Estimation of price elasticity of demand for tobacco products in Armenia

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Abstract

This paper aims at estimating the price elasticity of demand for tobacco products in Armenia. The data is collected from the database of Statistical Committee of the Republic of Armenia, and then transformed for obtaining the variables of our interest. Autoregressive distributed lag models have been used for the identification of the relationship between variables of our interest, i.e. consumption, price, imports, etc., and estimation of the price elasticity. The paper proceeds to argue that prices can be used to control the consumption of tobacco products and seeks to find the data-driven proof for this assumption.

Keywords: price elasticity, tobacco, cigarettes, demand, Armenia

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The Introduction

The harmful impact of tobacco products has been a topic of debate for many generations, yet, there are countries that have hard time controlling domestic tobacco market. According to the Centers for Disease Control and Prevention (CDC) report (2007), cigarette smoking has a harmful effect on almost every organ of human body. It is considered to be the cause for many diseases and responsible for the reduction of overall health of cigarette smokers. Smoking increases risk for several diseases, for example, it increases the risk for stroke by 2 to 4 times, for lung cancer by 25 times and for coronary heart disease by 2 to 4 times. Inhaling tobacco smoke exposes users to more than 7000 toxicants and at least 70 carcinogens, damaging the whole body. A regular smoker typically loses more than a decade of his/her life. It is important to note that tobacco use is one of the crucial preventable causes of premature death in the world. The statistics reported by World Health Organization (WHO, 2015) indicates that the cause of death for more than six million people per year is considered to be tobacco use. Hence, there is no doubt that limiting tobacco consumption is an effective and rational way to save lives and improve overall well-being of both smokers and secondhand smokers.

The situation in Armenia is worth paying attention, as, according to WHO reports (n/a), Republic of Armenia has one of the highest rates (14.1 percent) of disability-adjusted life years (DALYs) attributable to tobacco use in the world. It higher than any of the nearby countries, with Georgia having 12.8 percent, Turkey 10 percent and Iran 5.7 percent. The riskiest age group is from 55 to 74 years. According to recent reports, more than 50 percent of Armenian population are smokers (National Statistical Service of the Republic of Armenia, 2017) and it ranks sixth in the number of smokers in the world and number one in Europe. It is reported that there is a steady decrease in the prevalence rate in the latest seven years.

Armenian market does need regulations, because the consumption should be controlled for the overall well-being of its citizens. Refer to Table 1 and Table 2 for more detailed picture of Armenian tobacco use distribution data (Appendix). Approximately 30 percent of all the deaths in Armenia are caused by tobacco consumption; hence, stricter regulations should take place as soon as possible. Currently, there are only several regulations on smoking in government facilities, indoor offices, pubs and bars, public transportations, which are not appropriately controlled for. Besides changes in regulations, there are other alternative solutions to the existing problem. Jha and Chaloupka (2000) argued that price changes have a statistically significant impact on the consumption of the tobacco products; hence, by setting the desired level of prices, consumption can be reduced to acceptable levels and monitored thereafter. By estimating the price elasticity, the responsiveness of the demand will be determined, which, in its turn, will indicate how much the price increase should be so that the consumption of the tobacco products decreases to appropriate level. For this purpose, we would like to use augmented autoregressive distributed lag models for inclusion of specific lagged variables to account for the addictive nature of tobacco products. The results show that the elasticity is -0.32, which is relatively inelastic compared to low- and middle-income countries. According to Ramsey Rule, taxes applied to goods and services with relatively inelastic demand are more efficient than those applied to demands that are more elastic. As it is the case in Armenia, raising taxes can be yet another efficient alternative for controlling tobacco use.

Hence, the purpose of the research is to analyze and define the demand for tobacco products in Armenia, as it will help to have a reasonable understanding of the ways that the demand is determined. Afterwards, when the determinants of demand are detected, it will be possible to identify ways that the demand can be influenced, or more appropriately, reduced. Several articles refer to this issue from different points of view and discuss possible solutions, which are going to be presented in the next section.

The Literature Review

Demand for the tobacco products has been and still is a current topic of discussion for many economists. According to the principle of consumer sovereignty, individuals are aware of the products that are at their best interest to consumer. Consumers know the risks concerned and internalize all the costs and benefits involved. Therefore, private consumption decisions result in the most efficient allocation of society's scarce resources. However, there are market failures that do interfere into the process of efficient allocation. Wilkins, et al.(n/a) discusses three crucial market failures associated with tobacco market that result in economic inefficiencies and hence, require intervention.

First market failure refers to the "information failure" about the health risks of tobacco use. The distorted and concealed information spread by industry players cause misconception about the health risks of the smoking. Another important cause for this "information failure" is underestimation of the health risks because of the delay between starting to smoke and the onset of tobacco related disease. This underestimation is more common for low- and middle-income countries, which is applicable to Republic of Armenia.

Second market failure refers to the "information failure" about the addictive nature of tobacco consumption. Jha and Chaloupka (2000) also discuss the addictive nature of tobacco use as a result of physical addiction to nicotine. The physical addiction indicates that there is a significant amount of effort and discomfort involved in the process of quitting the smoking. However, the addictive nature of nicotine is largely underestimated by adolescents, and once addicted they face high costs in trying to quit (Green, et al., 2016). Above mentioned two types of "information failures" result in high private costs of death and disability for smokers.

Third and final market failure refers to the external costs imposed on non-smokers by smokers. Physical costs include the health impacts of passive smoking and the greater risk of fire and property damage. Wilkins, et al. (n/a) proceed to state that, "financial costs borne by people, whether or not they are exposed to tobacco smoke, include tobacco-related public health care costs and cross-subsidization of tobacco-related private health care costs". Moreover, "caring externalities" can include the suffering from the illnesses or deaths of smokers.

After all, the existence of above mentioned internal (harm to themselves) and external costs (harm to non-smokers) justifies government intervention and continuous search for tools to limit the consumption of tobacco related products. Wilkins, et al. (n/a) proceed to discuss the nuances of the methodology and interpretation of the results, which will be discussed in the research later. The paper provides throughout discussion of the need for identification of the determinants of the demand for the tobacco products and guides through the process of estimation of the price elasticity.

Meanwhile, Jha and Chaloupka (2000) discuss the price elasticity of demand for tobacco products from the revenue maximization point of view. According to the paper, low- and middle-income countries increasing prices lead to significant reduction in the use of tobacco products. The same can be concluded for high-income countries. The estimated price elasticity of demand for low- and middle-income countries is two times higher than those for high-income countries, where estimates indicate numbers around -0.4 in the long-run. It can be explained by the differences in the taxes for low-, middle- and high-income countries. In general, taxes in low- and middle-income countries are lower than those in higher income countries, and therefore the prices follow the same pattern. Additionally, the cigarette taxes usually account for approximately two-thirds of the final prices in high-income countries compared to approximately half of the price in low- and middle-income countries (refer to Table 3, Appendix). There are some outliers from the general notion, such as Republic of Armenia and United States of America. It can be seen that tax rate in Armenia is

higher than for other countries in the same segment. Taking into account the above-presented information, it is reasonable to conclude that any changes in the tax rates will eventually be reflected in the prices of the tobacco products. Since the percentage of the tax in the final price is considerably higher for Armenian market, we can assume that these observations are valid and can be shown on the data. After identifying clear relationship between increases in taxes and price changes, it needs to be translated into relationship with actual consumption of the tobacco products. According to the most fundamental law of economics, downward-sloping demand curve is derived from the consumer's constrained utility-maximization process. To be more precise, when the price of a product rises, the quantity demanded of that product falls. However, it was believed that because of the addictive nature of the tobacco products this case could be an exemption (Winston, 1980). Still, more current literature prove the existence of the relationship between price changes and tobacco use.

It is essential to note that demand for tobacco products is more elastic in the long run, which can be explained by the addictive nature of the product (Green et al., 2016). Jha and Chaloupka (2000) also refer to the groups that are most sensitive to price changes. The research indicates that youth and young adults that are less educated and have lower income are more sensitive to price changes in the tobacco products. Afterwards the authors proceed to discuss various motives for tobacco taxation, including revenue generation motive and improvement of economics efficiency and overall well-being of the public.

Anderson et al. (2016) shows the connection between tobacco control policy changes and smoking prevalence. The authors aimed at comparing low- and middle-income countries with other income categories for eight consecutive years (2007 to 2014) and analyze if the policy changes reflect in the smoking prevalence. All the related information was collected from World Health Organization (WHO) reports and Observatory Data Repository. After policy percentage scores (PS)

were calculated, authors made a trend analysis with respect to the income category of the corresponding country. The study shows that the policy scores were improved during that period for all the income categories with different rates. After all, a negative relationship between higher policy percentage scores and change in the smoking prevalence was identified. Therefore, strengthening the policies helps controlling the tobacco consumption in all the countries of different income categories. Hamilton also points out the importance of policy changes in advertising. The author comes to the conclusion that stronger antismoking health warnings, while proposed continually, are considered second-best to an advertising ban. Hamilton further argues that, "Action based on wishful thinking seldom is as effective as that based on carefully specified models accurately depicting the forces influencing the policy objectives and the connections between forces and proposed policy actions."

While estimating the elasticity of the demand, the problem of illegal trade should be taken into account, as it distorts the overall picture. An article published by World Health Organization (WHO, 2015) discusses the illegal trade of tobacco products and what should the public be aware of to stop it. It states that illicit trade of tobacco products is not only a health priority, but also a major economic and security issue for any country. According to the survey, in every ten cigarettes at least one is traded illegally. There are a number of initiatives that WHO undertakes to stop the illicit trade; however, considerable results can be achieved only when countries are determined to solve this problem on an individual level first. Smugglers target low-income youth, which according to Jha and Chaloupka (2000) is the most responsive age group. No doubt, that eliminating the illegal trade of tobacco products will be a win-win situation in terms of decrease in consumption, therefore, decrease in the rate of premature deaths, and increase in tax revenue for governments.

There are numerous discussions on the topic of what drives smuggling. One of the controversial ones refers to increase in the taxes, however, latest research (WHO, 2015) shows that

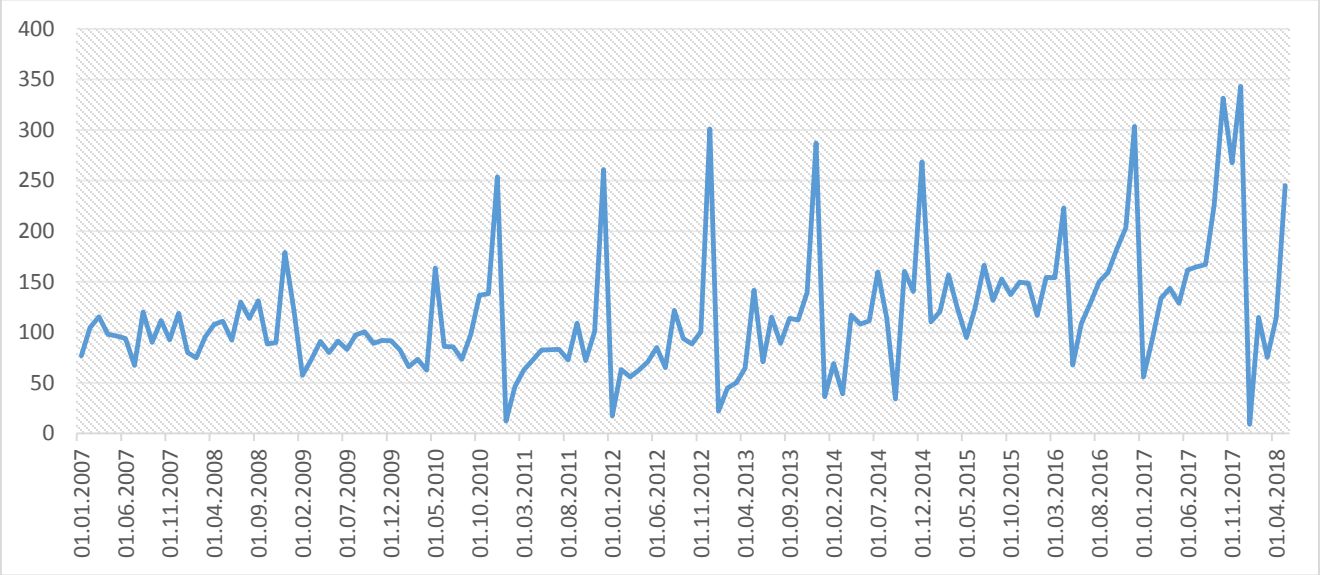
there is no direct correlation between high taxes and smuggling. Another cause of smuggling can be considered the ease and cost of operating in the tobacco industry of a certain country, how well the illegal networks are organized. Yet other important determinant is the efficiency of tax administration system and the probability of being caught and ultimately punished for the committed crime. All of these theories and facts should be considered when gathering information for the research and interpreting it.

Besides the papers already mentioned, there was a number of other articles and books discussing the tobacco industry and its complications. Hence, it can be concluded that the issue is universally addressed and researchers are trying to find answers. However, there was little information about trends in Armenia and any analysis on the price elasticity of demand for tobacco products. That is why this paper can contribute to the existing literature by providing more information about the price elasticity for tobacco products in Armenia. The approaches discussed by Jha and Chaloupka (2000) are used extensively in the paper, as they describe details of the industry in low- and middle-income countries. However, the absence of papers regarding data-driven results in tobacco industry in Armenia is vital for understanding the limitations of the model and opportunities for the economic analysis.

Data Description

Estimation of the price elasticity of demand for tobacco products requires collecting information about consumption (use of tobacco products) and price. There is no data for consumption in Armenia; hence, the current study calculates the figures based on the data provided by the database of Statistical Committee of the Republic of Armenia. By computing production volume, sales in the country, imports, it was possible to estimate consumption.

Figure 1. Local Wholesale Sale per capita (smokers and non-smokers) during 2007-2018, AMD



From the Figure 1, we can identify clear patterns of seasonality. Almost every year there is an immense increase in December and dramatic decrease in January. This can explained by New Year resolutions (Jha and Chaloupka, 2000), when smokers make a resolution not to smoke in the coming year. Alternatively, it can be explained by stores overbuying tobacco products to avoid stock-outs during the holiday period. As the purpose of the research is to estimate the elasticity, it is more appropriate to transform the data and take natural logarithm of the consumption, which will help to see the relative change in percentage terms.

Figure 2 provides a closer look on the dynamics of local production volume**.** There is a clear trend line in the production volume with the peak at the end of 2017.

Figure 2. Cigarette Production Volume during 2007-2018, AMD

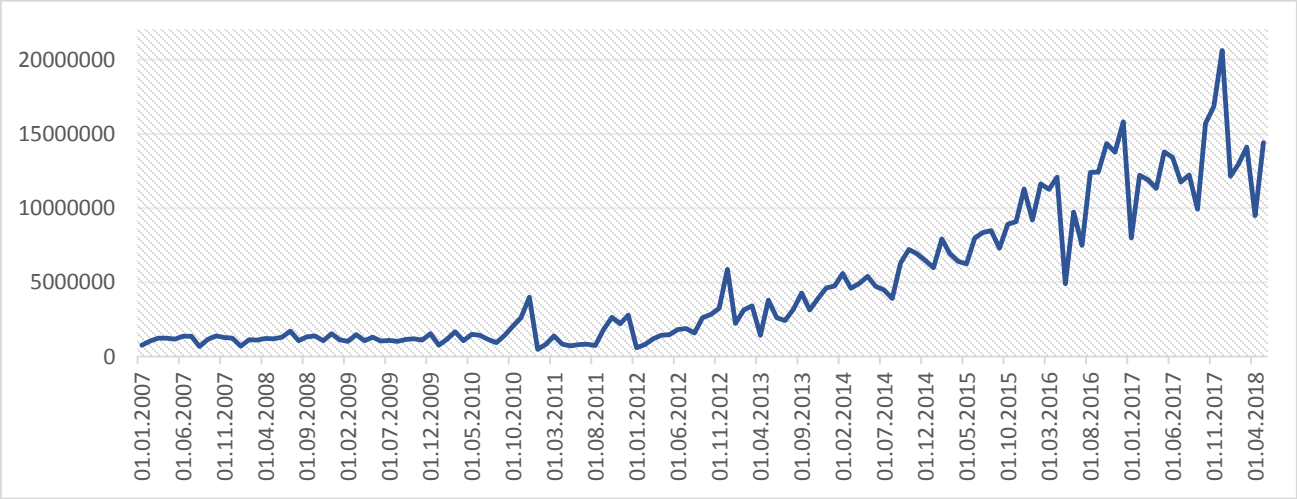
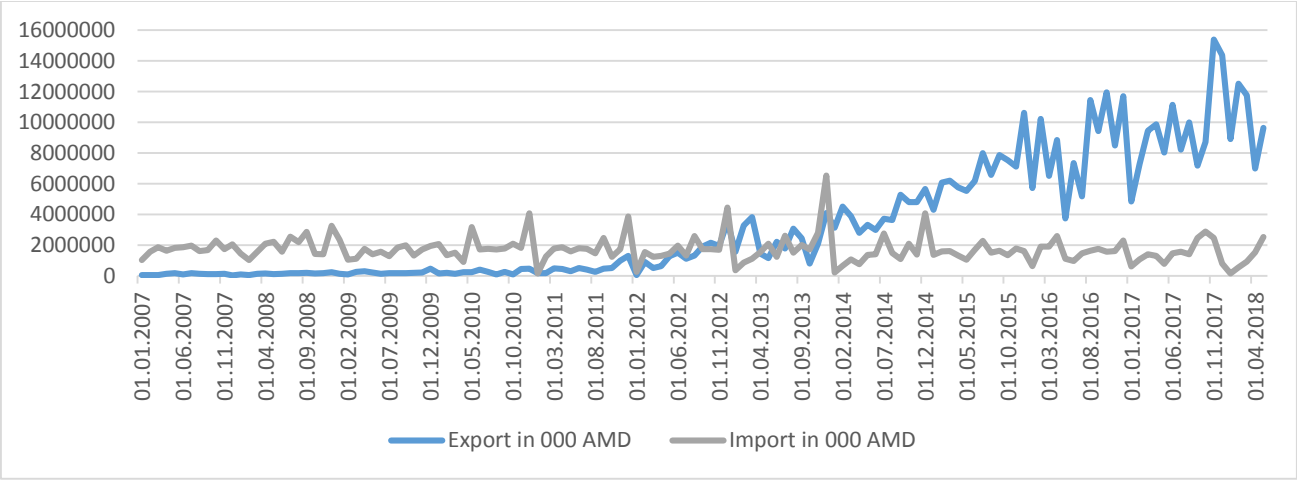
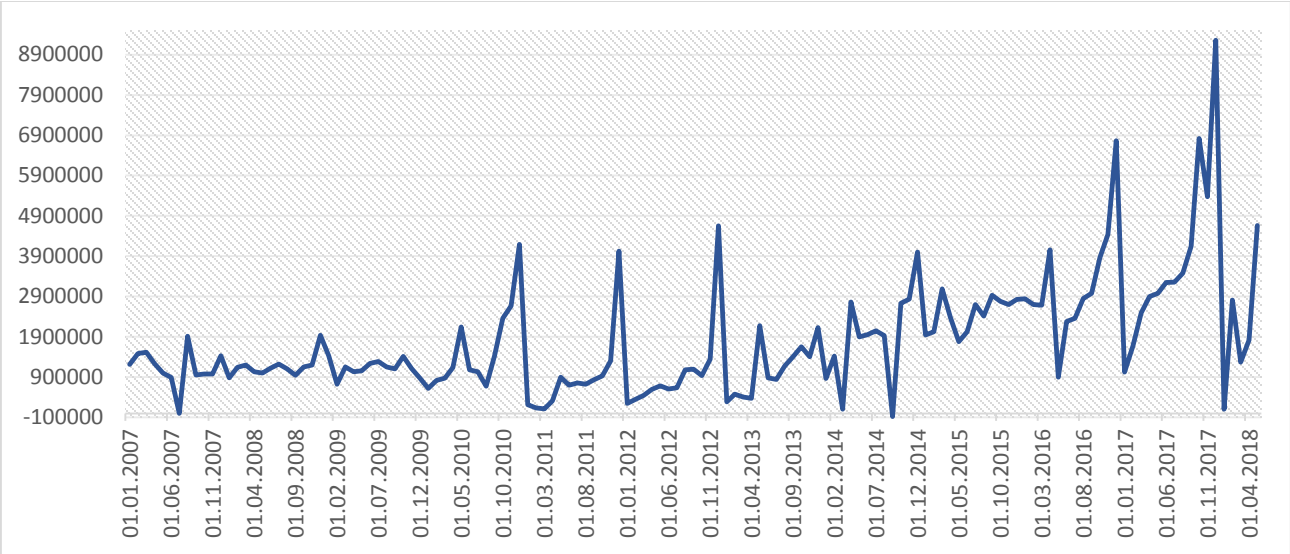


Figure 3. Cigarette Exports and Imports during 2007-2018, AMD



The dynamics of imports and exports of tobacco products is presented on Figure 3. After the second half of 2013, exports started growing much faster than imports, leaving a negative trade balance. From the last graphs, it is evident that fluctuations are increasing over time. The same pattern can be observed for cigarette sales in RA (refer to Figure 4).

Figure 4. Cigarette Sales during 2007-2018, AMD



Figures for consumption can be obtained in a number of ways. The first option is adding sales in the country to imports. Alternatively, we can add the imports to the production and subtract the exports. For checking purposes, we compare the estimated figures and make sure they are comparable, which means that estimated consumption can be used for the purpose of estimation of the price elasticity of demand for tobacco products, assuming that stocks are constant over time.

$$Consumption = Sales\ in\ RA + Imports$$

$$Consumption = Production - Trade\ Balance\ (where\ Trade\ Balance = Exports - Imports)$$

Another variable that is essential to the analysis is a proxy variable for the income of the households. There are two such variables that are applicable for this purpose: average nominal wage and real income index. In the Figure 5a and Figure 5b we can see the general trend of income during the period of observations.

Figure 5a. Average Nominal Wage per capita during 2007-2018, AMD

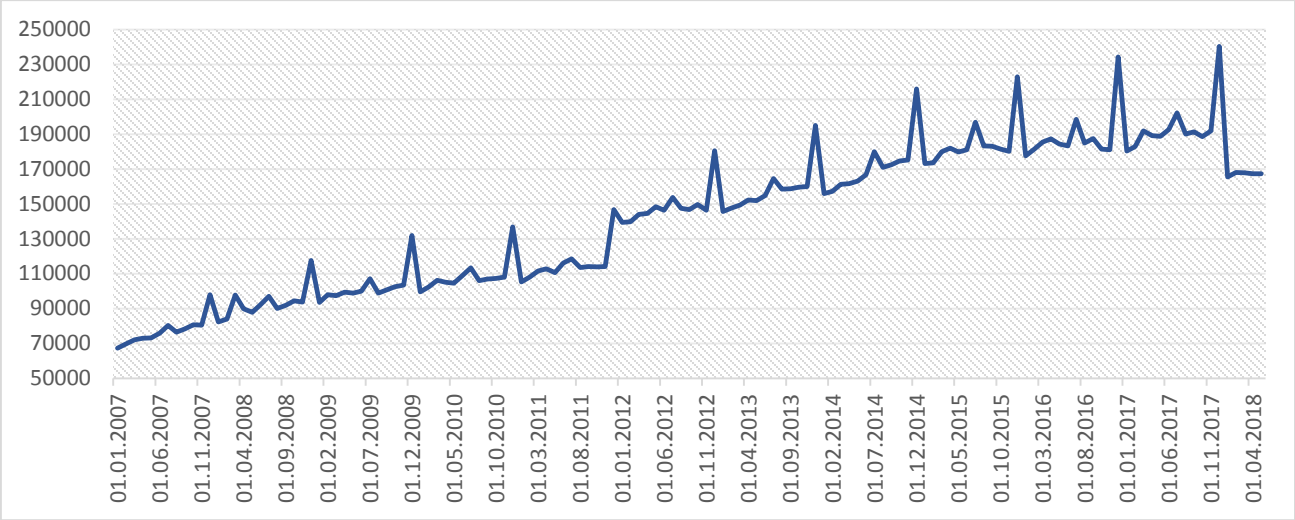
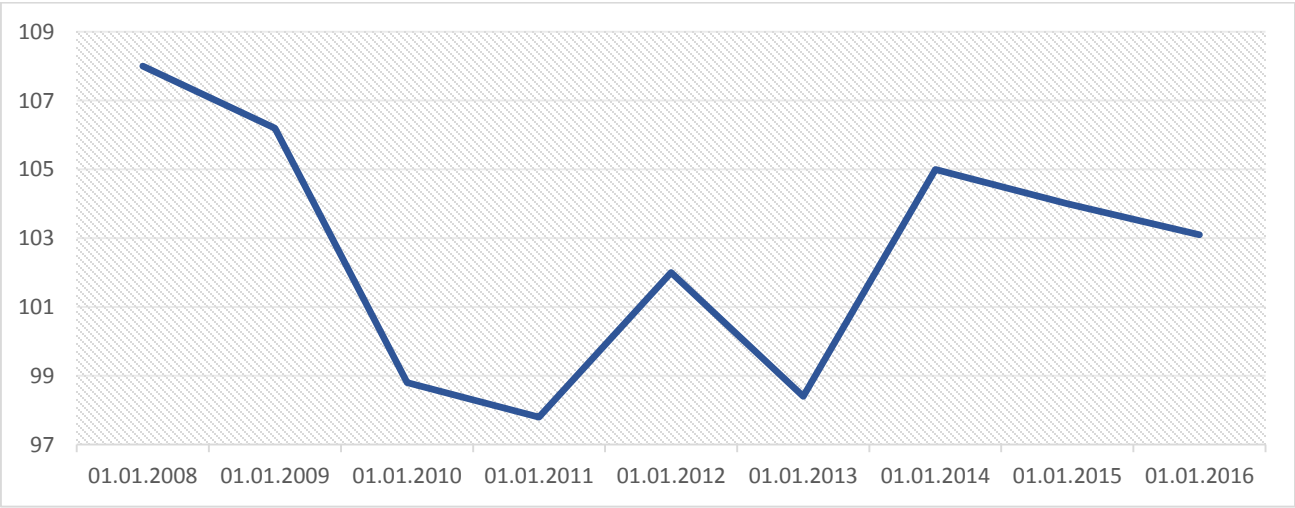
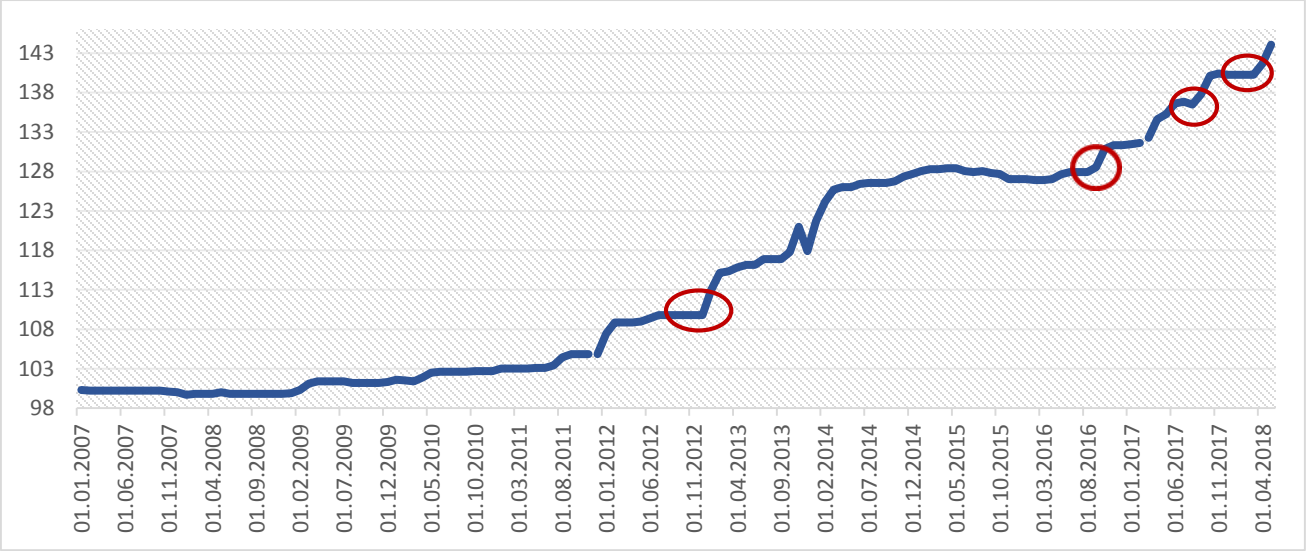


Figure 5b. Real Income Index during 2007-2018, AMD



Because nominal wages do include fluctuation in the inflation, it is more appropriate to take real income index for the purpose of the research. However, these two graphs combined can be an understanding of the inflation, which needs to be controlled for in the model we are going to use. The corresponding variable for the price of the cigarettes will be cigarette CPI index, which also can give us an understanding of the price increases during the period of observation. From the Figure 6, we can see red circles, which identify the dramatic rises in the CPI index of the cigarettes.

Figure 6. Cigarette CPI Index during 2007-2018, AMD



To prove the theory of Jha and Chaloupka (2000) we compare the price hikes with excise tax changes in the policies. Indeed, most of the CPI increases correspond to the increases in the excise tax; therefore, the variable can be used as proxy for the price of cigarettes (as there is no aggregate information on the prices of tobacco products).

Previously the consumption per capita has been calculated on the whole population, i.e. smokers and non-smokers were included. We would like to estimate how much a current smoker spends yearly on tobacco products. For the result, please, refer to Table 4.

Table 4. Yearly consumption per smoker during 2010-2016, AMD (Statistical Committee of the Republic of Armenia)

Year	Smoking prevalence	Population	Number of smokers	Consumption	Consumption per smoker (in AMD)
2010	56,80%	3262600	1853156,8	43045112,95	2322,7993
2011	56,30%	3021400	1701048,2	31979121,57	1879,9656
2012	55,10%	3026900	1667821,9	34065806,1	2042,5326
2013	54,30%	3017100	1638285,3	37724086,62	2302,6567
2014	53,60%	3010600	1613681,6	40893353,85	2534,1650

2015	52,50%	2998600	1574265	48445351,91	3077,3314
2016	52,10%	2986100	1555758,1	58273627,99	3745,6741

Smoking prevalence rate can be obtained from World Health Organization database and population of the country is reported by the Statistical Committee of the Republic of Armenia. By multiplying given numbers, we can find the number of current smokers ("current" smoking means smoking at least once in the past week). After dividing the consumption by the number of smokers we find yearly consumption per smoker in AMD. This number is suspiciously low, because all the people surveyed that have smoked at least once in the past week are also taken into consideration. Which means if a person has smoked just one cigarette in the past week at the time of survey, even if that is the only cigarette he/she smoked during the whole year, they are considered to be smokers along with those who smoke on a daily basis.

After collecting the data needed for the research, we need to proceed to constructing the statistical model, which will most efficiently and precisely estimate the price elasticity of demand for tobacco products in the Republic of Armenia.

The Methodology

The first two models we are going to use for the purpose of research are auto-regressive distributed lag models. It is a time-series model, which helps to investigate multivariate relationships between variables.

Model 1: $Y\delta\ consumption\ =\ \beta1 +\ \beta2 * Xinflation\ of\ price +\ \beta2 * Xlag1\_\delta\ consumption + \beta3 * lag2\_\delta Consumption\ +\ \beta3 * Xlag12\_\delta Consumption\ +\ \varepsilon$

The first model includes four variables, and helps us look at consumption in terms of disaggregated picture. Including the different types of consumption helps understand if the addiction argument has a right for existence and is data-driven. According to the authors of "Tobacco Control in Developing Countries" (Jha and Chaloupka, 2000), in a country, where there is no or little smuggling, consumption can be replaced by production. However, Armenian market is not still perfectly regulated and illegal trading takes place on a daily basis; therefore, we do not have the luxury of replacing estimated variable with the verified data.

Model 2: $Y\ import\ =\ \beta1 +\ \beta2 * Xinflation\_of\_price +\ \beta2 * X\delta Consumption +\ \beta3 * Xlag12\_\delta Consumption\ +\ \varepsilon$

In the second model, we replace estimated consumption with imports. The rational expectation is that the coefficient should be comparable, as imports are the most sensitive segment of tobacco products (the price of imported cigarettes is relatively higher compared to domestically produced ones). As in the previous model, there is a differenced consumption and seasonally lagged variable of the differenced consumption. It is expected that coefficients $\boldsymbol{\beta_2}$ and $\boldsymbol{\beta_3}$ have a positive sign, because the increase in the consumption will eventually lead to higher imports to meet the needs of the smokers.

***Model 3**:* `ARIMA (1,1,0)x(1,1,0)`, where consumption- endogenous, inflation-exogenous

The third model is a seasonal ARIMA, which combines the auto-regressive and moving-average terms through an order of differencing. A seasonal ARIMA model is classified as an ARIMA (p,d,q)x(P,D,Q) model, where P=number of seasonal autoregressive (SAR) terms, D=number of seasonal differences, Q=number of seasonal moving average (SMA) terms. Because of the addictive nature of tobacco, we have to include AR (of one) to account for the dependency of the current consumption on the last period's consumption. Since including only AR term does not eliminate first order autocorrelation, we also need to include differencing of order one. The same logic follows for the seasonal part of the model, as seasonal pattern is both strong and stable over time.

Constructed models aim at the most precise and appropriate estimation of the price elasticity of demand for tobacco products. Each of the models looks at the final goal from a different perspective, hence, providing an opportunity for objective and unbiased conclusion.

The Results

The ultimate goal of the research is to precisely estimate the price elasticity of demand. Table 5 summarizes the outputs we obtained after running the specified models:

Table 5. Results

	R-squared	R-squared adjusted	F stat	Probability F stat	AIC
Model 1	0,476	0,456	22,96	0.0000	165,3
Model 2	0.615	0.604	54.35	0.0000	71.08
Model 3	-	-	-	-	158.396

The R squared of the models cannot be compared because the dependent variable changes from consumption to imports of tobacco products. Other statistics cannot be compared as well. From the results of first model, we can state that the constructed linear regression is statistically significant and the independent variable explain about 47.6 percent of the variations in the dependent variable, which is considerable for out type of analysis. The results of the second model are fairly unexpected. The R squared is 61.5 percent, which means that the independent variables that was chosen to be included in the model explain the above-mention percent of variations in the dependent variable. As brought up earlier, the prices of imported tobacco products are relatively higher compared to domestically produced ones, therefore, when the price rises the most responsive group is the relatively high-end segment of the product, because smokers prefer switching to relatively cheaper tobacco products. Thus, imports are influenced considerably. The third model, which is seasonal ARIMA, is not conventionally used for this type of research. However, this model is important for comparison of the coefficients. Without further due, please, refer to the Table 6 for the detailed information on the coefficients obtained.

Table 6. Summary of outputs

	Model 1		Model 2		Model 3	
	Coefficients	St. error	Coefficients	St. error	Coefficients	St. error
Inflation_of_price	-0,3152***	0.062	-0,1907***	0.043	-0,0733	0.051
lag1_dConsumption	-0,5924***	0.089	–	–	–	–
lag2_dConsumption	-0,2085*	0.084	–	–	–	–
lag12_dConsumption	-0,2598*	0.118	0,1660*	0.053	–	–
dConsumption1	–	–	0,5033***	0.077	–	–

Because of the reasons mentioned earlier, we cannot compare the estimated coefficients for different models. In the first model the coefficient is -0.3152, which does confine to the interval mentioned in the "Tobacco Control in Developing Countries" book (Jha and Chaloupka, 2000). The coefficient is statistically significant, so the estimated price elasticity of demand for tobacco products according to Model 1 is -0.32. The rest of the coefficients, which include the lagged differences of consumption, are also statistically significant. This proved that the current consumption is strongly connected to the previous period consumption and even to one-year earlier consumption, which is explained by the addictive nature of tobacco products.

The second model, where the dependent variable is import of the tobacco products, does provide an insight into the movement between the cigarette segments. Whenever there is one point index increase in the price, the imports decrease by 19 percent. The coefficient is statistically significant, along with the coefficient of all the independent variables in the model.

The third model is not common for this type of research; however, it provides us a different insight on the issue. Unfortunately, the coefficient for price is insignificant; therefore, we cannot compare it with the coefficient of the first model. Three different models give us different understanding of the issue, however, the ultimate goal of estimating the price elasticity of demand

for tobacco products has been reached. To see what the elasticity means in Armenian reality and how to use it in the further actions refer to next section.

The Conclusion

The results indicate that price elasticity of demand for tobacco products in Armenia is comparable to the results obtained by World Bank (Wilkins, et al.). The recent conventional models of tobacco demand estimate price elasticities of consumption ranging from -1.23 to -0.14. According to our first linear model, when price of the tobacco products increases by one index point, then consumption of these products decreases by 0.32 percent. The second model aims at explaining the changes in imports through changes in prices. The coefficient proves that increase in the price of tobacco products lead to decrease of imports of these products. Because imported cigarettes usually have relatively higher prices than those produced locally, increase in the price of cigarettes first affects expensive cigarettes. However, we cannot be sure if the increase led to the decrease in the tobacco use, or substituting one cigarette type with less expensive one. By making shift in the consumption of the types of cigarette, the eventual consumption of tobacco products can stay unchanged. Another point that should also be taken into consideration is the addictive nature of the cigarettes. Because myopic addiction can be overcome only in a certain period of time, the long-run changes in the consumption can be much more considerable than the short-run effects.

After concluding that Armenian data support the arguments of reverse relationship between prices of tobacco products and eventual consumption as well as a positive relationship between tax rate and prices of these products, there is a need for identifying a threshold for the profit-maximizing tax rate. As it was mentioned earlier, the consumption of tobacco products in low- and middle-income countries are more sensitive to price changes. Hence, higher taxes on cigarettes and other tobacco products would lead to significant reduction in cigarette smoking and other tobacco use. According to Jha and Chaloupka (“Tobacco Control in Developing Countries”, 2000), there are two

important notions of economic efficiency when referring to appropriate tax levels of tobacco products.

The first one refers to the Ramsey Rule. According to this rule, given that governments should generate revenue and consumption taxes are a part of this revenue, taxes applied to goods and services with relatively inelastic demand are more efficient than those applied to more elastic demand (given elasticity of supply is constant). Taking into account the fact that the estimated price elasticity of demand for low- and middle-income countries is two times higher than those for high-income countries, the taxes appear to be "not-efficient" taxes. But not in the case of Armenia, because according to the numbers we have, the price elasticity of demand is relatively inelastic for Armenia compared to its low- and middle-income competitors. Therefore, taxation is applicable to Armenia.

The second notion touches on the topic of externalities that was discussed in the previous sections. The concept insists that smokers should bear the full costs of their consumption, including all the externalities. Because of the nature of tobacco products, one individual's consumption imposes costs on others, which is considered a negative externality, and, as a consequence, of the imposed costs, others are burdened with the consumption of that individual. Pigou (1962) suggested taxes as an improvement to economic efficiency in that kind of situations. The tax would raise the marginal cost of smoker to the point, where it will be equal to the marginal cost of smoking, and this tax will produce an economically efficient outcome. When determining the threshold, the net social costs of smoking should also be taken into consideration.

All the results and conclusion should be taken with caution given the limitations of the data. Some of the reported figures did not follow the logic or were wrongly reported. Because of these issues, we had to use monthly average smoothing in some cases to make the data more appropriate for modeling. Another limitation of data was the absence of reports on the consumption figures. The

used data was estimated with the information available on the official website of the National Statistical Committee. As a result, numbers are merely an approximate estimation of the actual consumption figures.

Finally, the inverse relationship between price and consumption has been identified on Armenian data, which implies that government should use this relationship to control the consumption in the country. As mentioned in the introduction, according to statistical reports, at least 52 percent of the population are smokers. Raising taxes is considered to be an efficient and least expensive alternative for Armenia. Among more resource-demanding alternatives for reduction of consumption can be government regulation referring to smoking policies in public places. After all, the reduction of tobacco use through tax raise is not only a revenue-generating loophole, but also an attempt to increase the overall health condition of its citizens.

Appendix

Table 1. Tobacco use data (Survey conducted by WTO, 31 December 2016)

	Youth tobacco use		Adult tobacco smoking	
Prevalence (%)	Current tobacco smoking[1]	Daily tobacco smoking	Current tobacco smoking	Daily tobacco smoking
Male	5.0	4.0	51.5	49.9
Female	1.0	1.0	1.8	1.6
Total	3.0	n/a	27.9	26.9

[1] "Current" smoking means smoking at least once in the past week.

Table 2. Smokeless tobacco use data (Survey conducted by WTO, 31 December 2016)

	Youth tobacco use	Adult tobacco use
Prevalence (%)	Current smokeless tobacco smoking	Current smokeless tobacco smoking
Male	6.0	1.8
Female	3.0	0.0
Total	4.4	n/a

Table 3. Cigarette prices and taxes, selected countries, by income group (Jha and Chaloupka, 2000)

	Price(US$)	Tax (US$)	Tax as percentage of price
Low-income countries			
Armenia	0.20	0.10	50
Bangladesh	0.09	0.03	30
Cambodia	0.05	0.01	20
China	0.20	0.08	38
Middle-income countries			
Albania	0.29	0.20	70
Bolivia	0.32	0.20	61
Bulgaria	0.60	0.25	42
Thailand	0.60	0.37	62
Upper-middle-income countries			
Argentina	1.38	0.97	70
Brazil	1.05	0.79	75
Chile	0.88	0.62	70
Poland	0.50	0.20	39
Middle-income countries			
Australia	4.85	3.15	65
Austria	2.96	2.16	73

Denmark	5.21	4.38	84
Finland	4.49	3.28	73
United Kingdom	4.16	3.24	78
United States	1.94	0.58	30

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