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Factors of Alcohol Consumption in Modern Russia

Abstract

The goal of this project was to find out the influence of some economic and social factors on the demand for alcohol in modern Russia. The number of regression models is estimated on the base of "The Russia Longitudinal Monitoring Survey (RLMS-HSE)" 2006-2011. There are classic models of demand for alcohol of Becker and Murphy (1988): static, myopic and rational addiction models. We use two-step way of estimation because of two-step consumer decision ("to drink or not to drink" and how much to drink). The idea of this research is to use as independent variables not only economic parameters (as prices and incomes of respondent and his/her family members) but some social characteristics such as educational level, gender, age, nationality, optimism level, alcohol use by other family members, and other. The main conclusion of our research is that in modern Russia culture seems to be more important factors of alcohol consumption than the change in prices on alcoholic beverages. The influence of the consumer capital (i.e. the addiction) also is very high so we can not expect that the increase of prices on alcohol will stimulate its consumption decrease.

Key words: alcohol consumption, addictive behavior, demand for alcoholic beverages

JEL Classification: Z13, I12, D11, D12

Introduction¹³²

The problem of alcoholism in Russia remains one of the most urgent in the beginning of the XXI century as well as hundred years ago. The features of alcohol use in modern Russian society make it possible to consider it as a very dangerous. Many key parameters of alcohol use and its consequences have dramatically rose during the last 20 years (volume of alcohol consumption, morbidity and mortality rates, criminality because of abusing spirits, susceptibility to alcoholism of various socially-demographic groups and population strata). World health organization (WHO) experts assert that every fifth man in Russia and the CIS countries dies of the illnesses due to alcohol consumption. According to WHO experts, annual consumption of pure alcohol more than eight liters is hazardous to health and also to human life. At the same time Rosstat¹³³ data show that spirits sales (in pure alcohol per capita) exceeded 9 liters a year in 2009 in Russia. But some other experts believe it to be considerably higher (up to 18 liters per capita including moonshine). Alcohol makes fatal impact on population health, creates many social problems. As the official statistics shows, annual sales of the alcohol in Russia has grown during last 20 years (1990-2009)

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¹³³ FSSS, Federal State Statistics service, <http://www.gks.ru/wps/wcm/connect/rosstat/rosstatsite.eng/>

on 70%, from 5,38 to 9,13 liters of pure alcohol per capita. For the same time mortality rate due to alcohol has grown almost in 4 times: from 12,3 to 48,4 persons on 100 thousand of population. However according to Nemtsov's estimations, figures on mortality rate due to alcohol are strongly underestimated, as they include only direct influence of alcohol on death (i.e. an alcoholic poisoning). Nemtsov (2004) believes that about third of all death in Russia are anyhow connected with the alcohol use. Denisova (2010) research also found a very strong influence of smoking and excess alcohol consumption on the odds of death in Russia during 1994-2007. Treisman (2010) showed not only the dependence between binge drinking and mortality, but also the role of low price on alcohol as a negative factor of mortality rate on the regional level.

Consumption of substances changing of consciousness and producing the dependence effect (in particular alcohol, cigarettes, drugs) is named "addictive behavior". From the economic point of view, the use of these goods damage population health. This one, in turn, influences incomes, efficiency, expenses on services of public health system. "The total tangible cost of alcohol to the European Union as it existed in 2003, has been estimated at €125 billion, 1,3% of the gross domestic product". (WHO 2010, p.8).

Theoretical background

It is obvious that consumption of some goods have the "predilection" effect (smoking, alcohol, drugs etc.) and their consumption increase with time. This effect is often explained by *change* of tastes: the more the person listens to good music, more he or she wishes to listen to it. It is a predilection for good music. In case of consumption of alcohol, nicotine, drugs the doubtless effect is due to the medical dependence to the given substances. However economists Becker and Stigler (1977) explain such predilection without argument about change of tastes: "The essence of our explanation lies in the accumulation of what might be termed "consumption capital" by the consumer, and we distinguish "beneficial" addiction like Marshall's good music from "harmful" addiction like heroin." (Becker and Stigler 1977, p.78)

Specificity of demand for alcohol consists in addiction effect, i.e. in dependence of the present consumption on the consumption in the past. The explanation of demand for alcohol has been given in the theory of rational addiction of Becker and Murphy (Becker and Murphy 1988, Becker, Grossman, and Murphy 1994). The main feature of this model is that past consumption of some goods influences their current consumption by affecting the marginal utility of current and future consumption. This model was also generalized by Cook and Moore (2000). In the other variant of model on demand for alcohol the consumer is "nonrational" or "myopic" (Becker, Grossman and Murphy 1994), so the consumption depends only on the past but not on the future. The static model excludes both lagged and leaded consumption. But the model of rational addiction is the generalized case of "myopic" and static models. The curve of demand for alcohol has a classical negative inclination, i.e. consumption of alcoholic beverages decreases with growth of the price for them.

The rise in prices is the very important factor reducing consumption of alcohol and cigarettes. The curve of demand on addictive goods depending on the price is decreasing as it was found by Clements, Yang and Zheng (1997). The same conclusion has been made by Andrienko and Nemtsov (2005) for Russia in 1994-2003, including their estimation of cross prices elasticity. It means that tax policy measures can be effective in reduction of alcohol and tobacco consumption.

Alcohol is the normal good, i.e. alcohol consumption (in its physical amount) increases with income growth. At the same time some researchers have shown a nonlinear form of dependence between incomes and alcohol consumption. For Russia Andrienko and Nemtsov (2005) have found out U-shaped dependence between the income and alcohol consumption in 1994-2003, i.e. the poor and the rich drink more than people with the medium income. Nevertheless it is not so for USA: positive linear dependence between the income and amount of consumed alcohol was observed. One other important fact is the essential growth of expenditures on alcoholic beverages with income increase. Thus, more riche individuals prefer to increase not the amount of alcohol consumption, but its quality, buying more expensive and qualitative beverages.

Empirical researches confirmed that educational level of the consumer influences alcohol and tobacco consumption negatively. Grossman (1972) has shown that people with higher level of education make more effective investments into health capital, and, hence, are less inclined to the alcohol and tobacco use. Within the other approach Farrell and Fuchs (1982) have shown that there is no direct influence of educational level on consumption of alcohol and cigarettes, but both of these variables are simultaneously influenced by the factor of time preference. Finally, the third explanation was offered by Kenkel (1991): influence of educational level on alcohol and tobacco consumption consists in greater awareness of educated people about negative consequences of such consumption.

There are at least two sociological explanations of people propensity to alcohol consumption, despite its fatal consequences. The first one considers drinking as the form of deviant behavior, when the individual do not respect social norms and rules (Hirschi 1969, Sutherland 1924). The second approach believes that drinking is a way of psychological state changing, mood raising, removal of pressure, weariness, leaving from problems etc. (Peirce 1994, Brody 1982). Besides addictive effect there is also an effect of "collective consumption" of alcohol, because it is a social action and drinking with friends is much more pleasantly for people that do it alone. Thus, consumption of alcoholic beverages depends not only on individual preferences, but also on social environment. The social environment can influence consumption both indirectly and directly – through availability of this good. Besides influence on the decision to drink or not to drink, the social environment can influence a choice of type of a consumed beverage.

For Russia Demianova (2005) has also found out the influence of some social factors, in particular, alcohol consumption by other family members, on RLMS data in 2000. Differentiation between alcohol consumption of different groups of population (by age, gender, residence, income level, education) were presented on RLMS data for 1994-2002 by Tapilina (2006) and for 2006-2008 by Denisova (2010b). They found out that gender, educational level and age are more influencing that income.

Methodology of the empirical research

The purpose of this research is to find out the economic and social factors influencing alcohol consumption by Russians in 2006-2011. Russian population at the age over 15 years is its object. Research problems are following:

- To estimate and compare the influence of economic and social factors on the decision about to drink or not to drink;
- To estimate and compare the influence of economic and social factors on the amount of pure alcohol consumption by the Russian population,
- To compare influence of various factors on alcohol consumption by men and women.

"The Russia Longitudinal Monitoring Survey (RLMS-HSE)"¹³⁴ is an empirical basis of this project. It represents a number of annual national representative inquiries on the basis of the likelihood stratified multistage territorial sample developed with the assistance of leading world experts in this area. Data have been collected 16 times since 1994. The most important here is the panel nature of the data that allow to use lagged variables and to test panel regressions. Besides, we have the information about other members of a family, in particular, their incomes and alcohol consumption. In the database there is information about each family member and also about household as a whole. The inquiries were spent annually from 1994 till 2011 (except 1997 and 1999). Weighted representative data are used for estimation of alcohol use, panel data - for regression analysis. The representative sample of the people over 15 years has made in 1994 8478 individuals (panel sample - 8814), in 2001 - 7195 (9917), in 2006 - 6993 (12325), in 2010 - 14462 (18086).

¹³⁴ "The Russia Longitudinal Monitoring Survey of NRU-HSE (RLMS-HSE)", accomplished by the National research university Higher school of economics and Joint-Stock Company "Demoscop" with the assistance of the Carolina Population Center at the University of North Carolina at Chapel Hill and Institute of Sociology of the Russian Academy of Sciences. (Sites of RLMS-HSE survey: <http://www.hse.ru/rlms>, <http://www.cpc.unc.edu/projects/rlms>)

The methodology of estimation of demand for alcohol. In this paper, we will follow the methodology of estimation of demand for addictive goods offered by Becker, Grossman and Murphy (1994) and then developed by Labeaga (1999). Their base theoretical approach is based on the model of rational addiction. Sometimes, in different papers, however, the myopic or static models are tested which use the same basic principles. This depends on the availability of data sets. But Becker, Grossman and Murphy (1994) tested the demand for tobacco on aggregate data, using information about expenditure on tobacco. They also offered a way to estimate the model with lagged and leaded consumption using the IV (instrumental variables) of tobacco past and future prices as they are not correlated with the error term. But this solution of the problem of endogenous regressors is not so easy for micro level analysis because individual past and future consumptions depend on many other parameters except prices. Only the change of price and price differences between residences can not explain the individual demand.

In addition to the problem of estimation of past and future consumptions (though these variables are available in panel data they are often considered as data with measurement error) micro data on alcohol (and tobacco) consumption are usually censored at two levels. Firstly, we can assume that an individual makes a decision on participation in the consumption, i.e. "to drink or not to drink". The model on participation is usually tested with the use of probit regression. In a similar case related to a labor supply, this equation can be used for correcting the selection bias in the model for working hours using the Heckman procedure. It is appropriate as those people who have decided to work must allocate some time for their work. Drinkers or smokers, however, might have their consumption on a zero level, depending on the time of survey. When Labeaga (1999) analyzed the consumption of tobacco in Spain he used variable of weekly expenditure on tobacco as a depending variable. Due to the short period when surveys were conducted there were many observations equal to zero (due to the "infrequency of purchase"). That is why he proposed to use the Tobit model for the estimation of demand using the Mills inverse ratio for correction bias. This methodological approach is based on the idea of double-hurdle theoretical model.

We believe that a two-step consumer decision (to drink or not to drink and that how much drink) requires a two-step model. Firstly, we will estimate the equation of participation with a binary depending variable (=0 for an abstainers and =1 for a drinkers). Then we will calculate the Mills inverse ratio to introduce it in the Tobit model. This one is estimated for drinkers only, but the consumption of "light drinkers" is equal to zero (as it is assumed in double-hurdle model).

The problem is that in both myopic and rational addiction models there is the endogeneity of explanatory variables being equal to the lagged and lead dependent variable. As noted Ebbes (2007), this is one of five sources of endogeneity. Some researchers used lagged and leaded prices as the instrumental variables in this case (Becker, Grossman and Murphy 1994, Andrienko and Nemtsov 2005). We also try to use regional prices as well as the variable measuring pure alcohol sales in liter (both at the regional level, for past and future) as instruments, but the results were confusing. Almost all independent variables became insignificant. So we can conclude that here prices are not the good instruments. We believe that it is necessary to use some individual parameters as instruments because variation in individual consumption could not be explained only by aggregate variable (prices and sales). So we decided to use as instrument income in the past (income in the future can not be used because it should be dependent on the present alcohol consumption), smoking in the past and in the future (smoking status as the instrument for drinking status and number of cigarettes used as the instrument for alcohol consumption), and prices and sales of pure alcohol in the past and in the future. All pooled regressions are estimated as clustered by individuals.

Measuring alcohol consumption in RLMS data. The correct estimation of the percentage of alcohol abstainers in RLMS-HSE data became possible since 2006, when the new question has been included in the questionnaire: "Do you consume alcoholic beverages, including beer, at least sometimes?" We will use this question to construct dummy variable for the participation equation (1 - drinker, 0 - abstainer). The next question is about consumption of different alcoholic beverages in the last 30 days. This question made it possible to separate alcohol abstainers from "light

consumers", who drink alcohol but did not do it in the last 30 days and so their pure alcohol consumption is equal to zero.

In 1994-2005 there were two questions about every kind of alcoholic beverages: "Did you drink it in the last 30 days?", and "For those you drank how many grams you usually consumed in a day". Considering a difference of the maintenance of ethanol in various drinks (beer - 4-6%, wine dry - 10-12%, fortified wine - 15-18%, vodka and moonshine - about 40%, alcoholic cocktails - 5-15%), it is possible to estimate approximately the daily average dose of consumed ethanol. Since 2006 a question "How many days did you consume this beverage in the last 30 days?" about each kind of beverages was introduced. Therefore it is possible to calculate the amount of pure alcohol consumed (by multiplication of day dose of each kind of beverages by the quantity of corresponding days, and then summation). Pure alcohol consumption of "light consumers" (who drink but did not drunk in last 30 days) is assumed to be 1 g (so it's log is equal to 0).

Measuring explanatory variables. In its classic form the model of rational addiction use only past and future consumption, prices and income (or wage) as necessary determinants of present consumption. Other influencing factors may be not so important at the macro level. But the individual demand for addictive goods, including alcohol, depends also of some social and demographic characteristics as it was shown above. In his estimation of households demand for tobacco Labeaga (1999) and Jones and Labeaga (2003) besides income and prices used such variables as family size, parameters of the head of household, regional dummies and others. Andrienko and Nemtsov (2005) used log income per capita, prices on alcohol, tobacco and sugar, gender, age and dummies for urbanization level as independent variables in their estimation of the individual demand for alcohol.

We also included in our model the prices on different alcoholic beverages as independent variables. The information about prices on different alcoholic beverages in 2006-2011 on regional level was found in Rosstat Data¹³⁵. All prices were deflated to the 2011 level of prices with the Consumer Price Index (CPI). We also calculated the regional price on pure alcohol by dividing the sales of all alcoholic beverages in rubles by it's volume in pure alcohol.

Some variables measuring income are used. First of all it is the real income per capita (log). Second, there are two variables: log of personal income and log of income of all other family members. Third, we try to test the square-law dependence on income using two variables: income per capita (divided by 10000) and it's square. As controlling variable we use regional income per capita. All of these income variables are also deflated to the price level of 2011 (using CPI).

Surely we take as regressors gender, age and squared age and dummies for residence type. But our general hypothesis is that besides economic factors like prices and income alcohol consumption is greatly influenced by some social characteristics, as it is predicted by sociological approach. That is why we introduce in our model some "social" independent variables such as : marital status, number of children in different age and number of adult, dummies for nationality, educational level, optimism measured as the satisfaction with life (T-1) and the anxiety about future income (T-1), health self-estimation (T-1). We also use the drinking status of spouse and other family members (in the participation model), and pure alcohol consumption by all other family members because of collective character of addictive goods consumption.

The dynamics and structure of alcohol consumption in Russia: stylized facts on RLMS micro data

According to the data, more than one third of Russian women and more than one fifth of men over 15 consider themselves abstainers. This percentage among women has grown from 31,5 to 36,3%, and among men - from 19,3 to 23,6% for the last 6 years. In the long term, the struggle against consequences of alcohol consumption in Russia is possible; it is possible to consider this fact as a positive tendency. Regarding distinctions by age, the percentage of non-drinkers is high enough among people younger than 26 years (about 40% of the group in 2011), then it falls to almost to one

¹³⁵ Unified interdepartmental statistical information system <http://www.fedstat.ru/indicator/data.do>

fifth in the group aged of 26-40 years, and rises to a quarter in the group of people of 41-60 years old, reaching almost half among older people. During the last 6 years the percentage of alcohol abstainers younger than 60 were constantly increasing, and among the elderly it was growing till 2008, and then it has again decreased. The percentage of drinkers has fallen from 78 to 73 % in all cities and towns and from 65 to 61 % in villages.

At the same time there are people in Russia who generally are drinkers but they do not consume alcohol every month. In 2011 69,5% of the population over 15 years old were not alcohol abstainers, however, only 50,5 % of people were drinking alcoholic beverages within the last 30 days before the beginning of case studies. The percentages of monthly drinkers was the highest in 2001 (49,6% among women, 72,7% among men), and the lowest - in 2011 (41,9% among women and 60,8% among men).

From 1998 Russian drinkers, both men and women, began to drink alcohol more often (in 2011, an averaged Russian drinking man kissed a bottle 5,9 times per a month, and a woman - 3,1 times per month). The frequency of consumption had a small increase in the age group below 40 years old, and decreased in senior age groups. The percentage of those who drank once a month decreased strongly (from 27-30% to 17-19% in age groups under 60). The percentage of those who drank more than 4 times a week did not practically change, and the group of people drinking 2-8 times a month became more numerous. Average frequency of the alcohol use is almost the same in urban and rural areas.

As RLMS-HSE data show, after a small growth in the percentage of drinker in the mid-1990s, the recession of 1998 followed, then there were some rise in 2000-2002 and in 2006-07, and a slow decrease by 2011. These changes correlate in some extent with the growth rates of income per capita by Rosstas data (but not with a price index). This fact highlights the rather high elasticity of demand for alcohol by income and relatively low elasticity by prices.

From the mid-1990s the structure of consumed alcoholic beverages essentially changed. First of all, it concerns the growth of beer consumption in percentages (it changed from 36,4 to 64,5% among drinking men and from 16,4 to 38,2% among women). This increase occurred, apparently, to the detriment of vodka consumption (it diminished from 88,8 to 66,1% among drinking men and from 60,3 to 35,9% among women). Beer consumption also superseded the consumption of dry wine and champagne among women by 2000 (the percentage of drinkers was reduced from 53,3 to 31,4%), however, by 2011 the percentage of those who preferred these two latter beverages were escalated to 47,1%. The growth of the percentage of moonshine consumers is also clearly visible in 1998-2000 among women (from 2,8 to 10,9%), and especially among men (from 9,6 to 24,3%), this might be justified by a financial crisis and the decrease of real incomes of the population. But in 2011 only 7,3% of men and 2,7 of women consumed moonshine (among drinkers over 15).

Let's look now at the volume of alcohol consumption in terms of its equivalence to pure ethanol. We can see that every Russian inhabitant over 15 years (drinker or not drinker) drank 2,6 l of ethanol in 2006: Russian men drank 4,64 l of pure alcohol, but Russian women consumed only 0,97 l. At the same time this calculations give us lower figures that the Rosstat does according to alcohol sales (counted on all population, including babies) and those estimations are lower than that figures given by experts and the WHO. The reasons of such discrepancy have been specified in works of Cook and Moore (2000), Tapilina (2006), Andrienko and Nemtsov (2005). In particular, they had noted the high level of sensitivity of questions about alcohol consumption, the desire of people to not show the high level of it's use; the other argument is the biased samples, in which percentage of alcohol abusers (as a rule, marginal groups of population) is lower than in total population.

As the average volume of pure alcohol consumption are underestimated according to RLMS-HSE data, it can give us the idea more likely about dynamics of this indicator (growth rates), than about real volumes of the ethanol drunk by the population. Besides, this indicator can be used for an estimation of influence of various factors on consumption volume, considering displacement. Our estimation shows the decrease in consumption from 2006 to 2010 (by 15%), and then a small growth in 2011. However decrease in consumption looks more essential for women than for men.

As to distinctions by social and economic characteristics, consumption of pure ethanol is practically the same for townspeople and for countrymen in 2011; people without higher education consumed approximately on a quarter more than those who have University diploma; people in age 26-60 years consumed almost twice more than younger and older people. If we calculate the volume of pure ethanol consumption only for drinkers it will be in one and a half time higher for men and twice higher for women.

If we look at the dependence of alcohol consumption on family incomes we can see that the falling of real incomes and the decrease in volume of alcohol consumption were observed in the late nineties and in 2009-11. It was possible to observe the decrease in alcohol consumption of women from the first (poorest) group to the fourth, and then some increase, especially in the richest (tenth) group. The dependence between income and alcohol consumption of men is more complicated, however in any case it is possible to tell that dependence of volume of consumption on income the per capita is nonlinear.

Frequency of the alcohol use differs by gender: more than 73% of women drink not more often than three times a month whereas the half of men drink 1-3 times a week. The volume drunk depending on frequency of consumption is also differentiated by gender. So, men, who drink every day (though their percentage is only 3,1% of drinkers) drink almost 3,7 l of pure alcohol per month, and women (0,5 %) drink monthly "only" 1,36 l. However it is obvious that even by this self-estimation (which, as we saw above, is underestimated), men who drink 2-3 times a week and more often, consume more than 9,5 l of pure ethanol per year, that is considered critical for health by WHO experts. The dangerous norm is drunk by women who drink 4-6 times a week and more often.

In 2011 the percentage of alcohol drinkers (non-abstainer) was lower (61,4 %) in a countryside than in cities (the share of consumers made 73,5% in Moscow and St.-Petersburg, 74% - in the regional centers, 72,2% - in other cities). Frequency of the use differs not so considerably among drinkers in cities and villages, especially among men. However in countryside a men drink higher volume of alcohol than in the city: more than 0,58 l of pure ethanol in a month. It is due to the consumption structure, as on villages they drink more often a hard liquor (vodka and moonshine), than in cities.

Estimation of the participation model

Now we pass to the principal part of our study: estimation of model of demand for alcohol, including a set of social variables. Here we will discuss the results of modeling the equation of participation (table 1), for all population and for men and women separately. As it include as the independent variable the drinking status in the past (lagged variable), the IV probit was estimated with instruments log income per capita, smoking status of the respondent, log regional price on the pure alcohol, regional sales of pure alcohol in liters (all in the past period, T-1). It was found out that the risk to be drinker is higher for men, people of middle age and those who live in the regional centers. Our estimation has shown that income per capita is insignificant but log of individual income influence the participation decision positively. At the same time the effect of incomes of all other family members is negative. We use here total income but not the income per capita as we control the number of household member (separately adults and children). All this results correspond to the theoretical hypothesis.

Now we turn our attention to other additional variable included in the model. First of all there are variables on drinking status of respondent in the past and of his/her relatives in the present. As one can see, to be drinker in the past strongly increase the risk to not be abstainer in the present. This fact also corresponds to the theory of the "myopic" consumer. If respondent's spouse use alcohol, it has the positive impact on the decision to be drinker, as for as the presence of other drinkers in the household. At the same time the abstainer status of spouse is the important factor of the same status of respondent. Here, as one can conclude, we see the cross influence of two variables: marital status and whether spouse is drinker. In general, married people have more chances to drink alcohol. But it is the truth only for those whose spouse is not abstainer.

Family structure also influences the addictive behavior. There are few drinker in large households (taking into account adults only). It should be expected that baby is a good argument for woman for

not to drink. But it is difficult to explain why women from households, where there are children of 1-2 years old, are more disposed to be drinkers than those from families without kids. Men are drinkers less probably in the families with children of 7-15 years.

The educational level is a negative factor of drinking alcohol (but in static model without past drinking status it is positive). Some theoretical approach and empirical estimation have shown that for some reason more educated people should be less disposed to use alcohol. In the matter of fact, last medical researches confirmed that the moderate alcohol consumption is even favorable for health. This can explain why educated individuals do not refuse drinking. At the same time the most important harm to the health is caused not by the alcohol use, but amount of consumption. And demand model estimation shows that more educated people drink less of pure ethanol. But the university diploma is significant only for women, and technical school diploma - only for men. Employment status in the past is also a significant factor of alcohol use. The chance of drinking is higher for unemployed. We believe that unemployed Russian men should be more stressed than employed ones because of their fidelity to the stereotype that man must be the breadwinner. Maybe it confirms the social theory considering alcohol use as the escape from some problems and bad emotional state.

As it was foreseen, nationality is the important factor of alcohol use. Unfortunately, we have no information about people religion in these rounds; that is why nationality can be used as a proxy. As social theory says, religion creates serious barriers for some social action, including alcohol prohibition. That is why it is not surprisingly that Tatars (most of them are Muslim) both men and women are less liable to weakness for alcohol than Russians. But such dependence was not confirmed for people of North Caucasus and Volga and Russian North.

It was expected that the bad health (measured as self-estimation in the past) is a serious argument for to be abstainer, besides the influence of the great age. It was confirmed for static choice model, but in this myopic model it is insignificant. We also noted that some fact confirms the concept of alcohol use as the some sort of escape; but it is not confirmed for the variable, measuring the anxiety (in the past) about future income (as well as for the life satisfaction).

Finally, let look on the prices impact. In the model using the calculated price on pure alcohol any dependence was not found. If we include regional prices on different beverages we found some confirmation of the economic theory, because the prices on vodka and wine have the negative effect, but only for women. But the prices on beer have the positive effect on the decision to be drinker that looks not corresponding to the theory. If so all measures of tax politics aimed on reducing of alcohol use will have controversial effect.

We see here at list two possible explanations. The first one appeals to the theory of demand and supply where prices result the balance of demand and supply. Thus the higher demand on beer (i.e. the percent of drinkers) would increase the price on it. This may express the differences as between regions as between years. As a matter of fact, real prices on vodka and fortified wine were diminishing and beer price were increasing in 2006-2011 according Rosstat data. At the same time the percentage of drinkers among Russians has fallen. But the average price on beer has increase by 15%, and the average price on vodka has decrease by only 5%: at the same time the regional difference in prices was much higher. For example, in 2011 the average price on the one liter of vodka in Tatarstan was 208 rubles (the lowest), and in Kamchatka - 415 rubles (the highest), i.e. more than 2 times. The same difference was found in the beer prices (minimum - 48 rubles, maximum - 100 rubles). So, we can expect the greater impact of regional difference in price on the alcohol use.

According to the data, there is a significant correlation between prices on all alcoholic beverages, and also between prices, regional level of average income per capita and the probability to be drinker. So, in more wealthy regions the prices on all alcoholic beverages are higher as well as the percentage of drinkers, but at the same time the relative price of beer in comparison to vodka (beer price divided to vodka price) is lower. That is why the influence of prices on decision to be drinker in the model estimated is relative: for the average vodka price the influence on beer price is positive, and for the average beer price the influence of vodka price is negative. The influence of

prices on the decision to drink vodka or/and beer in Russia was found by Yakovlev (2012), but it was estimated as negative. But the most important should be the influence of prices not on the decision to be drinker, but on the volume of alcohol consumed because the alcohol abuse and not the use is the threat to the health and violence. Let us now to pass to the results of the estimation of the demand model.

Estimation of the demand model

Now we will explain the results of our estimation of demand models (tables 2, 3 and 4). Table 2 demonstrates the estimation of tobit regression, including inverse Mills ratio, for static model of alcohol consumption. So the lagged and lead consumption are not included and there is no problem with it's estimation. We found the coefficients in the model for all population (testing the influence of the log income per capita as well as the square dependence on income) and for men and women separately.

We can look now at the significance of coefficients. As it could be predicted, men are drinking more than women. Influence of age is square as it was found in the selection model. Higher education has the negative effect on the amount of the alcohol consumed (but only for men). This fact conform the theoretical idea about it. People who worked in the past (T-1) are less moderate consumers than the unemployed. Income per capita has predicted positive impact but only for women. The square dependence of consumption on income was also confirmed for the whole sample and for women. As social theory predict, there is a high correlation between the alcohol consumption of family members. The influence of family size remains significant. So, married women drink less than single ones, as well as those who have children under 1. But there is no difference between single and married men, and babies under 3 even stimulate alcohol consumption of men. May be the birth of a child can be treated as some sort of stress for fathers leading to the increase of drinking. Older children (of 7-15 years) stimulate the reduction of alcohol consumption by men. Both men and women drink less in the great families (measured as the number of adults over 16).

Nationality is insignificant for the demand model (besides woman from North Caucasus), and it means that ethnic barriers are high at the decision about drinking but not about consumption lever for those who decided to drink. As in the selection model family structure is important parameter. Health was not one of the barriers to drink, being drinker signifies also to not worry about health and not reduce the alcohol consumption. The fact of negative impact of life satisfaction (in the past) on the present consumption looks no surprisingly because the bad emotional state is predicted as the possible determinant of heavy drinking.

There are some influence of the site characteristics. So, women in the villages consume less than in the cities being the administrative center of the region. Regional unemployment rate has positive influence on female consumption that can also confirm the theory of problem escape. If there are cafes and restaurants in the site it has some negative influence on consumption, we believe that this let is possible to make alcohol use more institutionalized and less inclined to be "heavy". But our hypothesis that the presence of a stadium or a park in the sit can create an alternative way to pass the leisure was not confirmed, just on the contrary.

The influence of the prices does not confirm the economic theory. The prices on vodka and beer are insignificant (on the contrary to the selection model), and these two alcoholic beverages ensure more than 80% of all pure alcohol consumed, so the influence of its' prices should be the most important. Only the price on the fortified wine has the predictable effect but only for men; on the contrary the price on the wine under 14% influence the consumption of women positively. Some possible explanation of the price influence was given above.

The static model also show that the alcohol consumption was reduced in 2008-2011 in comparison with 2006.

But these conclusions were made only for the static model, i.e. if the effect of lagged consumption (or the stock of habits) is negligible. But the most important result of the economic theory is the addictive character of alcohol use so we can expect that the influence of habits (consumer capital)

should be significant. In the micro level only panel data give us possibility to include the past consumption in the myopic model. As it was said above the estimation of such a model requires the use of instrumental variables; lagged alcohol consumption was instrumented by the lagged tobacco use (there are very high correlation between these two variables), the lagged income per capita, regional price on pure alcohol and regional level of pure alcohol sales (in liters). The influence of lagged alcohol use was found significant and positive that confirm the theory of "myopic" consumption (table 3).

Some of the independent variables keep their significance: gender, consumption of alcohol by other family members, family size and baby presence in the households. Other are influencing only for women: income, age, marital status, nationality of North Caucasus and living in the village. Education, past employment status, life satisfaction, social infrastructure (cafes, restaurants and stadiums) became insignificant. More contradictory result is the positive influence of the Tatar nationality on the men alcohol consumption.

All prices on alcoholic beverages are insignificant in the myopic model for women. Men's consumption is influenced by fortified wine price negatively and by wine and beer prices positively. Vodka price is insignificant. These facts do not confirm the theory.

Now let us see on the results of the rational addiction model testing (table 4). Lead alcohol consumption was instrumented by future tobacco consumption and regional prices on pure alcohol (T+1) and alcohol sales (in liters). Both past and future alcohol consumption has positive impact that confirms the theory of rational addiction. Alcohol use of other family member and gender, as the family characteristics and nationality for women keep their significance. But the influence of all other variable including prices is almost negligible.

Inverse Mills ratio is significant and negative in static models, what let us to conclude that estimation without this correction would bias the coefficients. In all regression with lagged and lead consumption inverse Mills ratio is significant but positive. It means that in myopic and rational addiction models there is a positive association between the stochastic components in both the consumption and the selection model.

Conclusions

So, we can conclude that we found the great influence of the set of social characteristics on the decision "to drink or not to drink". Income has the predictable impact, but the role of prices on alcoholic beverages is ambiguous. The significance of the variable in the selection models for men and women are similar (excluding education and some family parameters).

The static model of demand for pure alcohol also demonstrates the influence of many social parameters such as gender, age, family structure, nationality, life satisfaction and some other, as well as of the income per capita. Some variables measuring development of social infrastructure are also important. In the demand model the difference between the determinants of alcohol consumption for men and women is more than in the selection model. But the influence of prices on beer and vodka was found insignificant.

The myopic and rational addiction models estimation confirmed the impact of the lagged and lead consumption (so, of the consumer capital or of habits). Some social parameters keep their significance in these models but some other do not. Income influence remains positive for women only. The impact of prices in the myopic model is contradictory, and in rational addiction model is negligible. In all demand models as well as in the selection model the influence of alcohol consumption of other family member was positive.

So the main conclusion of our research is that in modern Russia culture seems to be more important factors of alcohol consumption than the change in prices on alcoholic beverages. Maybe the one of the most important is the collective way of this practice. The influence of the consumer capital (i.e. the addiction) also is very high so we can not expect that the increase of prices on alcohol will stimulate its consumption decrease. The most probable in this case is the change of the structure of consumption in favor of more cheap brands of moonshine or alcoholic surrogates. But the fall of alcohol consumption need some long-term measure aimed on the culture changing.

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APPENDIX

Table 1.

Estimation of the participation model (IV), probit, all population, 2007-2011.

	All	All	Male	Female
Drinker, T-1	2,663***	2,671***	2,840***	2,549***
There are other drinkers in the household	0,193***	0,188***	0,158***	0,214***
Spouse is drinker	0,167***	0,163***	0,228***	0,151***
Spouse is abstainer	-0,116***	-0,115***	-0,141***	-0,089***
Male =1	0,079***	0,077***		
Age/10	-0,066***	-0,068***	-0,057	-0,065**
Age square /100	0,004	0,005*	0,003	0,004
Technical school diploma	-0,022*	-0,024**	-0,042**	-0,011
University diploma	-0,042***	-0,043***	-0,024	-0,045***
Log of individual income	0,006***	0,006**	0,004	0,007**
Log of all other family income	-0,004**	-0,004**	-0,005	-0,004*
Nationalities of North Caucasus (base cat. - Russians, Ukrainians)	0,080*	0,127***	0,133*	0,071
People of Volga and Russian North	-0,039	-0,028	0,043	-0,041
Tatars	-0,069**	-0,079***	-0,084**	-0,080**
Number of adults (16+)	-0,040***	-0,037***	-0,030***	-0,045***
Number of children under 1 year	-0,096**	-0,094**	0,070	-0,172***
Number of children 1-2 year	0,065***	0,066***	0,035	0,078***
Number of children 3-6 year	0,018	0,019	-0,017	0,030
Number of children 7-15 year	0,021**	0,020**	0,033**	0,010
Employed, T-1	-0,054***	-0,056***	-0,077***	-0,049**
Health self-estimation, T-1	-0,006	-0,007	-0,001	-0,005
Anxiety about income, T-1	0,006	0,006	0,011	0,003
There are fast food in the site	0,057***	0,046**	0,105***	0,020
Some State enterprises were closed here in the past 12 months	-0,022	-0,017	-0,018	-0,018
There are police office in this place	-0,040**	-0,056***	-0,011	-0,076***
Town, not the regional center	-0,054***	-0,039**	-0,055*	-0,035
Village (City - the regional center is the base category)	-0,060***	-0,030	-0,083**	-0,008
Log regional income per capita	-0,009	-0,006	-0,063	0,025
Regional unemployment rate	-0,002	-0,004	-0,007	-0,003
Log pure alcohol price	-0,002			
Log fortified wine price		0,060	0,014	0,089*
Log wine price		-0,103**	-0,035	-0,148**
Log vodka price		-0,250***	-0,155	-0,293***

Log beer price		0,353***	0,400**	0,310***
Log sugar price	0,041	0,182**	0,138	0,217**
Log tobacco price	-0,116*	-0,348***	-0,339**	-0,350***
round17	0,046*	0,056**	0,040	0,065**
round18	0,133***	0,122***	0,110**	0,126***
round19	0,117***	0,075**	0,041	0,089*
round20	0,159***	0,189***	0,165**	0,200***
Const	-0,949***	-0,631**	-0,911*	-0,426
rho	-0,628	-0,635	-0,581	-0,652
Number of observations	49486	49486	20272	29214
Prob > chi2	0,00	0,00	0,00	0,00
Wald test of exogeneity (Prob > chi2)	0,00	0,00	0,00	0,00

Here and below: *** - 1% significance, ** - 5%, * - 10%.

IV for lagged alcohol consumption (yes or no) are: log income per capita (T-1) and (T+1); smoking status of the respondent (T-1); log price on pure alcohol in the region (T-1); sales of pure alcohol in the region in liter (T-1). Dependent variable for all probit model: abstainer = 0, drinker = 1, all simple.

Table 2.

Estimation of the demand model, tobit with inverse Mills ratio, drinkers only, static model, 2007-2011.

	All	All	Male	Female
Log alcohol consumption of all other family members	0,263***	0,264***	0,261***	0,287***
Male =1	2,122***	2,120***		
Age/10	0,815***	0,807***	1,010***	0,647***
Age square /100	-0,101***	-0,100***	-0,107***	-0,096***
Technical school diploma	-0,035	-0,031	0,016	-0,054
University diploma	-0,120**	-0,119**	-0,179**	-0,102
Married	-0,067	-0,064	-0,080	-0,262***
Log income per capita	0,117***			
Income per capita (/ 10000)		0,089***	0,058**	0,122***
Income per capita square		0,000***	-0,001	-0,001***
Nationalities of North Caucasus (base cat. - Russians, Ukrainians)	-0,957***	-0,978***	-0,392	-3,068***
People of Volga and Russian				
North	0,137	0,136	0,157	0,107
Tatars	0,140	0,138	0,046	0,223
Number of adults (16+)	-0,314***	-0,311***	-0,311***	-0,321***
Number of children under 1 year	-0,297***	-0,304***	0,288***	-0,973***
Number of children 1-2 year	0,090*	0,085*	0,167***	0,007
Number of children 3-6 year	0,040	0,039	0,039	0,015
Number of children 7-15 year	-0,061*	-0,063*	-0,138***	0,000
Employed, T-1	0,166***	0,169***	0,194***	0,167**
Health self-estimation, T-1	0,048	0,045	0,058	0,046
Life satisfaction, T-1	-0,079***	-0,075***	-0,095***	-0,056**
There are cafes in this site	-0,227***	-0,231***	-0,190*	-0,301**
There are restaurants in this site	-0,134*	-0,135*	-0,196**	-0,047
There are parks or stadium in this	0,277***	0,270***	0,215**	0,341***

site				
Town, not the regional center	-0,049	-0,054	0,031	-0,131*
Village (City - the regional center is the base category)	-0,243***	-0,256***	-0,008	-0,488***
Log regional income per capita	0,154	0,144	0,086	0,248*
Regional unemployment rate	0,015	0,014	-0,010	0,033**
Log fortified wine price	-0,375***	-0,379***	-0,648***	-0,132
Log wine price	0,354*	0,347**	0,640***	-0,002
Log vodka price	0,185	0,197	0,124	0,228
Log beer price	0,000	0,010	0,433	-0,357
Log sugar price	0,818***	0,816***	0,190	1,382***
Log tobacco price	0,333	0,312	0,231	0,466
Mills inverse ratio	-0,825***	-0,826***	-0,825***	-0,799***
round17	-0,036	-0,034	-0,093	0,004
round18	-0,431***	-0,420***	-0,220**	-0,618***
round19	-0,514***	-0,501***	-0,259*	-0,760***
round20	-0,462***	-0,446***	-0,464**	-0,482**
Const	-5,311***	-4,209***	-1,111	-5,338***
Number of observations	34503	34503	15626	18877
uncensored	26789	26789	13382	13407
Prob > chi2	0,00	0,00	0,00	0,00
Pseudo R2	0,06	0,06	0,03	0,04

Dependent variable for all tobit model is log of monthly ethanol consumption, drinkers only. For light drinkers pure alcohol consumption is equal to 1g (log alcohol consumption = 0).

Table 3.

Estimation of demand model, tobit with inverse Mills ratio, drinkers only, myopic model IV, 2007-2011.

	All	Male	Female
Lagged log alcohol consumption	0,967***	0,946***	1,078***
Log alcohol consumption of all other family members	0,161***	0,159***	0,164***
Male =1	0,602***		
Age/10	0,224***	0,105	0,301***
Age square /100	-0,034***	-0,016	-0,044***
Technical school diploma	-0,014	0,013	-0,025
University diploma	-0,008	0,061	-0,073
Married	-0,119***	-0,040	-0,201***
Income per capita (/ 10000)	0,037***	0,027	0,041**
Income per capita square	0,0001*	0,000	0,000
Nationalities of North Caucasus (base cat. - Russians, Ukrainians)	-0,358**	0,057	-2,148***
People of Volga and Russian North	0,011	0,035	0,020
Tatars	0,194**	0,281**	0,077
Number of adults (16+)	-0,173***	-0,169***	-0,174***
Number of children under 1 year	-0,281***	0,175	-0,732***
Number of children 1-2 year	0,276***	0,174***	0,417***
Number of children 3-6 year	0,000	0,057	-0,062
Number of children 7-15 year	-0,031	-0,055*	-0,006
Employed, T-1	-0,057	-0,030	-0,081

Health self-estimation, T-1	0,010	0,036	-0,006
Life satisfaction, T-1	0,003	-0,003	0,012
There are cafes in this site	-0,020	-0,029	0,013
There are restaurants in this site	0,026	0,036	0,053
There are parks or stadium in this site	0,017	-0,026	0,070
Town, not the regional center	0,030	0,148***	-0,052
Village (City - the regional center is the base category)	-0,098*	0,090	-0,271***
Log regional income per capita	-0,070	-0,157	0,041
Regional unemployment rate	-0,019**	-0,029**	-0,015
Log fortified wine price	-0,070	-0,295**	0,151
Log wine price	0,130	0,464***	-0,226
Log vodka price	0,032	-0,110	0,078
Log beer price	0,160	0,821***	-0,465
Log sugar price	0,635***	0,355	0,810***
Log tobacco price	-0,334	-0,410	-0,209
Mills inverse ratio	1,373***	1,735***	1,372***
round17	-0,053	-0,100	-0,026
round18	-0,141**	-0,077	-0,196**
round19	-0,131	-0,102	-0,160
round20	0,025	-0,079	0,087
Const	-2,596***	-2,349**	-2,130**
Number of observations	32482	14584	17898
uncensored	25176	12482	12694
Prob > chi2	0,00	0,00	0,00
Wald test of exogeneity (Prob > chi2)	0,00	0,00	0,00

IV for lagged log alcohol consumption are: log income per capita (T-1); number of cigarettes used (T-1); log price on pure alcohol in the region (T-1); sales of pure alcohol in the region in liter (T-1).

Table 4.

Estimation of demand model, tobit with inverse Mills ratio, drinkers only, rational addiction model IV (two step estimation), 2007-2010.

	All	Male	Female
Lagged log alcohol consumption	0,562***	0,600***	0,589***
Lead log alcohol consumption	0,423***	0,338***	0,498***
Log alcohol consumption of all other family members	0,124***	0,119***	0,136***
Male =1	0,475***		
Age/10	0,040	-0,068	0,084
Age square /100	-0,009	0,007	-0,016
Technical school diploma	-0,018	-0,028	0,019
University diploma	0,011	-0,021	0,050
Married	-0,024	0,078	-0,139***
Income per capita (/ 10000)	0,030*	-0,005	0,052**
Income per capita square	0,000	0,000	0,000
Nationalities of North Caucasus (base cat. - Russians, Ukrainians)	-0,314*	-0,009	-1,715***

People of Volga and Russian North	0,001	-0,068	0,089
Tatars	0,324***	0,264*	0,367**
Number of adults (16+)	-0,137***	-0,128***	-0,148***
Number of children under 1 year	-0,397***	0,009	-0,865***
Number of children 1-2 year	0,144***	0,069	0,203**
Number of children 3-6 year	0,037	0,066	-0,007
Number of children 7-15 year	-0,019	-0,058	0,016
Employed, T-1	0,029	0,092	-0,037
Health self-estimation, T-1	0,031	0,075*	0,001
Life satisfaction, T-1	-0,006	-0,017	0,005
There are cafes in this site	0,024	-0,037	0,097
There are restaurants in this site	-0,065	-0,107	-0,012
There are parks or stadium in this site	0,066	0,051	0,082
Town, not the regional center	0,058	0,089	0,059
Village (City - the regional center is the base category)	-0,016	0,162*	-0,154
Log regional income per capita	0,082	0,128	0,070
Regional unemployment rate	0,000	-0,006	0,001
Log fortified wine price	-0,002	-0,206	0,164
Log wine price	0,131	0,332	-0,047
Log vodka price	0,066	-0,082	0,178
Log beer price	-0,482*	-0,015	-0,860**
Log sugar price	0,131	-0,315	0,377
Log tobacco price	-0,010	-0,027	0,073
Mills inverse ratio	0,802***	1,089***	0,784***
round17	-0,084	-0,168**	-0,034
round18	-0,141*	-0,067	-0,185*
round19	-0,016	0,088	-0,109
Const	-0,953	-0,122	-1,360
Number of observations	20824	9160	11664
uncensored	16296	7919	8377
Prob > chi2	0,00	0,00	0,00
Wald test of exogeneity (Prob > chi2)	0,003	0,009	0,003

IV for lagged and lead log alcohol consumption; instruments are: log income per capita (T-1); number of cigarettes used (T-1) and (T+1); log price on pure alcohol in the region (T-1) and (T+1); sales of pure alcohol in the region in liter (T-1) and (T+1).