products and repealing Directive 2001/37/EC. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ%3AJOL_2014_127_R_0001 (accessed: 13/04/2018)
26. Donnelly, P., Whittle, P. (2008). After the smoke has cleared—Reflections on Scotland's tobacco control legislation. *Public Health*, 122(8), 762-766.
27. Employment Promotion Act. (2012). Official Gazette, No. 57/12

28. Engle, R. F., Granger, C. W. (1987). Co-integration and error correction: representation, estimation, and testing. *Econometrica: Journal of the Econometric Society*, 251-276
29. Eozenou, P., Fishburn, B. (2009). Price Elasticity Estimates for Cigarettes Demand in Vietnam, MPRA Paper No. 12779, available on-line at: <https://mpra.ub.uni-muenchen.de/12779/> (accessed: 13/09/2018)
30. Epstein, J. A., Bang, H., Botvin, G. J. (2007). Which psychosocial factors moderate or directly affect substance use among inner-city adolescents? *Addictive Behaviors*, 32(4), 700-713.
31. Euromonitor International. (2018). <http://www.euromonitor.com/> (accessed: 11/04/2018)
32. European Commission. (2018). *Excise Duty Tables (Part III- Manufactured Tobacco)* https://ec.europa.eu/taxation_customs/sites/taxation/files/resources/documents/taxation/excise_duties/tobacco_products/rates/excise_duties-part_iii_tobacco_en.pdf (accessed: 6/04/2018)
33. European Council Directive 2011/64/EU of 21 June 2011 on the structure and rates of excise duty applied to manufactured tobacco. <https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A32011L0064> (accessed: 13/4/2018)
34. European health interview survey - EHIS. (2014). Tobacco consumption statistics, ISSN 2443-8219, https://ec.europa.eu/eurostat/statistics-explained/index.php/Tobacco_consumption_statistics (accessed: 11/05/2018)
35. European Monitoring Centre for Drugs and Drug Addiction. (2015). European School Survey Project on Alcohol and Other Drugs (ESPAD), <http://www.espad.org/report/home> (accessed: 27/04/2018)
36. Excise Duty Act. (2016). Official Gazette, No. 22/2013 to 115/2016
37. Goel, R., K., Budak, J. (2007). Smoking patterns in Croatia and comparisons with European nations. *Central European Journal of Public Health*, 15, 110–115.
38. Guindon G. E., Driezen, P., Chaloupka F. J., Fong G. T. (2014). Cigarette tax avoidance and evasion: findings from the International Tobacco Control Policy Evaluation Project. *Tobacco Control*, 23(0 1), i13–i22.
39. <https://blogs.worldbank.org/opendata/new-country-classifications-income-level-2018-2019> (accessed: 03/08 2018)
40. <https://data.worldbank.org/country/croatia?view=chart> (accessed: 29/06/2018)
41. <https://www.hgk.hr/english/average-annual-wages-growth-najava> (accessed: 30/06/2018)

42. Havard, A., Tran, D. T., Kemp-Casey, A., Einarsdóttir, K., Preen, D. B., Jorm, L. R. (2017). Tobacco policy reform and population-wide antismoking activities in Australia: the impact on smoking during pregnancy. *Tobacco Control*, 0, 1-8.
43. Hirschhorn, N. & WHO Tobacco Free Initiative. (2005). The tobacco industry documents: what they are, what they tell us, and how to search them: a practical manual. Geneva: World Health Organization
44. John, R. M. (2008). Price elasticity estimates for tobacco products in India. *Health Policy and Planning*, 23(3), 200-209.
45. Jones N, Jones H, Walsh C. (2008). *Political science? Strengthening science-policy dialogue in developing countries*. London: Overseas Development Institute
46. Joossens L., Raw M. (2006). The Tobacco Control Scale: a new scale to measure country activity. *Tobacco Control*, 15(3), 247–253.
47. Joossens L., Raw M. (2017). The Tobacco Control Scale 2016 in Europe, Association of European Cancer Leagues, <http://www.tobaccocontrolscale.org/wp-content/uploads/2017/03/TCS-2016-in-Europe-COMplete-LoRes.pdf> (accessed: 6/04/2018)
48. Klein, S. M., Giovino, G. A., Barker, D. C., Tworek, C., Cummings, K. M., & O’Conner, R. J. (2008). Use of flavored cigarettes among older adolescent and adult smokers: United States, 2004–2005. *Nicotine & Tobacco Research*, 10, 1209–1214.
49. Kurzer P., Cooper A. (2016). The Dog That Didn’t Bark: Explaining Change in Germany’s Tobacco Control Policy at Home and in the EU. *German Politics*, 25(4), 541-560.
50. Liberman J. (2006). The future of tobacco regulation: a response to a proposal for fundamental institutional change. *Tobacco Control*, 15, 333–338.
51. Loayza, N., & Ranciere, R. (2004). Financial development, financial fragility, and growth. The World Bank.
52. Loubeau P. R. (2009). Selected Aspects of Tobacco Control in Croatia, *Central European Journal of Public Health*, 17(1), 47-52
53. Matković, B., Nedić, A., Matković, A., Rupčić, T., Ožegović, P. (2014). Alcohol and tobacco use in sport coaches. *Kinesiology: international journal of fundamental and applied kinesiology*, 46, Suppl. 1; 114-119.
54. Mayer D. (2017). Mjere u provođenju borbe protiv pušenja duhana. *Hrvatski časopis za javno zdravstvo*, 13(51), 2-8.
55. Mayer, D., Pavić Šimetin, I., Belavić, A., Hemen, M. (2017). Svjetsko istraživanje o uporabi duhana u mladih - rezultati za Hrvatsku, Hrvatski zavod za javno zdravstvo, Zagreb (Croatia)
56. Mons, U., Nagelhout, G. E., Allwright, S., Guignard, R., van den Putte, B., Willemsen, M. C., Breitling, L. P. (2013). Impact of national smoke-free

- legislation on home smoking bans – Findings from the International Tobacco Control (ITC) Policy Evaluation Project Europe Surveys. *Tobacco Control*, 22(0), e2–e9.
57. Nabyonga-Orem, J., Gebrikidane, M., & Mwisongo, A. (2016). Assessing policy dialogues and the role of context: Liberian case study before and during the Ebola outbreak. *BMC Health Services Research*, 16(Suppl 4), 219.
 58. Nanninga S., Lhachimi S. K., Bolte, G. (2018). Impact of public smoking bans on children's exposure to tobacco smoke at home: a systematic review and meta-analysis, *BMC Public Health*, 18, 749.
 59. Narayan, P. K., Smyth, R. (2006). What Determines Migration Flows from Low-Income to High-Income Countries? An Empirical Investigation of Fiji–Us Migration 1972–2001. *Contemporary Economic Policy*, 24(2), 332-342.
 60. Njavro, M., Juračak, J., Čop, T. (2018). Agrokor Case: The Recent Past and The Uncertain Future of The Big Agribusiness Conglomerate In Croatia, Proceedings in System Dynamics and Innovation in Food Networks 2018, 70-82.
 61. Nkoro, E., Uko, A. K. (2016). Autoregressive Distributed Lag (ARDL) cointegration technique: application and interpretation. *Journal of Statistical and Econometric Methods*, 5(4), 63-91.
 62. Occupational Safety Act (2014). Official Gazette, No. 71/2014
 63. Ordinance on Excise Duties (2017). Official Gazette, No. 1/2017 and 14/2017
 64. Ordinance on Processing of Tobacco. (2006). Manufacturing and Branding Tobacco Products, Official Gazette, No. 69/2006
 65. Padjen, I., Dabić, M., Glivetić, T., Biloglav, Z., Biočina-Lukenda, D., Lukenda J. (2012). The Analysis of Tobacco Consumption in Croatia – Are We Successfully Facing the Epidemic? *Central European Journal of Public Health*, 20(1), 5-10.
 66. Pattichis, C. A. (1999). Price and income elasticities of disaggregated import demand: results from UECMs and an application. *Applied Economics*, 31(9), 1061-1071.
 67. Pesaran, M. H., Shin, Y., Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics*, 16(3), 289-326.
 68. Rosenbloom, J., Rees, V. W., Reid, K., Wong, J., Kinnunen, T. (2012). A cross-sectional study on tobacco use and dependence among women: Does menthol matter? *Tobacco Induced Diseases*, 10:19.
 69. Ross, H., Al-Sadat, N. A. (2007). Demand analysis of tobacco consumption in Malaysia. *Nicotine & Tobacco Research*, 9(11), 1163-1169.
 70. European Commission (2010). Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR) Opinions - Addictiveness and Attractiveness of Tobacco Additives,

- https://ec.europa.eu/health/scientific_committees/latest_opinions_en
(accessed: 23/06/2018)
71. Sebríe E. M., Barnoya J., Pérez-Stable E. J., Glantz S. A. (2005). Tobacco industry successfully prevented tobacco control legislation in Argentina. *Tobacco Control*, 14:e2, 1-11.
 72. Shang C., Lee H. M., Chaloupka F. J., Fong G. T., Thompson M., O'Connor, R. J. (2018). Association between tax structure and cigarette consumption: Findings from the International Tobacco Control Policy Evaluation (ITC) Project, *Tobacco Control*, 0, 1-6.
 73. Special Eurobarometer 458 Report. (2017). Attitudes of Europeans towards tobacco and electronic cigarettes, <https://ec.europa.eu/commfrontoffice/publicopinion/.../79002> (accessed: 12/07/2018)
 74. Statista. (2018). <https://www.statista.com/statistics/415034/cigarette-prices-across-europe/> (accessed: 29/08/2018)
 75. Tobacco Act. (2014). Official Gazette, No. 69/1999, 14/2014
 76. Tušek, K., Lončarić, R. (2017). Market analysis of tobacco production in the Republic of Croatia, Conference proceedings of the 52th International symposium of agronomists, 12-17 february 2017, Dubrovnik, Croatia, 181-185.
 77. U.S. Department of Health and Human Services. (2012). Preventing Tobacco Use Among Youth and Young Adults: A Report of the Surgeon General. Atlanta: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health
 78. U.S. National Cancer Institute and World Health Organization. (2016). The Economics of Tobacco and Tobacco Control. National Cancer Institute Tobacco Control Monograph 21. NIH Publication No. 16-CA-8029A. Bethesda, MD: U.S. Department of Health and Human Services, National Institutes of Health, National Cancer Institute; and Geneva, CH: World Health Organization
 79. Walters, B. H., Petrea, I., Lando, H. (2018). Tobacco Control in Low-and Middle-Income Countries: Changing the Present to Help the Future. *Journal of Smoking Cessation*, 13(4), 187-188.
 80. Wilkins, N., Yurekli, A., Hu, T. W. (2004). *Economic analysis of tobacco demand. Economics of Tobacco Toolkit*, Washington DC: World Bank
 81. World Bank Group Tobacco Control Program. (2018). <http://www.worldbank.org/en/topic/health/brief/tobacco> (accessed: 2/04/2018)
 82. World Health Organization Report on the Global Tobacco Epidemic (2017). http://www.who.int/tobacco/surveillance/policy/country_profile/hrv.pdf?ua=1 (accessed: 2/04/2018)

83. World Health Organization. (2018). <http://www.euro.who.int/en/health-topics/disease-revention/tobacco/publications/key-policy-documents/who-framework-convention-on-tobacco-control-who-fctc/implementation-of-the-who-fctc/infographic-who-fctc-implementation-2018-download> (accessed: 21/8/2018)
84. Zelenka, I. (2009). Tax Policy Impact on Consumption of Tobacco Products in Croatia. *Financial Theory and Practice*, 33(4), 465-479.

Appendix A

Table A. Zivot-Andrews unit root test with a structural break in the intercept and trend for Croatian Cigarette Demand Data, 2000–2017

| Variable | Testing whether Stationary in: | Number of Lags | Minimum t-statistics | Order of Integration |
|-------------------------------------|--------------------------------|----------------|----------------------|----------------------|
| Consumption (cons_ap) | Levels | 1 | -5.476** | I(0) |
| Real tobacco CPI (rcpi) | Levels | 0 | -4.236 | I(1) |
| Real tobacco CPI (rcpi) | First differences | 0 | -6.514*** | I(0) |
| Real retail price of cig. (rcp_ms) | Levels | 1 | -8.661*** | I(0) |
| Real retail price of cig. (rcp_wap) | Levels | 1 | -7.242*** | I(0) |
| Real gross wages (rbwag) | Levels | 2 | -4.769 | I(1) |
| Real gross wages (rbwag) | First differences | 0 | -7.043*** | I(0) |

Note: Critical values: 1%: -5.57, 5%: -5.08%, 10% --4.82.

Table B. The Long – and Short - Run Effects of Cigarette prices and Income on Consumption

(Model 1) - Dynamic specification: ARDL (2, 0, 2); Double-log model

| Variable | Coef. | Std. Err. | t |
|---|---------------------------|-----------|-----------|
| Long- Run Coefficients | | | |
| lnrcpi | -0.497 | 0.045 | -10.96*** |
| lnrbwag | -0.959 | 0.113 | -0.48*** |
| ADJ | -1.412 | 0.150 | -9.39*** |
| Short- Run Coefficients | | | |
| L.D.lnrcpi | 0.408 | 0.119 | 3.44*** |
| D.lnrbwag | -1.025 | 0.286 | -3.59*** |
| L.D.lnrbwag | -1.814 | 0.382 | -4.75*** |
| Intercept | 26.561 | 3.092 | 8.59*** |
| No. Observations | 16 | | |
| Adj R- squared | 0.86 | | |
| Ramsey's RESET | F- stat: 3.97 (0.07) | | |
| Jarque-Bera test | Chi2-stat: 0.78 (0.68) | | |
| Breusch-Godfrey LM test | Chi2-stat: 3.12 (0.08) | | |
| Breusch-Pagan/ Cook-Weisberg test | Chi2-stat: 1.32 (0.25) | | |
| LM test for autoregressive conditional heteroscedacity (ARCH) | Chi2-stat: 0.01 (0.95) | | |
| Mean VIF | 2.49 | | |
| Bound test (F-ststistics) | 30.032 | | |
| Bound test (t-ststistics) | -9.392 | | |

Notes: *Indicates significance at the 10% level; **indicates significance at 5% level; ***indicates significance at 1% level. Variables are defined in Chapter 5.2. Bottom critical value for F-statistics (t-statistics) is 3.17 (-2.57) and top critical value for F-statistic (t-statistic) is 6.36 (-4.10).

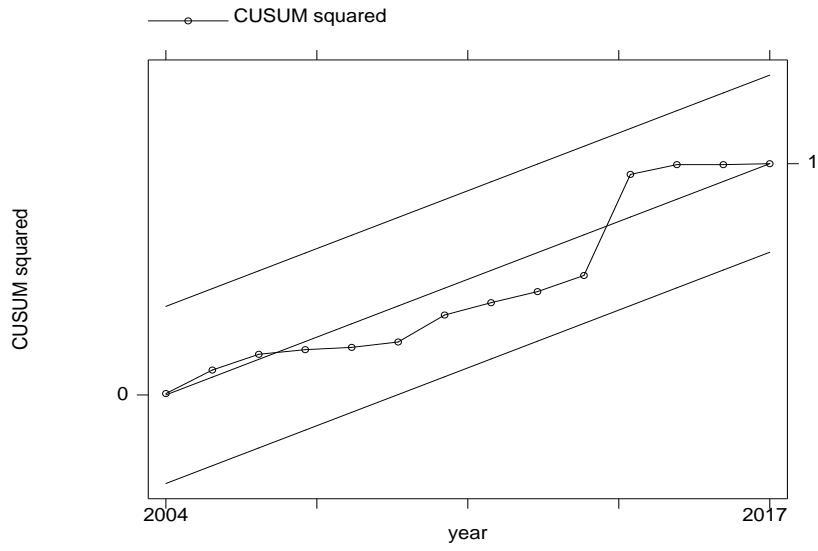


Figure A. Plots of the CSUM of Square for the Double-log Model 1

„In my opinion there is a real social interest in the publication of this work. This work is original and scientifically relevant because it uses a suitable scientific methodology and provides a basis for decision-making, especially in the field of tax policy. Different aspects related to the issue of (taxation of) tobacco products have been investigated and presented in one place, thus creating a unique document for anyone interested in this topic.“

Lena Malešević Perović, PhD

„This monograph brings together the most interesting perspectives and issues related to the tobacco taxation policy, regulation, and control. It is particularly valuable because it represents a comprehensive, straightforward and scientifically based research, which will help policy makers, researchers, students understand the context and potential implications of increasing tobacco consumption and long-run health consequences on population. Therefore, it is an excellent scientific resource related to tobacco policies and control, highly recommended manuscript to read, being very important for future research in this area.“

Ana Mugoša, PhD