THE EFFECT OF ANTI-TOBACCO POLICIES IN RUSSIA ON FILTERED CIGARETTES CONSUMPTION

by

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Abstract

In 2013, the anti-tobacco policy in the Russian Federation was changed substantially as a result of joining the WHO Framework Convention on Tobacco Control. This paper analyzes the effect of these anti-tobacco measures on cigarette consumption in the Russian Federation using the RLMS-HSE data. The results suggest that the average number of cigarettes, smoked daily by men, is estimated to decrease by approximately 1 cigarette as a result of the policy changes of 2013. However, the changes were less successful in decreasing the tobacco consumption of women.

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1. Introduction

Tobacco use is one of the most common factors of risk to health along with alcohol consumption, unhealthy diet, and lack of physical activity (World Health Organization, 2014). The problem of tobacco consumption is very sharp in the Russian Federation. As of 2008, 60% of the Russian male population were smokers and the rate of quitting was very small, which indicates inefficient anti-tobacco measures (Ross, 2008). This study is intended to contribute to the research of smoking behavior and current policy efforts' results in the Russian Federation. In particular, one of the main research questions is how the most important anti-tobacco policies of 2013 changed the smoking behavior in Russia in the subsequent years. I will analyze how the average number of cigarettes smoked daily responds to the anti-tobacco policy changes in the Russian Federation. The results will help reflect on these changes and plan future steps in policy development.

In September of 2008, Russia joined the World Health Organization (WHO) Framework Convention on Tobacco Control, which obliged it to "develop, implement, periodically update and review comprehensive multisectoral national tobacco control strategies, plans and programs" (World Health Organization, 2003; Tobacco Control Laws, 2020). This led to a series of amendments to existing laws. Specifically, in May of 2012 Ministry of health and social development of the Russian Federation issued the order on the approval of warning labels on the dangers of smoking, accompanied by pictures, which obliged cigarette manufacturers to print approved pictures that demonstrate the repercussions of smoking instead of previously required warnings about the dangers of smoking (Order of the Ministry of Health and Social Development of Russia No. 490n, 2012). Additionally, Federal Law No. 15-FZ of February 23, 2013, on Protecting the Health of Citizens from the Effects of Second-Hand Tobacco Smoke and the Consequences of Tobacco Consumption (Anti-Tobacco Law, hereafter known as AT Law) was developed. It was designed to protect the health of

people from second-hand smoke by putting restrictions on smoking in public places and banning tobacco advertising, promotion and sponsorship (Tobacco Control Laws, 2020). Amendments to legislation in subsequent years were aimed at implementing these provisions. In November 2013, the Administrative Offences Code, Law No. 195-FZ was amended to enact penalties for violating the AT Law (Tobacco Control Laws, 2020). Along with these changes, tobacco excise taxes continued to increase. In 2013, the excise tax on tobacco was 730 rubles per 1 thousand cigarettes, more than twice higher than in 2011[1]. Looking at raw data from RLMS-HSE suggests that the percentage of the smoking population decreased from 32.74% in 2009 to 27.25% in 2016. Over this period, for men, the percentage decreased by about 11% and by about 2% for women. According to WHO Global Adult Tobacco Survey, the percentage of smokers in 2009 was even larger (5-6%) than the same percentage in RLMS-HSE, widening the difference between 2009 and 2016 (Quirmbach, 2016). Even though the results are impressive, more work still needs to be done since the percentage of smoking women decreased by only 2%. Thus, analyzing the effect of the changes made in the year 2013 to apply this knowledge to the future anti-tobacco measures is of primary interest.

This paper proceeds as follows. Section 2 discusses the literature review on anti-tobacco policies and factors that may affect tobacco consumption. Section 3 entails an overview of the tobacco market in the Russian Federation. Section 4 discusses the RLMS-HSE data and data cleaning process. Section 5 details the empirical approach. Section 6 presents the results. Section 7 offers conclusions. Section 8 includes a reference list.

[1] 730 rubles are equivalent to 22.9 dollars as of 2013.

2. Literature Review

According to the WHO report on the global tobacco epidemic (2019), the Russian Federation is in the top countries based on the prevalence of tobacco smokers among the population aged 15+ years. Additionally, the female population accounts for a significant part of the smoking population. In 2017, 15.5% of the female adult population were smokers (WHO, 2019). Therefore, choosing the right policy to prevent alcohol and tobacco use is a priority in improving the health condition of the Russian population. In this regard, increasing excise tax rates on these products and enforcing bans on advertisement have been shown to be the most effective, which includes their cost-effectiveness and increased tax revenue that can be used to improve public health. (An & Sturm, 2011; Cook & Moore, 2002; WHO, 2019). Lai et al. (2007) show that by increasing excise tax by 11%, the intervention cost of averting one disability-adjusted life year for tobacco consumption in Estonia is 14 euros. The advertisement ban is the second in terms of cost-effectiveness. These two interventions are approximately 4 times cheaper than brief interventions in primary care and 7 times cheaper than nicotine replacement therapy (Lai et al., 2007).

Kossova et al. (2018) analyze the socioeconomic factors that influence the decision to smoke. They propose that in addition to increasing excise tax on tobacco and bans on indoor smoking, the Russian authorities should take measures to promote a healthy lifestyle using social advertising, public lectures and similar activities. In addition, they propose to increase the population's confidence in future economic development to motivate them to refuse to consume cigarettes in favour of their health in the future (Kossova et al., 2018).

Analyzing factors that might affect cigarette consumption is of great importance. Kossova et al. (2018) find that being of middle age, unmarried and having smoking parents tend to increase the likelihood of smoking. They also point out that women who live in large

cities and have relatively high incomes are more likely to smoke. In contrast, men who have higher income and level of education are less likely to smoke (Kossova et al., 2018).

While using RLMS-HSE data from 1994 to 2005, Herzfeld (2014) finds no quadratic relationship between age and demand for cigarettes for both men and women. Having a university education and being of older age are negatively correlated with the demand for cigarettes (Herzfeld et al., 2014). Household size and marital status are found to be significant for women, but not significant for men (Herzfeld et al., 2014; Kossova et al., 2018). According to Herzfeld et al. (2014), married women smoke fewer cigarettes than single women, as well as cigarette demand tends to decrease with household size. Peto (2012) suggests that the cases for males and females should be analyzed separately due to the complexity of gender-based socio-cultural factors.

It is also important to consider the prices of cigarettes. Most tobacco manufacturers pass the tax increase on the prices of their products. For instance, according to Lyalyakina (2014), JTI is known for doing so. Ivanova (2018) also reports that in 2017 the share of excise tax in the consumer price of traditional cigarettes amounted to 48.9%, and it increased to 56.2% in 2018 (according to British American Tobacco). Huang (2018) estimates price elasticities for cigarettes to be -1.48 in the US, which means that the demand for cigarettes is highly responsive to price changes.

This paper adds up to the existing literature in the following way. While previous papers on the anti-tobacco policy in Russia focus on the general overview of the policy and the demographic factors that might affect smoking behavior, this paper considers the AT Law and corresponding policy changes. This is the first paper that carries out empirical work on the effect of the anti-tobacco policies of 2013 and excise tax increase on smoking behavior in the Russian Federation.

3. The market for tobacco in Russia

In 2009, 39.1% of the Russian population were smokers (Global Adult Tobacco Survey, 2009). This was one of the highest levels of smoking prevalence in Europe at that time along with Bulgaria (40.9%) and Greece (38.9%) (Gallus et al., 2014). In addition to that, cigarettes were becoming more and more affordable, because even though the excise taxes were increasing slightly every year, these increases were smaller than the double-digit rate of inflation (Ross et al., 2008). Consequently, the overall trend in real prices of cigarettes was downward (Ross et al., 2008). This is illustrated in Figure 1. The figure illustrates nominal and real retail prices of local cigarettes in rubles in Russia from the year 2000 to 2007. It can be seen from the graph that while the trend in nominal prices was upward, the real prices (adjusted for inflation) decreased during this period.

In 2011-2012, the Russian State Duma's focus was on controlling tobacco consumption by increasing excise taxes dramatically compared to the previous rises. In July of 2012, the excise tax on tobacco was increased from 360 in 2011 to 510 rubles per 1 thousand cigarettes, to 730 rubles in 2013, continuing to increase every year (RIA News, 2011), while an average price of a pack of cigarettes was 56.40 rubles in 2012 and 69.23 rubles in 2013. However, one of the most important steps was the AT Law, signed in February 2013 (Tobacco Control Laws, 2020). It partially entered into force on June 1, 2013; most of it entered into force by the end of 2013 (Federal Law No. 15-FZ, 2013). It is the most important law because it changed anti-tobacco policy in Russia in a very substantial way. According to the AT Law, smoking is banned in indoor public places, workplaces and public transport with long-distance transport being the only exception (Tobacco Control Laws, 2020). Tobacco advertising, promotion and sponsorship are strictly prohibited with only a few exceptions (Tobacco Control Laws, 2020). According to Tobacco Control Laws (2020), "the law restricts, but does not prohibit, promotional features that may appear on tobacco product packaging".

On June, 12 of 2013 the order on the approval of warning labels on the dangers of smoking, accompanied by pictures entered into force, which means that cigarette manufacturers were obliged to print approved pictures that demonstrate the repercussions of smoking on the tobacco product packaging (Order of the Ministry of Health and Social Development of Russia No. 490n, 2012). There were 12 approved pictures, which illustrate dangers to the health caused by smoking such as cancer, periodontal disease, addiction, premature ageing, and dangers related to giving birth (Order of the Ministry of Health and Social Development of Russia No. 490n, 2012). According to the Order of the Ministry of Health and Social Development of Russia No. 490n (2012), illustrations along with the caption "smoking kills" must occupy half of the back of the cigarette pack and 30% of the front side. In 2018, the requirements changed, increasing the area of the front side of the pack of cigarettes, occupied by preventive illustrations to 50% (Information on the entry into force of the technical regulations of the Customs Union "Technical regulations for tobacco products", 2016).

Figure 1

Nominal and Real Retail prices of Local Cigarettes, in Rubles

Note. This graph was produced by Ross et al. in 2008 from the Worldwide Cost of Living Survey by Economist Intelligence Unit, 2007. http://eiu.enumerate.com/asp/wcol_WCOLHome.asp

4. Data and Methods

This study uses the Russia Longitudinal Monitoring Survey - Higher School of Economics (RLMS-HSE), which has been organized and coordinated by a fellow of the Carolina Population Center, at the University of North Carolina at Chapel Hill, Dr Barry M.Popkin with contributions from other UNC researchers, The Institute of Sociology, Russian Academy of Sciences (ISRosAN), The Higher School of Economics, Paragon Research International, The Russian Center for Preventive Medicine (RCPM), The Russian Institute of Nutrition, Russian Academy of Medical Sciences and The State Statistical Bureau, Russia (Goskomstat Rossiia) (Russia Longitudinal Monitoring Survey of HSE, n.d). It has been collected since 1992 to study the effects of Russian policies on the economic and physical well-being of households and individuals. It is collected via face-to-face interviews, and the answers are recorded in the questionnaires by the interviewers. From 1994 to 2010 the number of sampled households was 4000 and the multi-stage probability sampling was performed. First, 1850 primary sampling units (PSUs) were created from consolidated districts. Among these, 3 very large population units: Moscow city, Moscow oblast and St. Petersburg city, were chosen with certainty and constituted 3 strata. The rest of the PSUs were divided into 35 equal-sized strata based on ethnicity, geographical factors and level of urbanization (Russia Longitudinal Monitoring Survey of HSE, n.d). Then, one district was chosen from each of these strata using the proportional size of a district as a probability of being chosen. In 2010, the target sample increased to 6000 households, but the sampling design remained unchanged.

The data cleaning process included dropping observations of non-smokers and respondents under 18, as the population of interest is adult smokers. Additionally, the observations collected before 2010 and after 2016 were dropped. Years 2010-2012 represent the data before the policy changes of 2013 and 2014-2016 – after. The resulting sample is unbalanced.

Variables Overview

The dependent variable is the number of cigarettes that an individual smokes in a day. Individuals are asked: "Do you now smoke? If yes, what do you mainly smoke and about how many individual cigarettes or papyruses do you usually smoke in a day?". Respondents may choose among various types of tobacco products: filtered/unfiltered cigarettes, self-rolled cigarettes, papyrus and pipe. In the sample, 95.25% of the respondents chose filtered cigarettes, 3.45% chose unfiltered cigarettes, and only 1.3% chose other types of tobacco products. *Policy* is the variable of interest, which is expected to indicate the effect of the 2013 policy changes on the number of cigarettes smoked by the participants of the survey.

The regressions are controlled for the price of a pack of domestic and imported cigarettes. I include these variables to control for the change in the excise taxes that occurred during this period. There was a stable increase in both prices from 2010 to 2015 (Rosstat, 2012).

A dummy variable *female* controls for the gender of the respondent. Dummy variables *notworking* and *rural* indicate if an individual is not working and lives in a rural region, respectively. Variable *income* is added to control for earnings in rubles, received in the last 30 days, which includes all possible sources of income of an individual. For the level of a finished education, a categorical variable was created for having or not having finished secondary school (eighth grade or less) and having a higher education. For the marital status, 6 possible answers were consolidated to form 3 dummy variables: *single* (never married or widow/widower), *married* and *divorced.* Similarly, the variables indicating the self-evaluated health status of respondents were consolidated to form three dummy variables to reflect if the person has very good and good health, average or very bad and bad health. While these variables are potentially endogenous, this should not cause problems since they are added for control reasons. Among the smoking population in the sample, more than 90% are Russian and Tatar. 3 dummy variables were, therefore, created indicating if an individual's nationality is

Russian, Tatar or other. Variable *army* indicates that a person served in the military, variable *alcohol* controls for drinking alcohol at least sometimes. There is no reason for an increase in the number of children from 1 to 2 to have the same effect as an increase in the number of children from 2 to 3. The data indicates that most variation is observed for 1-3 children. So, a categorical variable for having no children, one, two or more than two children is constructed. Similarly, a set of dummy variables is used for age. Respondents are divided into 5 groups: 18-30, 31-50 and 51+.

The regressions are controlled for region fixed-effects. Eleven economic regions were consolidated from 38 primary division units in the data, based on the division decided upon by the federal government of Russia. These regions include East Siberian, Povolzhsky, North West, West Siberian, Central Chernozem, Central, Ural, North Caucasus, Far East, Volgo-Vyatsky and North.

RLMS data also include codes of the profession types according to the ISCO-08 standard, occupation classification structure of the United Nations. I collapsed 438 ISCO-08 profession types into 3 groups: white-collar, blue-collar job and other. There are 10 major groups in the ISCO-08 standard. For each of the 10 major groups, there is information about the level of skill that is required for that group (skill level 1 being the most elementary and level 4 being the most advanced). I used this for the provisional division of codes, which start from the same number, into 3 groups. After that, I double-checked each of the codes along with their definitions and made corrections, where they were necessary.

Summary statistics are presented in table 1. The first two columns of the table show the mean of variables for years before the change (2010-2012) and after the change (2014-2016). The last column reports the difference in means of variables before and after the change. The t-statistics show that the differences in the composition of the samples in terms of gender, occupation, nationality and type of living area are not statistically significant. Differences are

significant for daily consumption of cigarettes, and price per pack of domestic and imported cigarettes. Specifically, the average number of cigarettes, smoked daily, decreased by 0.734. At the same time, the average prices of cigarettes increased significantly for both types of production. According to Table 1, the percentage of respondents aged 18-30 in the sample decreased over the period, while it increased for those, who are older than 30. The sample after the policy changes contains more people with very good and good health, as well as more people with higher education. The average income is higher in the sample after the policy introduction. The sample after the change also includes more people with 2 children and fewer people who have none, 1 or more than 2 kids.

Table 1. Summary statistics of the variables

	Before change	**After change**	**Difference in means**
	Mean	**Mean**	
Average number of cigarettes, smoked daily	16.075	15.341	-0.734***
Average price per pack of domestic cigarettes, RUB	37.023	73.085	36.062***
Average price per pack of imported cigarettes, RUB	66.529	115.307	48.778***
Female	0.277	0.283	0.006
Alcohol consumption	0.854	0.822	-0.032***
Serving in military	0.310	0.159	-0.151***
Number of children			
0	0.241	0.218	-0.023***
1	0.363	0.361	-0.002
2	0.309	0.324	0.015***
3+	0.328	0.315	-0.013**
Age			
18-30	0.293	0.231	-0.062***
31-50	0.442	0.478	0.036***
51+	0.265	0.291	0.026***
Occupation			
White-collar job	0.140	0.135	-0.005
Blue-collar job	0.512	0.509	-0.003
Other	0.348	0.356	0.008

Education			
Secondary School not finished	0.224	0.188	-0.036***
Secondary School finished	0.610	0.635	0.025***
Higher Education	0.162	0.174	0.012***
Marital status			
Single	0.275	0.266	-0.009
Married	0.551	0.554	0.003
Divorced	0.169	0.178	0.009*
Nationality			
Russian	0.884	0.890	0.006
Tatar	0.025	0.022	-0.003
Other	0.083	0.086	0.003
Self-evaluated health			
Good	0.378	0.403	0.025***
Average	0.534	0.512	-0.022***
Bad	0.084	0.077	-0.007*
Average Income	17936.780	24816.680	6879.900***
Rural	0.212	0.205	-0.007
Not working	0.252	0.264	0.012**
N	14,281	11,051	

5. Empirical model

The following model is employed:

$$Ncigs_{irt} = \alpha_i + \beta_1 policy_{it} + \beta_2 priceperpackd_{rt} + \beta_3 priceperpacki_{rt} + \beta_j X_{it} + u_{irt},$$

where *Ncigs* is the number of cigarettes smoked per day, *policy* is a dummy variable, indicating that the year is after 2013, *priceperpackd* and *priceperpacki* is the price per pack of domestic and imported cigarettes, respectively, and X_{it} is the vector of control variables, which includes natural logarithm of monthly income (*lnincome*), a dummy variable for drinking alcohol at least sometimes (*alcohol*) and other demographical variables described in the previous section. Index i is for an individual, r is for region and t is for year. Ordinary least squares (OLS) and fixed effects (FE) methods were used for estimating the model to employ the power of panel data and compare the results. The model is also considered separately for men and women to account for gender-specific characteristics.

6. Results and Discussion

The results of regressions for OLS and FE methods are presented in table 2 below. Columns 1-3 report OLS results, while columns 4-6 report FE results. Columns 1 and 4 report the results for the whole sample, columns 2 and 5 – are for men and columns 3 and 6 – are for women.

Table 2. Regression output

	Cross-sectional			Panel		
	(1)	(2)	(3)	(4)	(5)	(6)
	All	Men	Women	All	Men	Women
Policy change	-1.088***	-1.047***	-0.627*	-1.036***	-1.025***	-0.445
	(0.336)	(0.326)	(0.369)	(0.265)	(0.281)	(0.284)
Female	-5.732***					
	(0.225)					
Policy change*Female	0.511**			0.595***		
	(0.239)			(0.199)		
Average price per pack of domestic cigarettes, RUB	0.013	0.012	0.012	0.005	0.005	0.003
	(0.008)	(0.009)	(0.014)	(0.007)	(0.008)	(0.008)
Average price per pack of imported cigarettes, RUB	-0.005	-0.005	-0.004	-0.004	-0.004	-0.004
	(0.005)	(0.006)	(0.007)	(0.004)	(0.004)	(0.005)
Serving in military	0.184	0.106		0.219*	0.222	
	(0.152)	(0.159)		(0.128)	(0.133)	
Alcohol consumption	0.047	-0.042	0.273	0.213	0.200	0.256
	(0.287)	(0.353)	(0.210)	(0.166)	(0.220)	(0.215)
One child	0.639***	0.841***	0.123	0.471	0.550	-0.239
	(0.212)	(0.276)	(0.337)	(0.363)	(0.385)	(0.887)
Two children	0.917***	0.923***	0.778*	0.820*	0.888**	0.187
	(0.251)	(0.332)	(0.453)	(0.438)	(0.436)	(0.906)
More than two children	1.678***	1.584***	1.834***	0.562	0.417	1.229
	(0.358)	(0.449)	(0.469)	(0.507)	(0.527)	(1.363)
Age 31-50	1.257***	1.452***	0.781***	0.442*	0.420	0.432
	(0.191)	(0.267)	(0.249)	(0.257)	(0.337)	(0.291)
Age 51+	1.556***	1.769***	0.909**	0.386	0.169	0.965
	(0.261)	(0.364)	(0.364)	(0.351)	(0.416)	(0.593)
Secondary school not finished	0.820***	0.801***	0.774***	0.253	0.347	-0.124
	(0.165)	(0.207)	(0.264)	(0.213)	(0.269)	(0.328)
Higher education	-1.008***	-1.245***	-0.473*	0.382	0.821*	-0.271
	(0.229)	(0.315)	(0.267)	(0.357)	(0.415)	(0.469)
Not working	-0.531*	-0.412	-0.246	-0.738***	-0.823*	-0.543*
	(0.270)	(0.414)	(0.322)	(0.260)	(0.475)	(0.319)
Married	-0.117	0.043	-0.594**	-0.105	0.206	-0.671**
	(0.213)	(0.302)	(0.279)	(0.255)	(0.374)	(0.302)
Divorced	0.760***	0.815**	0.641**	0.251	0.350	0.126
	(0.221)	(0.332)	(0.297)	(0.300)	(0.406)	(0.373)
Logarithm of income	-0.017	-0.158	0.226	0.235**	0.153	0.340***
	(0.211)	(0.295)	(0.168)	(0.099)	(0.134)	(0.120)
Rural	0.326	0.422	0.009	0.046	0.000	0.084
	(0.229)	(0.258)	(0.291)	(0.212)	(0.295)	(0.303)
Tatar	0.638	0.727	0.349			
	(0.478)	(0.696)	(0.585)			
Other nationality	0.102	0.191	-0.390			
	(0.591)	(0.670)	(0.680)			

Good health	-0.436***	-0.505***	-0.273	0.171	0.209	0.078
	(0.156)	(0.175)	(0.231)	(0.121)	(0.134)	(0.169)
Bad health	0.764**	0.704*	0.991**	-0.455**	-0.278	-0.855**
	(0.296)	(0.364)	(0.485)	(0.208)	(0.286)	(0.340)
Blue-collar job	0.815***	0.936***	0.470	0.243	0.128	0.320
	(0.266)	(0.309)	(0.371)	(0.295)	(0.344)	(0.351)
Neither a blue-collar nor a white-collar	-0.046	-0.337	0.161	0.045	-0.093	0.165
	(0.245)	(0.326)	(0.328)	(0.217)	(0.357)	(0.283)
Constant	14.33***	15.16***	7.847***	12.83***	15.08***	8.426***
	(2.141)	(2.930)	(1.632)	(0.947)	(1.279)	(1.569)
N	25,332	18,251	7,081	9,475	6,701	2,774
R^2	0.140	0.048	0.041	0.013	0.014	0.013

Regional fixed effects are included.
Standard errors are adjusted for 11 clusters in regions.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

OLS

The coefficient of policy change is negative and statistically significant for all 6 models except model (6), which is not statistically significant at an acceptable significance level. For models (1) – (5), the coefficient behaved as expected. According to OLS regression, the number of cigarettes, smoked daily, is estimated to decrease by 1.1 cigarettes as a result of the policy changes of 2013, on average. This is statistically significant at 1% significance level. The results suggest that the policy was successful in decreasing tobacco consumption, especially for men. These results are in line with other literature.

The estimated price elasticity of cigarettes is statistically and economically insignificant in all six models. This result suggests the need for a further increase of tax on tobacco sales. Men with higher education are expected to decrease their daily consumption of cigarettes (β = -1.245), while men, who have not finished secondary school are expected to increase their consumption (β = 0.801), compared to men, who have finished secondary school. This is consistent with the results of the paper by Kossova et al. (2018), which suggests that men who have a higher level of education are less likely to smoke. The results suggest that having a blue-collar job is associated with smoking 0.82 cigarettes more than having a white-collar job. The effect is even higher for men (β = 0.936). These results might be an indication of the fact that having blue-collar jobs that usually require less education and are more physically challenging tend to increase tobacco consumption. Additionally, the estimate for divorced men is 0.815, which is statistically significant at 5% significance level. Among the regions, only the effects of living in Northwest (β = 2.992**) and Central economic region (β = 1.612**) are statistically significant. Additionally, living in a city is associated with fewer cigarettes per day (except for the FE estimation for men), which is also the case in the paper by Cheng and Estrada (2020), who find the same correlation between living in a city and the number of cigarettes smoked, in the Philippines.

OLS estimation suggests that people who don't have children smoke about 0.6 cigarettes less compared to those who have one child. Respondents, who have two or more children also tend to smoke more cigarettes than those who have no children. However, these effects decrease significantly when we consider interaction terms of the number of children with age and gender (see Appendix)[2]. The daily number of cigarettes smoked tends to increase with age. The OLS model suggests that people with bad health smoke about 0.76 cigarettes more than people with average health.

For the case of women, the changes of 2013 had a lower impact on the number of cigarettes smoked daily. The OLS coefficient is estimated to be -0.627. Additionally, the estimation of the model for both genders suggests that women decreased their daily consumption of cigarettes only by 0.58, which is twice as small as the decrease in consumption of men. Women, who have not finished secondary school are expected to have higher consumption ($\beta = 0.774$), compared to women, who have finished secondary school. Married women tend to smoke less ($\beta = -0.594$), whereas divorced women tend to smoke more ($\beta = 0.641$) than single women. Similar findings were made by Kossova et al. (2018), who find that being unmarried is associated with an increase in the likelihood of smoking, although they considered divorced and single women as one group ("unmarried"). The type of job does not affect the number of cigarettes, smoked by women, since the estimates are not statistically significant (P-value > 0.2). Regression (3) suggests that women with bad health smoke about 1 cigarette more than women with average health, holding other factors fixed.

[2] The models were also estimated with the interaction terms between gender and number of children, number of children and age, gender and age, gender and ethnicity, as well as age and health status. The main results are not affected by this change. See Appendix.

Fixed effects

Similar to OLS, fixed effects regression output suggests that the effect of changes of 2013 is higher in magnitude for men ($\beta = -1.025$ for men as opposed to $\beta = -0.445$ for women). Another similar result is that the estimated price elasticity of cigarettes is statistically and economically insignificant. However, in this case, serving in the military is estimated to have a slightly higher effect on the daily number of cigarettes smoked by men (approximately 0.22 cigarettes more), which is statistically significant at 10% significance level. Unlike OLS, FE estimation results suggest that men with higher education are expected to have a higher daily consumption of cigarettes ($\beta = 0.821$) compared to men, who have only finished secondary school. Men, who are not working, are estimated to smoke 0.82 cigarettes less than working men, holding everything else constant, which could be explained by the fact that they may have limited income. Similar findings were suggested by Cheng and Estrada (2020).

Higher income corresponds to a higher number of cigarettes for women, although the effect is small. Holding everything else constant, a 10% increase in income is estimated to increase cigarette consumption by 0.014, on average. Research by Kossova et al. (2018) supports that those women, who have relatively higher incomes are more likely to smoke.

7. Conclusion

In 2013, the anti-tobacco policy in the Russian Federation was changed substantially as a measure against the increasing rates of tobacco consumption, which was considered one of the most common factors of risk to health by WHO in 2014. This paper examined the impact of inducing the ban on cigarette advertising, smoking in public places, cigarette packaging restrictions and increases in the tobacco excise tax on daily consumption of tobacco in the Russian population using the RLMS-HSE data.

In this paper, we used the power of the panel data, following the person over time. The results are consistent for cross-sectional and panel data analysis. The AT Law and respective changes to anti-tobacco policy, associated with this law have shown themselves to be efficient in reducing the number of cigarettes smoked daily by men. All things being equal, it is estimated to decrease by about 1 cigarette as a result of these policy changes, on average. However, more work still needs to be done as women are less affected by the smoking policy changes of 2013. In particular, it is important to plan future anti-tobacco measures targeted specifically for women and whether the existing policy is sufficient to achieve the goals set by the Russian Government. Since the restrictive measures have shown themselves less effective for women, I would suggest promoting a more responsible attitude to health. This includes female-oriented social advertising, public lectures and consultations, especially for pregnant women, which can decrease consumption of tobacco further and prevent smoking in diverse target groups (Kossova et al., 2018; Wakefield et al., 2003). Additionally, the price elasticity of cigarettes is estimated to be statistically and economically insignificant. According to World Health Organisation (n.d.) recommendation, the tax share should be 75% of the tobacco retail price minimum. Whereas the tax share of the cigarettes price was only about 1% in 2013 in Russia. This suggests the need to increase tax on tobacco sales further.

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Appendix

Table 3. Regression output with interaction terms

	Cross-sectional			Panel		
	(1)	(2)	(3)	(4)	(5)	(6)
	All	Men	Women	All	Men	Women
Policy change	-1.110***	-1.051***	-0.626*	-1.023***	-1.023***	-0.429
	(0.332)	(0.329)	(0.371)	(0.266)	(0.278)	(0.286)
Female	-5.095***					
	(0.876)					
Policy change*Female	0.582**			0.566***		
	(0.238)			(0.196)		
Average price per pack of domestic cigarettes, RUB	0.012	0.012	0.012	0.005	0.005	0.003
	(0.008)	(0.009)	(0.014)	(0.007)	(0.008)	(0.008)
Average price per pack of imported cigarettes, RUB	-0.005	-0.005	-0.005	-0.004	-0.004	-0.004
	(0.005)	(0.006)	(0.007)	(0.004)	(0.004)	(0.005)
Serving in military	0.130	0.105		0.218*	0.223	
	(0.153)	(0.159)		(0.129)	(0.134)	
Alcohol consumption	0.051	-0.041	0.320	0.214	0.207	0.244
	(0.286)	(0.353)	(0.213)	(0.166)	(0.217)	(0.206)
One child	1.540***	1.306***	0.917***	1.032**	1.001**	-0.091
	(0.283)	(0.322)	(0.302)	(0.440)	(0.452)	(0.957)
Two children	1.821***	1.669***	1.536**	1.629***	1.475***	
	(0.388)	(0.401)	(0.586)	(0.486)	(0.488)	
More than two children	3.077***	2.777**	3.219***	0.878	1.154	0.945
	(0.838)	(1.153)	(0.821)	(1.264)	(1.745)	(1.585)
One child * Age 31-50	-1.115***	-0.962**	-1.481**	-0.390	-0.533	0.282
	(0.304)	(0.378)	(0.635)	(0.450)	(0.473)	(0.712)
Two children * Age 31-50	-1.169***	-1.122**	-1.350*	-0.665	-0.702	-0.238
	(0.403)	(0.421)	(0.717)	(0.488)	(0.547)	(0.853)
More than two children * Age 31-50	-1.849**	-1.599	-2.255**	-0.084	-0.455	0.625
	(0.789)	(1.249)	(0.923)	(1.356)	(1.940)	(1.084)
One child*Age 51+	-0.863*	-0.482	-1.931	-1.964***	-2.083**	-1.130
	(0.504)	(0.640)	(1.365)	(0.663)	(0.775)	(1.355)
Two children*Age 51+	-1.093**	-0.915	-1.835	-2.077**	-1.906**	-2.129
	(0.457)	(0.650)	(1.400)	(0.796)	(0.898)	(1.837)
More than two children*Age 51+	-1.601*	-1.331	-2.331	-2.106	-2.627	0.068
	(0.913)	(1.171)	(1.625)	(1.610)	(2.205)	(1.619)
One child*Female	-1.156***			-1.129		
	(0.419)			(0.951)		
Two children*Female	-0.718			-1.191		0.757
	(0.549)			(0.864)		(1.096)
More than two children*Female	-0.471			0.367		
	(0.671)			(1.354)		
Age 31-50	2.208***	2.177***	1.729***	0.794	0.886	0.409
	(0.373)	(0.426)	(0.576)	(0.522)	(0.531)	(0.529)
Age 51+	2.576***	2.342***	2.527*	1.947**	1.917**	2.578
	(0.546)	(0.621)	(1.299)	(0.822)	(0.906)	(1.645)
Age 31-50*Female	-0.500			0.101		
	(0.400)			(0.361)		
Age 51+ * Female	-0.612			0.986		
	(0.561)			(0.657)		
Secondary school not finished	0.794***	0.787***	0.719***	0.242	0.338	-0.123
	(0.166)	(0.207)	(0.256)	(0.213)	(0.266)	(0.318)

Higher education	-1.009***	-1.231***	-0.480*	0.373	0.797*	-0.304
	(0.229)	(0.315)	(0.276)	(0.355)	(0.419)	(0.473)
Not working	-0.546*	-0.427	-0.276	-0.746***	-0.818*	-0.554*
	(0.272)	(0.413)	(0.330)	(0.262)	(0.474)	(0.319)
Married	-0.277	-0.019	-0.733**	-0.173	0.111	-0.681**
	(0.213)	(0.302)	(0.276)	(0.263)	(0.378)	(0.308)
Divorced	0.668***	0.760**	0.545*	0.222	0.296	0.115
	(0.225)	(0.329)	(0.306)	(0.303)	(0.406)	(0.378)
Logarithm of income	-0.004	-0.154	0.232	0.226**	0.149	0.341***
	(0.209)	(0.294)	(0.165)	(0.101)	(0.135)	(0.122)
Rural	0.321	0.423	0.009	0.029	-0.011	0.086
	(0.227)	(0.256)	(0.287)	(0.212)	(0.295)	(0.304)
Russian	-0.227	-0.245	0.428			
	(0.641)	(0.629)	(0.636)			
Tatar	0.525	0.479	0.827			
	(0.914)	(0.886)	(0.948)			
Russian*Female	0.422					
	(0.826)					
Tatar*Female	-0.010					
	(1.528)					
Good health	-0.342	-0.321	-0.467	0.208	0.236	0.188
	(0.247)	(0.291)	(0.287)	(0.220)	(0.263)	(0.328)
Bad health	1.627**	1.106	2.135***	1.117**	1.564**	0.627
	(0.674)	(1.026)	(0.744)	(0.522)	(0.727)	(0.652)
Age 31-50 * Good health	-0.041	-0.179	0.295	-0.031	-0.037	-0.090
	(0.251)	(0.291)	(0.357)	(0.204)	(0.276)	(0.356)
Age 51+ * Good health	-0.233	-0.438	0.705	-0.104	-0.039	-0.471
	(0.500)	(0.561)	(0.703)	(0.545)	(0.583)	(0.764)
Age 31-50 * Bad health	-0.194	-0.089	0.094	-1.984***	-2.517***	-1.329*
	(0.714)	(1.083)	(0.974)	(0.564)	(0.822)	(0.670)
Age 51+ * Bad health	-1.316*	-0.620	-2.284*	-1.608**	-1.752**	-2.057***
	(0.763)	(1.067)	(1.155)	(0.603)	(0.806)	(0.708)
White-collar job	0.082	0.345	-0.143	-0.050	0.097	-0.176
	(0.242)	(0.321)	(0.334)	(0.215)	(0.355)	(0.287)
Blue-collar job	0.878***	1.265***	0.288	0.193	0.216	0.169
	(0.193)	(0.326)	(0.244)	(0.274)	(0.447)	(0.293)
Constant	13.86***	14.73***	7.154***	12.82***	14.78***	8.289***
	(2.357)	(3.104)	(1.786)	(0.976)	(1.287)	(1.714)
N	25,332	18,251	7,081	9,475	6,701	2,774
R^2	0.142	0.048	0.046	0.014	0.015	0.016

Regional fixed effects are included.

Standard errors are adjusted for 11 clusters in regions.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$