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Estimation of individual demand for alcohol

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Using individual data from RLMS, the longitudinal survey of the representative sample of the Russian population, we study static and dynamic models of demand for alcohol. We show the demand curve has traditional negative slope for any type of alcoholic drink: vodka, beer, and wine. We find substitution of moonshine for vodka with higher price on vodka and between vodka&beer with higher price on one of them. As a result of substitution vodka price has no impact on total ethanol consumption, while higher price on beer and wine reduce demand for ethanol. We also demonstrate that income has important effect on demand for alcoholic drinks. Risk to be drinker is rising with individual income. Higher income results in lower consumption of moonshine and in higher consumption of vodka, beer, and wine.

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CONTENTS

NON-TECHNICAL SUMMARY

Alcohol like cigarettes should be treated differently from other consumer goods due to its serious negative outcomes for health. In Russia a number of indicators linked to alcohol abuse, such as personal violence (homicides and suicides), mortality (from alcohol poisoning and accidents), and life expectancy are among the worst in the world. Public regulation of alcohol branch should not only aim to bring maximum budget revenues from highly profitable production but ideally minimize harm.

As it was shown by two prohibition campaigns in Russian history in XX century, regulation is able to affect public health in great degree. One of the common and accessible mechanisms of alcohol market regulation is taxation which is reflected in price formation. Decreasing demand curve is a common empirical result in economic literature on alcohol consumption and smoking in developed countries. WHO has even a recommendation for lower income countries to increase prices on tobacco which immediately brings positive effect on public health.

In this project we consider economic model of rational addictive behavior. From the model one can derive a dynamic empirical model of alcohol consumption. For empirical investigation of the demand curve slope we explore mostly available individual data from RLMS, the longitudinal survey of a representative sample of Russian population. Due to a large number of censored (zero) observations we use Tobit model. We show the demand curve has a traditional negative slope for any type of alcoholic drink: vodka, beer, and wine. We find substitution of moonshine for vodka with higher price on vodka and between vodka&beer with higher price on one of them. As a result of substitution vodka price has no impact on total ethanol consumption, while higher price on beer and wine reduce demand for ethanol. We also demonstrate that income has important effect on demand for alcoholic drinks. Risk to be drinker is rising with individual income. Higher income results in lower consumption of moonshine and in higher consumption of vodka, beer, and wine.

1. INTRODUCTION

Alcohol is not an ordinary consumer good because of negative consequences linked to its consumption, the cardinal of which is the ability to cause dependence and even death. Degree of harm connected to alcoholic drinks depends on the level and structure of alcohol consumption. In their turn, the levels of alcohol consumption and abuse are determined by several factors such as availability, income, retail process, public policy and individual factors including genetic, psychological, ecological, and other (World Bank, 2003).

Public alcohol policy should aim at harm minimization. Among the first priority tasks, countries should seek to significantly decrease alcohol consumption (Edwards *et al*., 1994). This does not mean that there is a need in alcohol prohibition since the Soviet and international practices show it is all but impossible. Significant reduction of production ultimately leads to dire consequences due to consumption of low-quality drinks, in particular moonshine. There should be right balance between the need in alcohol and its availability, between industrial and domestic production. There are a number of instruments, economic and political, which have impact on the size of both markets. No doubt that development of preventive measures should be focused on certain groups (teenagers, women, and hard drinkers) and circumstances of consumption (drunken driving, drinking on job, on street, and in public places).

From an economic standpoint demand for alcohol can be studied as for ordinary consumer good. On the first glance higher prices on alcohol after raised taxation on production and distribution should lead to lower alcohol consumption due to lower available income. But it is indubitably for many that such policy in Russia is accompanied by substitution of illegal alcohol, in particular moonshine (*samogon* in Russian), for legal drinks. Anti-alcohol campaign in the former Soviet Union showed that it took a mere five years to compensate the reduction in legal production. But many important details of this process are unknown.

Also, it is not clear what happens with alcohol consumption when income becomes higher. Country aggregate panel data for alcohol consumption from WHO shows positive dependence on GDP per capita.[1] However in higher income countries alcohol consumption has been gradually declining since 70 or 80-s. In fact this seems to occur due to different restrictive policies and reasonable alcohol policy.

It is quite within reason to suggest, that higher personal income as well as lower relative price of alcohol may lead to higher availability of alcohol and consumption of better quality drinks. Therefore, risk to be drinker, the level of consumption and its structure may change with income and price. If these hypotheses are true, then stable or decreasing real prices on alcohol may not lead to the desired result, the reduction of alcohol related harm during the period of economic growth.

[1] This result is obtained by Y. Andrienko for spirits consumption and total ethanol consumption on the sample of 150 countries for time period from 1975 to 2000 controlling for country (fixed) effect.

If alcohol is a luxury good then rich people spent higher proportion of income on alcohol. It is known from household budget surveys that a family from higher income group has higher expenditures on alcohol and even higher its proportion in total expenditures (Goskomstat, 2003). However, traditional alcohol consumption — income curve has U- or J-shape. Therefore, one can expect that consumption of alcohol by one category can be higher with income but lower for another.

One of the major distinctions of alcohol is that it is a habit forming good. This fact may indicate that demand is more stable for particular category of population and consumption is less sensitive to change in price. Therefore, alcohol policy has long-run effect which overweighs often invisible short-run changes. Any policy other than shock therapy such as notorious Gorbachev's anti-alcohol campaign in 1985 is not expected to provide immediate results.

Another attribute of alcohol, indicated by psychologists and sociologists, is that its consumption is usually collective process which serves to facilitate contacts (so called "communicative dope"). Due to social interaction the style of alcohol consumption is often unified ("social diffusion"). As a result, the more people around drink, the more a given individual drinks. In this project we test the hypothesis about influence of drinkers in a household on individual alcohol consumption.

Beside to the recognized negative influence of alcohol, it has several pharmacological properties such as to distress, boost spirits and rouse from the depression. Also, alcoholic drinks and especially red wine lower risk of male cardio-vascular disease when drinking is moderate.

The Soviet Russia has seen the serious socio-economic and medical consequences of immoderate drinking since the end of 50-s in XX century. The anti-alcohol campaign during the mid of 80-s was aimed to solve these problems drastically. Though poorly organized, it was quite successful in the short run. It led to reduction of the legal alcohol production, to higher prices on alcohol beverages and as a result to decreased availability of alcohol and significant fall in consumption. However, by the period of the market reforms alcohol consumption had approached level that was before the campaign due to underground production. Low labor productivity and especially high level of industrial injuries were the direct consequences of hard alcohol consumption for the economy during transition period. Mortality rates from injuries, poisoning, and accidents closely connected with alcohol abuse, became even more dramatic.

By these indicators the Russian Federation is among the most unfavorable countries in the world. Among 74 countries Russian homicide rate is the forth highest after that in Columbia, El Salvador, and Brazil and suicide rate is the second highest after Lithuanian one (WHO, 2002). It was recently estimated that 30 percent of all deaths in Russia are directly or indirectly connected with alcohol (Nemtsov, 2002). The similar estimates for other countries are substantially lower. Not surprisingly life expectancy of males is extremely low, 58.5 years in 2002.[2] Labor force is gradually decreasing thereby bringing long term economic problem. Therefore, there is an urgent need of reduction in alcohol related harm and losses in Russia, especially among vulnerable groups.

[2] It is not to be compared with life expectancy of males in Europe, 74–77 and even with Russian females' 72, thereby achieving 14 years the maximum gender difference in the world.

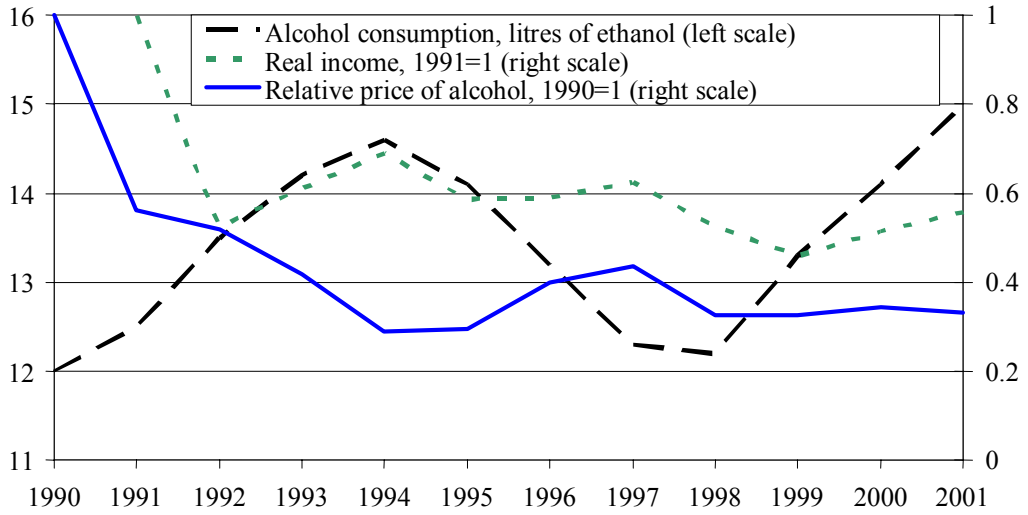

Fig. 1. Alcohol consumption, real income and relative price of alcohol. *Sources*: Nemtsov (2003a), Goskomstat (2003).

A question arises: what economic mechanisms affect alcohol consumption? At present alcohol supply is not restricted; it is competitive market, half of which is not regulated by the state in the past two decades (according to Chamber of Counting only 34 percent of consumed hard drinks are legal). This means that political decision has low efficiency in the near future. Real alcohol consumption has been fluctuating during the transition period. It grew until 1994, then fell until 1998 and again has been rising to date. What factors determine the fluctuations of alcohol consumption when availability of alcoholic drinks is not restricted? As we may see on Fig. 1, alcohol consumption rise in 1990–1994 was accompanied with sharp fall in alcohol prices. Then period of reduction in consumption 1995–1997 coincided with somewhat dearer alcohol. Finally, since 1999 consumption has been increasing while prices are relatively stable since 1998. At the same time, there is no any unequivocal link with average income. Thus, there were periods of both unidirectional changes (1993–1995, 1998, 2000–2001) and changes in the opposite direction (1992, 1997, and 1999). Does this mean that alcohol consumption is not correlated with income?

All of the above-mentioned approaches us to the main problem: what determines alcohol consumption during the last decade? We are going to concentrate our efforts on the partial problem: what is important in this process on the individual level? Thus, the main goal of the project is to estimate individual demand for alcohol in Russia.

Main hypothesis. *First of all, we are going to check whether alcohol is a normal good that is individual demand for alcohol of better quality is increasing with income. Also we test whether alcohol has a classical negative slope of the demand curve. Under individual demand for alcohol in this project we mean not only total ethanol*[3] *consumption but also decision to drink or not, frequency of*

[3] Hereafter, under ethanol we mean pure (100%) alcohol. We use conventional measure of ethanol consumption in liters and milliliters (ml) but not in grams and kilograms since density of ethanol is less than that of water. In order to imagine the volume of ethanol reported throughout this paper, 1 litre of ethanol is contained in 5 half-litre bottles of vodka.

alcohol consumption, *accustomed doses of different alcoholic drinks*. *The generalized hypothesis states that individual demand depends on economic characteristics*, *individual and aggregate* (*such as household income and prices on different alcoholic drinks*), *and other individual characteristics* (*such as gender*, *age*, *and environment*).

The empirical part is based on the estimation of a generalized demand equation, which is the level of individual consumption of alcohol as a function of income, prices on alcohol drinks and other individual and household characteristics. This model can be in the dynamic form. Therefore, not only short-term effects can be estimated in the demand equation but also long-term effects. The stationary and dynamic demand equations are estimated by *Tobit* model since the data contains some proportion of censored (zero) observations.

Data to be used in the project comes from Russian Longitudinal Monitoring Survey (RLMS). This survey is regularly conducted during ten-year period, except to 1997 and 1999, on the representative sample of population. Every round includes about 4000 households. The standardized interview contains numerous questions on health, nutrition, and economic status. In addition, a number of questions about consumption of addictive goods, such as cigarettes and different types of alcoholic drinks are asked. In the empirical part of the project a model of consumption will be estimated on the individual panel data from 5–11 rounds of RLMS covering period 1994–2002.[4]

The structure of this report is following. In the section 2 literature review on the subject of the project is done. In the section 3 we present theoretical models of addictive behavior. The section 4 contains methodology and data description. The section 5 demonstrates obtained results of econometric model estimation. The last one comprises conclusions.

2. LITERATURE

Addictive behavior is quite popular topic of economic research at present. How far the economic science goes forward one may judge, for example, looking at two surveys in *Handbook of Health Economics*, dedicated to the most popular addictive goods, cigarettes and alcohol. The volumes and references of those articles show that number of papers on alcohol consumption (Cook and Moore, 1999) is two-three times less than on smoking (Chaloupka and Warner, 1999). Economic research in these fields spreads out from study of consumer behavior (in particular includes its reaction to change of supply and price, advertisement and its ban) to efficiency estimation of state interventions.

During the last years research in this field becomes politically motivated problem in many countries because of necessity in state regulation and restructure into publicly acceptable market of addictive goods and approaching the adequate level of their consumption. The difficulty of studying this problem is explained by two facts. Hard alcohol consumption and smoking have on the one hand,

[4] There was another sample of population in rounds 1–4 in 1992–1994, which organizers gave up.

long term negative consequences to health and hence to economy and on the other hand, are very profitable for producers, provide valuable budget revenues and create jobs.

Beside recognized negative consequences of alcohol on health, there is evidence of lower risk of cardio-vascular disease when drinking, especially of red wine, is moderate. However, this result has no support in economic literature so far, possibly, due to other causes of lower risk, including unobserved ones. In other sciences this fact is demonstrated, for example, by means of one factor analysis for Russian senior males (see Aleksandri *et al*., 2003). As Finnish authors show, this and other positive effects prevail over negative effect only for the level of ethanol consumption below 2 litres per year.[5] However, negative consequences such as high risk of traumatism, in particular on the road, problems with health, within family or at work strongly dominate beginning with this low level.

Not so much the level of alcohol consumption per capita is important as the composition of consumption, which includes frequency, dose (how much a consumer drinks at a time), and types of drinks. In the paper (Bobak *et al*., 2003) based on cross sectional survey of drinking in one Russian, one Polish, and one Czech city authors show that while Russians have low mean drinking frequency, they consume the highest dose of ethanol per drinking session and have more individual problems related to drinking (see Table 8 in Appendix). In view of this fact individual demand for alcohol should be thoroughly investigated, including finding what determines the decision to drink, what to drink, how often and how much.

The major contribution of economic profession in the study of alcohol problems is in the use of the standard model of consumer choice with intertemporary effects and social impact. The most stable result in economic literature is repeatedly demonstrated fact that alcohol consumption and problems related to it fell when prices on alcohol rise. Moreover, economic literature shows decreasing demand curve for different types of alcohol (beer, wine, spirit) and that increase in price on one type leads to reduction in total alcohol consumption. In Table 1 we show the estimated price effect for a number of higher income countries. As a result of higher prices share of hard drinking population decreases. At the same time, it is possible that sensitivity to price change differs for diverse categories of population (Cook and Moore, 1999).

Estimation of price elasticity for alcohol abusing population remains among unsolved problems. It can be assumed that such people are either not sensitive or less sensitive to higher prices because they can keep the ethanol consumption on the same level substituting less expensive drinks for present ones. However, youth which is not yet addicted to alcohol should be more sensitive to prices. Since binge drinkers are often poor, they may potentially change their behavior in reaction on higher price on other goods such as cigarettes, coffee or sugar.

Another distinctive fact remarked by economists and social scientists is non-linear relation between alcohol consumption and income. This fact also will be demonstrated on Russian micro data in this project.

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[5] See Hauge and Irgens-Jensen (1990), Mäkelä and Mustonen (1988), Mäkelä and Simpura (1985).

Table 1. Price elasticity of alcohol consumption.

Country, period	Beer	Wine	Hard drinks	Source
USA, 1949–1982	–0.09	–0.22	–0.10	Clements, Selvanathan (1987)
Canada, 1953–1982	–0.28	–0.58	–0.30	Quek (1988)
UK, 1955–1985	–0.13	–0.40	–0.31	Selvanathan (1991)
Australia, 1955–1985	–0.15	–0.60	–0.61	Selvanathan (1991)
Finland, 1969–1986	–0.6	–1.3	–1.0	Salo (1990)

There are only few research papers on alcohol problems in Russia if we do not take into account clinical research. Almost all of them are done on macro level. Below, in the section *Data* we draw a comparison between RLMS data and data from other sources on Russia. Also, we try to compare it with alcohol surveys done in other similar or close countries such as China, Nigeria, Poland, and Czech Republic. Official statistics reports data which does not reflect real consumption (see Fig. 8). Probably some estimates of alcohol consumption in Russia on macro level are closer to reality such as in Treml (1997) and Nemtsov (2000), including scale of alcohol related mortality (Nemtsov, 2002) and other high consequences of alcohol consumption (Nemtsov, 2000). It was already noted that individual data from RLMS, the country representative survey, significantly underestimate actual distribution of alcohol consumption (Nemtsov, 2003).

There is no unanimity in estimation of economic consequences of high alcohol consumption in Russia. Thus, analysis of employment and income based on RLMS shows surprising result that the level of alcohol consumption has a positive impact on wage both for males and females (Tekin, 2002), though the endogeneity problem is not accounted for properly. Empirical results for other countries also confirm the result that abstainers earn less than drinkers (*e.g.* Bryant *et al.*, 1992, Zarkin *et al.*, 1998). It is likely, that impact of alcohol on labor productivity is indirect, affecting through the human capital accumulation (Cook and Moore, 1999).

While the most estimated demand equations for alcohol are done on macro level using country or state level data only few studies explore micro data. None of them consider censored nature of individual alcohol consumption data. Without dealing with this problem estimated coefficients are biased. Economic literature on smoking is more progressive in this sense. It provides models and results entertaining the censoring problem.

3. MODEL OF ALCOHOL CONSUMPTION

The common economic model of rational addiction (Becker and Murphy, 1988) is considered in the theoretical basis of the project. In this model past and future consumption play the primary role as it reflects the addictive effect.

We start with a model of demand for addictive good presented by Cook and Moor (1995), which assumes "myopic" formation of addiction. Myopia assumption means that agent recognizes that present consumption depends on past consumption but does not foresee that future consumption is determined by past and present ones. The agent's utility is a function of the addictive good past and present consumption and consumption of a composite good with unit price.[6] The following optimization problem is solved:

$$U_t = U\left(C_t, C_{t-1}, Y_t\right) \to \max \text{ under the budget constraint,} \tag{1}$$

$$P_t C_t + Y_t = I_t . \tag{2}$$

Notations include: U — utility, C_t — consumption of the addictive good at period t, Y_t — consumption of the composite good, P_t — price of the addictive good, I_t — income. Assuming the constant marginal utility of income and quadratic utility function, the following empirical model of demand for the addictive good is derived:

$$C_t = c + \alpha C_{t-1} + \beta P_t + \gamma I_t + \varepsilon_t , \tag{3}$$

where ε_t is error term of the model.

The signs of parameters in the empirical model are determined by parameters of quadratic utility function. Our basic hypotheses about these signs are that $\alpha > 0$, $\beta < 0$, $\gamma > 0$.

In more general model of rational addiction an individual decides how much to consume in present period taking into account not only past consumption but also future consumption (Becker *et al*., 1994). Rationality in contrast to myopia means that the consumer foresees future consumption of the addictive good. The consumer maximizes the discounted sum of the utilities:

$$U = \sum_{t=0}^{\infty} \beta^t U\left(C_t, C_{t-1}, Y_t\right), \tag{4}$$

where β is discount factor, given the budget constraint with the present value of income:

$$\sum_{t=0}^{\infty} \beta^t \left(P_t C_t + Y_t\right) = I . \tag{5}$$

For quadratic utility function and constant marginal utility of income and full depreciation of the addictive stock the empirical model for consumption is the next:

$$C_t = c + \alpha C_{t-1} + \delta C_{t+1} + \beta P_t + \gamma I_t + \varepsilon_{it} . \tag{6}$$

Coefficient β is negative under the assumption of the concave utility function. Coefficients α and δ are positive in case of rational addiction. In this case consumption in past and present periods are complements as in present and future periods.

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[6] For simplicity of the model exposition other variables in the utility function, such as gender, age, education, marital status etc, are not considered.

Econometric theory does not provide good methods of estimation for this model on aggregate panel data. However, Becker *et al*. (1994) have found an elegant solution. As the model assumes that present consumption does not depend on price in past and future periods, then using these prices as instruments for past and future consumption one get unbiased estimates of α and δ. In their and series of other papers cigarettes and alcohol consumption are shown to follow this empirical model and therefore, conform to the theory of rational addiction. This is done, in particular, for alcohol consumption in USA (Becker *et al*., 1994), for smoking in USA (Chaloupka, 1991), Australia (Bardsley and Olekans, 1998), and Finland (Pekurinen, 1991).

Rational and myopic addiction models are analyzed in economic literature mostly on aggregate level data. Micro level analysis meets with obstacles the major of which is presence of zero observations. Econometric treatment of nondrinkers can be proposed in several ways. Estimation of an individual demand for alcohol needs limited dependent variable models. In general individual data on consumption of alcohol are censored like consumption of durable goods because they are not purchased every week and therefore zero outcomes are frequent. The nature of zeros is double: one wants to drink alcohol but can not afford it while another does not like to drink at all.

In addition to considered models it is possible to derive the model on censored data with separated participation and consumption decisions. One approach of dealing with censoring is double-hurdle model of Jones (1989), suggested for cigarette consumption. The panel version of this model was developed by Labeaga (1999) who estimated the model of rational addiction on individual smoking data. He considered the trivariate model has the four equations:

1) start equation $k = 1\{\gamma' h + n > 0\}$;

2) quit equation $d = 1\{\alpha' z + v > 0\}$;

3) observed consumption $c = k\,d\,c^*$;

4) consumption equation $c^* = \max\{0, \beta' y + u\}$, c^* is called a latent variable, since it is not observed in censored cases.

This model is more difficult to estimate than the bivariate model, which excludes the quit equation. In the case of alcohol consumption we are not sure that any drinker or abstainer who has zero alcohol consumption at present will not drink in future, therefore, quit equation does not play the leading role.

The double-hurdle model means that the first hurdle is a decision of participation and the second hurdle is a choice of non-zero consumption (non corner solution of utility maximization problem). In this case the following method of estimation on panel data is applied. At the first stage the binary dependent variable of participation is regressed on some independent variables which may be different from those in consumption model. Then T cross-section regressions are estimated for latent consumption in each period. At the second stage the model of consumption is estimated on the

panel entertaining the results from the first stage which correct estimates on censoring bias (see methodology in Labeaga, 1999).

There are three alternatives to double-hurdle model. First, one could apply the panel Heckman model which is the first hurdle dominance. The program is supplied on the Web with paper of Kyriazidou (1999). It may be possible that this model can be applied in case of moonshine consumption and category of other drinks which exclude the most popular drinks like vodka, beer, and wine. Another option is to use complete first hurdle dominance model applying probit for participation and OLS for consumption. However, one may expect that not all zeros are explained by the first hurdle. The third model which we apply in the empirical part is standard selection mechanism implied by panel Tobit model assuming that participation decision is not as important as consumption decision and zeros are generated mostly by rare frequency of alcohol consumption. This model seems to be preferable for consumption of ethanol, vodka, beer, and wine.

The model of addictive behavior will be estimated by means of the following models beginning with Heckman model. The first step in Heckman model is participation equation:

$$D_i = c + \beta P_i + \gamma I_i + \varepsilon_i, \tag{7}$$

where D_i is dummy for participation decision. This equation can be estimated by probit model on cross-section data. The second step in Heckman model is OLS model for consumption equation which includes inverse Mills ratio $Mills_i$ obtained from the participation equation:

$$C_i = c + \beta P_i + \gamma I_i + Mills_i + \varepsilon_i . \tag{8}$$

In order to identify participation equation, it should include at least one additional identifying variable which is not in the consumption equation.

We suggest estimating the following static model on panel data using combination of Tobit and Heckman models. In Tobit model which is the standard model in case of censored data in addition to price and income the list of independent variables includes individual Mills inverse ratio, which allows correcting biased estimates.

$$C_{it} = c + \beta P_{it} + \gamma I_{it} + \delta Mills_i + u + \varepsilon_{it}, \tag{9}$$

where *u* is random effect.[7] Also we estimate dynamic model of consumption with lagged consumption, myopic addiction model:

$$C_{it} = c + \alpha C_{it-1} + \beta P_{it} + \gamma I_{it} + \delta Mills_i + u + \varepsilon_{it}, \tag{10}$$

and with both lagged and leaded consumption, rational addiction model:

$$C_{it} = c + \alpha C_{it-1} + \gamma C_{it+1} + \beta P_{it} + \gamma I_{it} + \delta Mills_i + u + \varepsilon_{it} . \tag{11}$$

[7] Tobit model with individual fixed effect can not be consistently estimated.

4. METHODOLOGY AND DATA

In the empirical part the models of demand for alcohol (7)–(11), *i.e.* static model and dynamic model with autoregressive terms (lag and lead) and including correction for censoring bias. Independent variables in the model are real income per head in a household, average prices for different types of alcoholic drinks, sugar, and tobacco, and other individual characteristics, including age, gender, and place of living (rural village, urban village, urban, and regional capital).

Participation equation is estimated by probit cross-section regression with binary dependent variable equal to 0 if an individual never drank during the survey period and participated at least in four surveys out of seven (in order to distinguish real abstainers from rare drinkers), and equal to 1 if an individual drank at least in one round. The list of independent variables is average individual income, average price of alcoholic drinks, sugar, and tobacco, gender, age. Then, consumption equation in a simple case is OLS on means with additional variable correcting censoring bias, inverse Mills ratio. This ratio can be calculated within *heckman* procedure in statistical software program STATA which also estimates both participation and consumption equations. Another way to estimate consumption equation is to explore a model on censored panel data such as Tobit model. Estimation of Tobit regression on panel data is obtained by means of procedure *xttobit* in STATA.

As dependent variable in consumption equation we take not only daily average ethanol consumption but also frequency of alcohol intake, usual dose of ethanol in one drinking day and usual dose of ethanol consumption for different types of alcoholic drinks: vodka, wine, beer, moonshine (home-made liquor in RLMS), and other drinks.[8]

Among independent variables in consumption equation we explore price on different alcoholic drinks (vodka, beer, wine and other drinks). As an alternative price on moonshine we use price on sugar, the main ingredient of its production. Since drinkers often smoke cigarettes, we also include price on tobacco. Below we discuss in details how dependent variables are constructed.

4.1. Data

The informational base of the project is *Russian Longitudinal Monitoring Survey* (*RLMS*), which began in 1992 on the national sample of population, and serves to study various aspects of economic situation and health condition. This survey is designed to cover representative regions and groups of population. It includes dynamic of wide range of socio-economic indicators during transition period for more than 4000 households and about 10000 respondents.

The standardized interview contains numerous questions on the structure of household, household budget, living conditions, health, nutrition, etc. The survey is almost annually conducted on the current sample since 1994 except to 1997 and 1999 by specially trained interviewers.

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[8] Average ethanol consumption is equal to the frequency time usual dose. Usual dose of ethanol is the sum of usual doses of ethanol for different types of alcoholic drinks.

Data on alcohol can be extracted from two questionnaires for family and adult, see Table 15 with questions in Appendix. In family questionnaire the head of household reports the quantity of purchased alcoholic drinks (vodka, wine, and beer) by household and expenditures on them during the last week. In individual questionnaire every adult is asked about frequency and usual consumption of alcoholic drinks (vodka, beer, dry wine, fortified wine,[9] moonshine, and other drinks) in the last 30 days. After data processing RLMS reports the daily average volume of ethanol for each drinker and usual ethanol dose for each type of alcoholic drinks. We have recalculated all individual data on consumption using more accurate Goskomstat data on ethanol content in beer (0.0285 before 1995, 0.0337 in 1995–1999, and 0.0389 beginning in 2000); keeping the other data the same as in RLMS (dry wine 0.144, fortified wine 0.18, moonshine 0.39, vodka 0.4, other drinks 0.228. Note in original RLMS data they used factor 0.028 for beer). As a result of recalculation, total alcohol consumption increased up to 6 percent depending on the round. Knowing ethanol content in drinks we are able to recalculate nominal price, which is expenditures divided by quality, into price for litre of ethanol.

There are few remarks concerning quality of data. Reported individual data on alcohol consumption is regarded as understated. Analysis of general population surveys in different countries shows that they capture only 40–60 percent of total consumption (Midanik, 1982). The explanation of this discrepancy is that respondents lessen the actual consumption because of negative attitude towards drinking. However, the survey sample can be biased because it excludes some hard drinking groups of population which either underrepresented or refused to participate (Cook and Moore, 1999). It was already noted that RLMS sample of drinking population is also biased. There are no migrants, servicemen, inmates, homeless people and other marginal groups in the sample (Nemtsov, 2003b). Some of these groups consist of binge drinkers. They are not in the sample since the object of the survey is a household.

There are a number of additional drawbacks which we noted while working with RLMS data. The survey reports only general frequency of alcohol use but frequency of drinking varies for different types of drinks (see, *e.g.* CINDI, 2001 and NOBUS, 2003). Hence total daily average ethanol consumption is estimated with errors for people who consume several types of alcoholic drinks. We find in Tobit regression analysis that marginal effect of being drinker of hard drinks (vodka or moonshine) on frequency is statistically higher than that of soft drinks (beer or wine) controlling for gender. Therefore, if a drinker consumes the two most popular types of alcoholic beverages, vodka and beer, his total ethanol consumption is generally somewhat overestimated. In order to escape this type of error we do not use daily average consumption of particular drink as dependent variable but explore only usual dose of that drink. Another drawback, respondents are asked about usual dose of alcohol without any information about cases of hard drinking. In this case alcohol consumption is underestimated.

[9] In the analysis below under wine we mean combined dry wine and fortified wine.

4.2. Comparison with other sources

In order to understand how representative RLMS cohort by alcohol attributes one may compare RLMS with data collected in other surveys in Russia within the last decade (see Table 24 and Fig. 6 in Appendix). We came to a conclusion that RLMS provides average volume and frequency of alcohol consumption as compared to other sources. Being on the first glance an outlier but in essence the most accurate data on consumption of alcohol, basically moonshine, in countryside is the figure reported in a survey of 75 typical families in three typical rural areas in Voronezh, Nizhni Novgorod, and Omsk regions (Zaigraev, 2004).[10] In international comparison Russian data does not looking as outstanding. Table 8 says that although males and females in Russia drink significantly less than in Poland and Czech Republic, this is due to low frequency of alcohol use whereas dose is much higher. In its turn, the comparison with alcohol surveys in Nigeria and China also show higher frequency of alcohol consumption there than in Russia (Table 9 in Appendix). Distribution of drinking frequency in Russia is closer to that in China both for males and females. Distribution in Nigeria indicates existence of two poles where every day drinkers and abstainers are allocated.

4.3. Data description

At the first stage and in accordance with the problems of the project the general description of RLMS information is done. Its structure is presented in Table 2 below. Only 1 percent of respondents do not report their current drinking status. In each round slightly above half of respondents were drinkers. One may note that dynamics of alcohol consumption corresponds to other available data on alcohol consumption in Russia, see Fig. 8.

Table 2. General characteristics of RLMS data on alcohol*

Round, year	Total num. obs.	Known alcohol status	Unknown alcohol status	Share of drinkers, %	Alcohol consumption per capita, ml of ethanol a day	Alcohol consumption per capita, litres of ethanol a year (litres of vodka equivalent)
5, 1994	8893	8781	112	54.6	14.4	5.3
6, 1995	8402	8281	121	53.2	14.4	5.2
7, 1996	8342	8219	123	51.7	13.0	4.7
8, 1998	8701	8596	105	50.7	10.8	3.9
9, 2000	9074	9000	74	51.5	14.0	5.1
10, 2001	10098	10022	76	58.6	13.7	5.0
11, 2002	10499	10373	126	57.4	14.6	5.3

* — Alcohol consumption is reported for respondents above 14 years of age.

[10] Data from Zaigraev (2004) does not seem to connect with the other data in Table 24 probably because only rural places were investigated. Nevertheless, the lack of abstainers is impressive.

Females dominate in the sample of respondents. Their share is 56–57 percent, which is approximately the true gender structure of adult population in Russia. Females' dominance is even more notable among permanent survey participants, with ratio higher than 3:2 (see Tables 7 and 20).

In Table 3 we show distribution of population by drinking status between 1994 and 2002. There were a fifth of females who never reported to be drinker during the month preceding the survey, but only 5 percent of males were abstainers. About two thirds of males and females have been occasional drinkers. 40 percent of males which is ten times as much as females have been hard drinkers at least one month during eight-year period. One may also note from this table very low number of males participated in all rounds.

Table 3. Distribution of the sample by drinking status, percent (only respondents participated in 5–11 rounds).

	Males	Females
Abstainers	5	22
Occasional drinkers*	64	67
Permanent drinkers	31	11
Total	100	100
Never hard drinkers**	55	74
Occasional hard drinkers***	40	4
Number of individuals	1272	2154

* — Respondents reported drinking during the last 30 days not in every round.

** — Consumption is less than 400 ml of ethanol (1000 ml of vodka) a week.

*** — Note, there are the only permanent hard drinker among males and none among females.

On Fig. 2 in Appendix we plotted histogram with distribution of the sample by the volume of alcohol consumption in 11 round, 2002 for males and females. Log of consumption has normal distribution. This is in accordance to results obtained both on Russian data (Simpura *et al*., 1997), and other data (Skog, 1985). Note, 20 percent of drinking males and 5 percent of drinking females consume more than a litre of vodka equivalent a week. At the same time about half of males and three quarters of females in the cohort observed during eight-year period have never consumed such amount of ethanol (Table 3).

Volume of consumption by age groups is shown on Fig. 3 in Appendix, separately for males and females. Not surprisingly, there is large gender difference in the level of consumption. The ratio is 5:1 in favor of males. Maximum consumption is achieved at 44 and 33 years of age for males and females respectively. After the pick reduction in consumption for females is much faster than for males. By 65 females drink on average 0.5 litre of ethanol per year while males reduce consumption to 1 litre only by 90.

Gender difference is observed for frequency of drinking as well (see Fig. 4). In addition to higher volume of drinking an average male slowly increases frequency by 45–50 years of age and then

does not change it (remember his life expectancy is 59 in 2002). That means the fall of his level of consumption is mostly because of lower dose of ethanol (compare Figs 3 and 4). Gradual reduction in frequency of drinking by average female occurs after 30. It goes more slowly than fall of her level of consumption which is also an evidence of decreasing dose with age. However this process begins 20 years earlier than for males.

RLMS allows us to estimate structure of ethanol consumption, that is how many people drink different types of alcoholic drinks (Table 4) and how much ethanol they drink for types of drinks (Table 5). It is possible to conclude from Table 4 that there is a dramatic increase of beer consumers in Russia together with comparable drop of vodka drinkers. The largest change is in share of beer drinkers, from 26 to 58 percent during eight-year period. We suppose that part of hard drinks users have switched consumption over to soft drinks (vodka-beer), and some small part remained but substituted cheaper moonshine for vodka.

Table 4. Share of drinkers by types of drink, percent (drinkers only).

Round, year	Vodka	Beer	Wine	Moonshine	Other
5, 1994	75	26	42	6	6
8, 1998	68	37	32	13	4
11, 2002	54	58	30	15	6

The next table shows very surprising fact for Russia that share of vodka reduced until half of ethanol consumption, but share of beer and moonshine grew.

Table 5. Structure of alcohol consumption by types of drink, percent of ethanol.

Round, year	Vodka	Beer	Wine	Moonshine	Other
5, 1994	69	6	14	10	2
8, 1998	63	10	8	16	3
11, 2002	49	15	10	22	4

Then, it is possible to calculate from data in Tables 2, 4 and 5 how much alcohol is consumed by average drinker for each type of alcoholic drinks measured both in terms of ethanol and vodka equivalent (Table 6). As expected, users of hard beverages drink more ethanol while minimum consumption is observed for beer and wine drinkers. Especially high volume of consumption is among moonshine drinkers.

4.4. Independent variable construction

In this section we describe how core independent variables are constructed. Consult the survey questions in Table 15.

Table 6. Average consumption of ethanol by types of drinks, litres of ethanol a year (vodka equivalent), drinkers only.

Round, year	Vodka	Beer	Wine	Moonshine	Other
5, 1994	9 (22)	2 (5)	3 (8)	15 (38)	3 (8)
8, 1998	7 (18)	2 (5)	2 (5)	9 (22)	5 (13)
11, 2002	8 (21)	2 (6)	3 (8)	14 (34)	5 (13)

Prices on different types of drinks were calculated as average in a given site (usually it is a city or a village) using information about household expenditures on vodka, beer, wine and other drinks and number of purchased drinks in last 7 days. This information is available for about half of households which have a drinker, therefore, for about a quarter of the entire sample. Moreover, we calculated for each individual his average price on ethanol using his structure of consumption and average prices on different drinks. For respondent not reported drinking we assigned average price of ethanol in its site. Average price for two other goods, sugar and tobacco, were constructed in similar way. For them there are considerably more observations among households.

The logical question arises. What is quality of prices on alcohol reported by households and how different average price in RLMS from official Goskomstat price? The comparison can be done on country average data. Among data reported by the survey respondents on alcohol, price of purchased alcohol is probably the most accurate since average prices are quite close to real prices on alcohol market. Average prices are reported by Goskomstat, which obtains them using registered prices in many retail places located in largest cities. Mean prices on vodka and beer with comparison to Goskomstat data can be found in Tables 13 and 14 in Appendix. Price on beer reported by RLMS and Goskomstat differ not more than in 16 percent (in 1995), that means coincidence is satisfactory. Slightly worse is the situation with vodka price. The largest overestimation by Goskomstat was almost 1.5 times in 1996. In other years the difference does not exceed 23 percent (in 1995). However, three latest surveys actually show practically the same average price as Goskomstat one. Considerably higher discrepancy in price of vodka in mid of 90-s is linked with the fact that Goskomstat registered only legal sales whereas RLMS respondents could purchased illegally produced and therefore cheap vodka. Economic inexpediency and difficulty to falsify beer explains better coincidence of beer prices.

After making comparison, we constructed real prices on alcohol, sugar, and tobacco in the following way. Since regions presented in RLMS differ in price levels for comparable goods and in order to escape influence of inflation, all prices were divided by price on basket of 25 basic foods in a region which is published by Goskomstat.[11] In Table 12 we show distribution of nominal prices on vodka and beer for each round. In particular we plotted distribution of price on vodka in 11 round on Fig. 7. According to it more than 60 percent of purchases were done in price interval 100 ± 20 roubles.

[11] This basket is elaborated on the base of norms conformable to minimum consumption and borders of nutrition adopted in international practice (Goskomstat, 1996).

In its turn, income per head is equal to total household expenditures in last 30 days divided by the number of household members. Real income used in the analysis is also obtained by division of income per head by price on basket of 25 basic foods. In Table 7 we present average frequency and level of alcohol consumption, as well as real income and alcohol prices in RLMS 5–11 rounds. As may be noted, in spite of hard problems related to alcohol in Russia, price on basic drinks is even falling and going back to the minimum level in mid of 90-s, when Russia achieved maximum levels of average alcohol consumption, abuse, and alcohol related problems. Note minimum level of real income and price on alcohol achieved immediately after financial crisis in 1998 according to RLMS correspond to minimum frequency and level of alcohol consumption.

Table 7. Descriptive statistics (drinkers only)*.

Round, year	Frequency, times a day	Ethanol consumption, ml a day (vodka equivalent)	Income per head	Price on vodka	Price on beer	Price on wine and other	Price on sugar	Price on tobacco
5, 1994	0.15	26 (65)	3.2	0.22	0.81	0.53	0.022	0.0074
6, 1995	0.16	27 (67)	2.9	0.21	0.92	0.49	0.022	0.0083
7, 1996	0.15	25 (62)	3.1	0.28	1.03	0.62	0.016	0.0093
8, 1998	0.13	21 (52)	2.3	0.25	0.69	0.49	0.020	0.0099
9, 2000	0.16	27 (68)	3.1	0.32	0.77	0.52	0.025	0.0090
10, 2001	0.16	23 (59)	3.5	0.31	0.72	0.61	0.019	0.0086
11, 2002	0.17	25 (63)	3.6	0.29	0.69	0.63	0.019	0.0087
On average	0.16	25 (62)	3.1	0.26	0.77	0.55	0.020	0.0088

* — Income and prices are expressed in food baskets, that is divided by price on basket of 25 basic foods; price of alcohol is for litre of ethanol.

Fig. 5 presents the link between the structure of alcohol consumption (only for drinkers) and income per head. On the X-axis are income deciles and on Y-axis is daily average consumption of alcoholic drinks in millilitres of ethanol. Consumption of vodka and ethanol in general have traditional U-shape with minimum in the sixth decile.[12] Interestingly, frequency of alcohol consumption has similar distribution. Maximum level of ethanol consumption among drinkers together with maxi-

[12] Reduction of consumption in highest decile occurs due to higher than usual proportion of females.

mum frequency belongs to the poorest fifth of population (first and second deciles).[13] There is no clear relation between consumption of beer and income what makes beer the most democratic drink. In contrast with beer, consumption of wine is higher with income. The most dramatic changes occur with consumption of moonshine, which falls with income, especially fast between the first and the second deciles. The general shape of distribution and its conformity with foreign investigations are indirect verifiers of relative accurateness of alcohol related information reported by RLMS respondents.

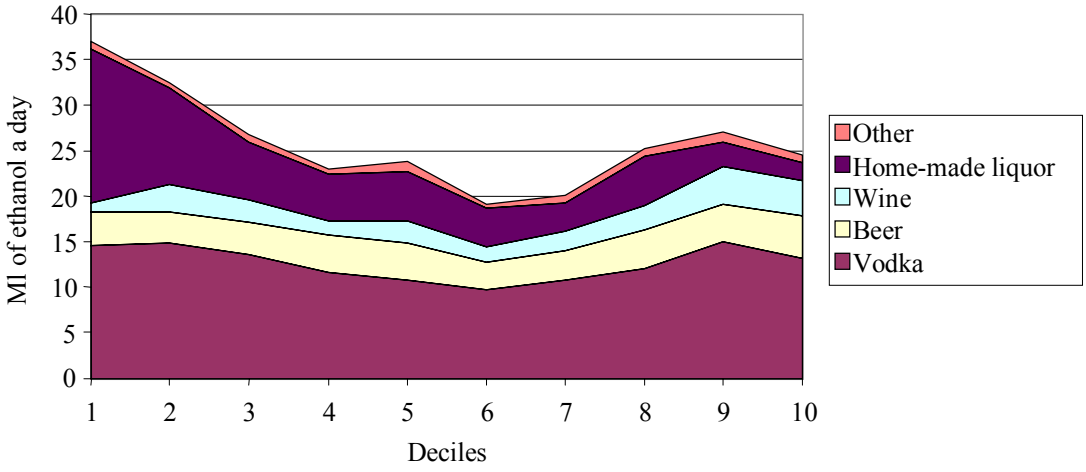

Fig. 5. Structure of alcoholic drinks consumption by income of respondents (11 round, 2002).

5. EMPIRICAL PART

We start the empirical part with participation equation estimation. First of all we study determinants of decision to be drinker vs. abstainer. We will try to identify participation equation exploring data for each individual about drinking status among the rest of the family. Inverse Mills ratio is calculated for every individual from probit regression and explored on the second stage. Then, we continue with consumption equation estimation entertaining information obtained from the participation equation. Static consumption equation is estimated on cross-section data using Heckman model and on panel data using Tobit model.[14] After that we study the two models of addiction, myopic and rational, by means of dynamic Tobit model on panel data. We finish our empirical part with estimation of the static Tobit model on subsamles and with robustness check.

[13] Meantime, one should bear in mind that the poorest group does not consume the most of alcohol because according to RLMS data there are less drinkers among poor. As we suppose, hard drinkers, who are mostly poor, are underrepresented in RLMS. At the same time the sample is biased towards poor. Therefore, both tendencies may counterweigh the sample.

[14] Unfortunately, there is no good program to estimate Heckman model on panel data. Available program (see Kyriazidou, 1997) for two-step estimation procedure, which 'differences out' the sample selection effect and the unobservable individual effect from the equation of interest does not provide stable results.

Inasmuch as income and alcohol consumption have lognormal distribution they are taken in logarithms as well as prices. Therefore the corresponding coefficients in consumption equations are either income or price elasticity of consumption. In order to estimate model on the entire sample, we decided to assign minimal volume of ethanol consumption to be equal to 0.1 ml a day for each non-drinker meaning that all data equal to or below this level are assumed to be censored.[15] The same was done with usual dose in the regressions for particular type of drink. Similarly, minimum frequency of alcohol consumption was assumed to be 0.01 time a day.

5.1. Participation and average consumption equations

On the first stage we estimate probit model for drinkers vs. abstainers on mean values of price, income and other variables. We explored in the model constructed for each individual a dummy variable for a drinker among the rest of household members. Results of the regressions are reported in Table 13 in Appendix. Dummy is statistically different from zero and has expected sign in probit regression (column 2). In consumption equation estimated by Heckman model, which is OLS with inverse Mills ratio, dummy of another drinker is not significant (column 4).[16] Hence, participation equation is identified. Risk to be drinker is higher for any person who lives in household which has a drinker. However, presence of a drinker among the rest has no impact on average alcohol consumption. Therefore, we estimate model for consumption without that dummy variable using OLS (column 3). In the last three columns of the table we show results of regressions with price on types of alcoholic drinks.

Price on ethanol and income are found to be significant determinants of risk to be drinker and volume of consumption. This risk is more sensitive to income than to price of ethanol, since magnitude of elasticity is higher, but for consumption of ethanol the opposite is true. It is more sensitive to price than to income. Prices on particular type of alcohol are only marginally significant. Price on cigarettes negatively affects risk to be drinker in contrast with consumption which is positively affected.

Obtained coefficients for other dummies indicate risk and consumption to be lower in rural areas and higher in a regional capital as compared to other urban areas. The negative sign for rural dummy in combination with lower income in rural areas in demand model may cause doubt either in adequacy of RLMS data or in Zaigraev (2004) data which are in accordance with common perception of incidence of hard drinking among rural population. However, controlling prices on types of drinks, we get insignificant rural dummy in consumption equations (columns 6 and 7).

In addition to simple probit on means we estimated participation equation on panel data using random effect probit model. It is not exactly analogous participation equation since almost half of ob-

[15] It is known, that organism generates alcohol in small doses. Moreover, alcohol is contained in medicaments and confectioneries.

[16] In participation equation dummy for a drinker among the rest is endogenous variable. Coefficient obtained for it is biased to zero, that is does not loose statistical significance. We do not know whether this dummy is endogenous in consumption equation. Instrumental variable is not found yet.

servations are zero because of rare drinking. In contrast to this case in probit model estimated on cross-section data only abstainers had zero observations. Panel regressions show quite similar results (see Table 14). While income elasticity of risk is only slightly lower than in cross-section probit for participation, ethanol price elasticity is thrice as much but gender dummy is only half as much. Dummies for village, urban village, and regional capital are not significant in this model.

5.2. Estimation of total demand for ethanol

Descriptive statistics of variables in the demand models estimated on panel data is located in Table 16 in Appendix. All core empirical results obtained in regression analysis of the model (9) are placed in Table 17. In the first column you see the names of independent variables. Results of Tobit regression for usual daily dose in millilitres of ethanol are in the second and third columns. The forth column contains results for frequency of alcohol consumption (number of occasions in last 30 days divided by 30, varying between 0 and 1). In the fifth column we report results for usual dose of ethanol.

Since coefficient for inverse Mills ratio is significantly negative in all cases, this is an indicator that OLS estimate without dealing with censored data problem has bias towards zero appearing due to abstainers.

We find that income has significantly positive impact on frequency, usual dose and as a consequence, total ethanol consumption. We came to the conclusion about aggregate positive effect of income on alcohol consumption. Out of the two components of total consumption, frequency and dose, the latter is twice more sensitive to change in income than the former.

Price elasticities of ethanol consumption, frequency and dose are significantly negative with respect to price on ethanol, beer, and wine. However, frequency is found to be positively dependent on vodka price while dose and ethanol are not sensitive to this price. Price on tobacco does not influence demand for ethanol. Price on sugar has significant impact with negative sign only on frequency of alcohol intake.

Concerning other results in demand equation, we obtain gradually increasing demand until the age of around forty with average consumption increasing by 10 percent annually and then demand is falling by 16 percent a year. Place of living dummies are not significant in all regressions.

5.3. Estimation of demand for particular type of drink

Demand for each type of drinks was also estimated. In the second column of Table 18 we place results of Tobit model for usual dose of vodka, in the third results for beer and so on.

As for total ethanol consumption, consumption of vodka, beer, wine, and other drinks are increasing with income. At the same time income has significantly negative influence on dose of moonshine.

Results bear evidence of expected impact of prices on consumption of different alcoholic drinks. Thus, consumption of any drink falls with its own price. This is the classical decreasing demand curve. Price elasticity of consumption varies from –1.0 for wine, –1.8 for vodka, to –3.0 for beer.

Note that these estimates are much higher than own-price elasticities reported in Table 1 for higher income countries. Meanwhile, there is the substitution effect between some pairs of drink, the most notable between vodka&beer, and vodka&moonshine. When price on vodka is higher demand for beer and moonshine is higher with larger cross-price elasticity, 4.1 for beer and 5.6 for moonshine. Similarly, with higher price on beer consumption of vodka and wine is higher although with lower cross-price elasticity, 0.8 and 1.2 respectively. Surprisingly, not all cross-price elasticities are negative. Thus, demand for wine falls with price on vodka with elasticity –1.5. Finally, we observe that not all pairs of drinks are substitutes. Beer and moonshine seems to be complementary goods due to negative cross-price elasticity, with price on beer elasticity of demand (for moonshine) –5.1 and price on wine and other, including moonshine, elasticity of demand (for beer) –0.6.

In distinction from estimated demand for ethanol we obtained significant effects of prices on sugar and cigarettes on demand for particular type of drinks. Price of sugar is found to have ambiguous effect. For hard alcoholic drinks (vodka and moonshine) demand is increasing with sugar price while demand for soft drinks (beer, wine, and other) is decreasing.[17] On the contrary, demand for these soft drinks is higher with cigarettes price. Only consumption of moonshine is lower with price on tobacco while this price does not affect consumption of vodka. Possible explanation: in contrast to vodka moonshine is chiefly consumed by poorest people who are more sensitive to price on another addiction good, cigarettes.

As it was many times shown, there is evidence of gender difference in alcohol consumption. Frequency, dose, and level of consumption for females are substantially lower than for males, except to wine, which females prefer the most.

Finally, results identify different age profile for types of alcoholic drinks. Thus, not only for total demand for ethanol, but also for hard drinks, vodka and moonshine, one may observe slowly rising demand by approximately forty years of age and then gradual decline with the similar angle. In distinction from that, demands for beer and wine are falling beginning with young ages.

5.4. Myopic and rational addiction models

In this section we test whether alcohol consumption follows myopic or rational addiction model. Both hypotheses need to estimate dynamic model. In Table 19 we report results of models (10) and (11) estimation. In the first and third columns we show results of regression with lag and lead of total alcohol consumption explored as independent variables. In the second and forth regressions we use fitted values of the consumption from the static model (9). That means likewise Becker *et al*. (1994) we use past and future prices as instruments for past and future consumption respectively in order to receive unbiased estimates. As results of the regressions demonstrate, uninstrumented lag and lead have much larger coefficients.

[17] Nonetheless we expected negative impact of sugar price on moonshine consumption.

Both models, myopic and rational, with instrumented lag and lead provide similar estimated parameters. In contrast to static model (column two in Table 17) dynamic models (columns two and four in Table 19) show significantly positive vodka price elasticity while prices on beer and wine have similar to the static case value of elasticity. Also, in myopic and rational addiction models gender and age have slightly lower effect in their magnitude as compared to the static case.

5.5. Estimation of demand for total alcohol on subsamples

Finally, we estimated static demand for ethanol on different subsamples. First of all, we started with estimation of demand separately for males and females. Results are reported in Table 20. Both regressions differ only in price effect. While for males the only significant price out of five is price of beer, for females all three alcohol prices are significant but price on vodka has the positive sign. Another distinction, women in regional centers drink greater by 17 percent than women residing in other urban places. Males living in an urban village consume 40 percent less ethanol than males in cities (compare with the case for poorest below). Other rural and urban dummies are not significant for females and males.

Then we divided the sample into three equally sized subsamples using 33 and 67 percentiles of real income. Three regressions on each subsample are located in Table 21. On the one hand, results obtained indicate high sensitivity of the lower income group of respondents to prices on beer, and wine. On another hand, the middle group is sensitive only to beer price and higher income population is not sensitive to changes in price of alcohol. With respect to income all income groups have positive effect on total alcohol consumption. In the middle income group this effect of income is three times larger than in the richest group but twice as much as in the poorest group. Finally, the first regression for the poorest part indicates that a rural citizen consumes ethanol greater by 40 percent than an individual from urban area. But rural dummy in the results for the higher income group demonstrates that rich persons in rural place consume 25 percent less than similar people from cities. Sugar and tobacco prices are insignificant.

As robustness check we have estimated consumption equations assuming 10 times higher volume of minimal ethanol consumption that is not 0.1 ml but 1 ml a day which is more than a bottle of beer in a month. This level seems to be unrealistically high for left censoring point. Results of these regressions can be found in Tables 22 and 23. We observe that almost all income and price elasticities are about 40 percent less than in the core case. This result may indicate that real drinkers are more sensitive to core variables in the demand equation, income and price.

6. CONCLUSIONS

In this project we have studied demand for alcohol by means of econometric analysis based on individual data from RLMS, the longitudinal survey of the representative sample of Russian population.

1. We have shown that alcohol has an ordinary demand as many other consumer goods. The only distinction, it is the addictive good which follows rational addiction model.
2. Raised price for any type of alcoholic drinks dominating in official production (in diminishing order: vodka, beer, and wine) leads to reduction in its consumption. This conclusion is of critical importance for the public policy. Own-price elasticities are found to be much higher than those obtained in time-series analysis for higher income countries.
3. There is strong substitution effect by another type of drink, in particular substitution of moonshine for vodka when price of vodka grows and between vodka&beer with higher price on one of them. As a result of substitution vodka price has no impact on total ethanol consumption. Income growth has important effect on demand for alcoholic drinks.
4. Risk to be drinker is rising with individual income. Risk is higher if there are drinkers among the rest of household members.
5. Higher income results in lower consumption of lower quality, hence, more toxic moonshine, and at the same time in higher consumption of vodka, beer, and wine. Also, growing income leads to higher frequency and usual dose which totals in higher consumption of ethanol.
6. While total ethanol consumption rises with income, it has more "soft" structure and could have less harm than that from lower level consumption corresponding to lower income.
7. We also find that poorest people in rural areas consume ethanol 40 percent greater than similar people in urban places.
8. Our findings with respect to income and price do not fully explain those huge changes in the structure of ethanol consumption which occurred during the period of observation 1994–2002 such as falling number of vodka drinkers and rising number of people consuming beer and moonshine. Additional investigation is needed. One could study participation decision for hard and soft drinks which may provide solution to the task.

APPENDIX

Table 8. Volume and frequency of alcohol consumption in one Russian, one Polish and one Czech city, percent (Source: Bobak, Room *et al*., 2004).

Frequency	Males			Females		
	Russia	Poland	Czech Republic	Russia	Poland	Czech Republic
≥ 5 times a week	5	15	35	0.6	12	8
1–4 times a week	31	21	36	5	7	20
1–3 times a month	35	24	11	26	18	22
3–11 times a year	14	21	6	43	26	15
1–2 times a year	4	6	6	10	14	19
Never	11	14	6	16	24	17
Volume of alcohol consumption, ml of ethanol a day	12.7	11.2	23.3	1.6	2.0	3.9
Number of alcohol intakes a year	66.5	78.7	179.3	14.7	22.9	43.3
Dose of alcohol, ml of ethanol a day	69.8	51.8	47.4	40.8	31.4	32.8

Table 9. Distribution of population by frequency of drinking in Nigeria and China, percent (Sources: Obot (2001), Wei *et al*., 2001).

Frequency	Nigeria 1988/1989	Frequency	China 1993/1994	
	M		M	F
≥ 5 times a week	36.3	≥ 1 times a day	13.3	0.7
3–4 times a week	7	4–5 times a week	7.4	0.4
1–2 times a week	5.7	2–3 times a week	15.3	1.5
1–3 times a month	3.6	2–4 times a month	29.4	7
<1 time a month	1.6	<=1 times a month	17.2	16
Never last year	4.2	never last year	17.4	74.4
Never	41.6			

Table 10. Price of vodka according to Goskomstat and RLMS, roubles for litre*.

RLMS								Goskomstat	9/4 in %
Round	Year	N. obs.	Mean	Min	Max	Lower quartile	Upper quartile		
1	2	3	4	5	6	7	8	9	10
5	1994	951	8	2	36	6	9	8	112
6	1995	784	16	1	74	13	19	20	123
7	1996	649	24	6	150	20	26	35	149
8	1998	540	42	10	140	36	48	47	113
9	2000	477	82	34	202	71	90	84	103
10	2001	606	96	18	792	80	107	95	99
11	2002	582	103	32	328	87	120	103	99

* — Calculated only for households reported expenditures on alcoholic drinks

Table 11. Price of beer according to Goskomstat and RLMS, roubles for litre*.

RLMS								Goskomstat	9/4 in %
Round	Year	N. obs.	Mean	Min	Max	Lower quartile	Upper quartile		
1	2	3	4	5	6	7	8	9	10
5	1994	441	2	0	11	1	2	2	88
6	1995	329	6	1	36	4	7	5	84
7	1996	396	8	2	22	6	9	7	90
8	1998	539	10	3	55	7	12	11	107
9	2000	765	19	4	120	15	22	20	105
10	2001	1014	22	9	83	18	25	23	104
11	2002	1034	24	9	82	20	28	26	106

* — Calculated only for households reported expenditures on alcoholic drinks.

Таблица 12. Table 12. Distribution of nominal prices, roubles for litre*.

Round	Percentile	Vodka	Beer	Wine and other
5	1	3	1	2
	5	4	1	3
	10	5	1	4
	median	7	2	9
	90	10	3	14
	95	12	5	16
	99	20	10	24
6	1	6	2	2
	5	8	2	9
	10	10	3	10
	median	16	5	18
	90	24	11	32
	95	26	12	36
	99	44	24	50
7	1	10	2	10
	5	12	3	14
	10	17	3	16
	median	22	7	25
	90	30	13	40
	95	36	14	50
	99	52	20	70
8	1	10	4	10
	5	20	5	18
	10	20	6	20
	median	41	10	36
	90	52	14	64
	95	60	16	80
	99	80	25	186
9	1	36	8	20
	5	40	10	24
	10	56	12	30
	median	80	19	57
	90	104	26	107
	95	124	30	133
	99	160	39	196
10	1	26	10	16
	5	40	12	32
	10	50	14	40
	median	90	20	86
	90	130	30	150
	95	150	32	200
	99	210	50	400
11	1	40	11	30
	5	50	13	36
	10	65	15	43
	median	100	23	100
	90	140	34	183
	95	156	38	286
	99	198	50	600

* — Calculated only for households reported expenditures on alcoholic drinks.

Table 13. Participation and consumption equations♦, probit and Heckman models.

	Dependent variable method					
	Drinker (0/1), probit	Consumption, log Heckman	Consumption, log Heckman	Drinker (0/1), probit	Consumption, log Heckman	Consumption, log Heckman
Drinker among rest (0/1)	0.356***		0.054	0.355***		0.033
Income per head, log	0.266***	0.09***	0.096***	0.285***	0.074***	0.078***
Price on ethanol, log	–0.074***	–0.142***	–0.145***			
Price on vodka, log				–0.005	–0.172*	–0.174*
Price on beer, log				–0.036	–0.007	–0.008
Price on wine and other, log				0.195**	0.064	0.066
Price on sugar, log				–0.644***	–0.106	–0.114
Price on tobacco, log				–0.332***	0.129**	0.123**
Age	0.018***	0.038***	0.039***	0.018***	0.041***	0.041***
(Age–40)×1 {Age>40}	–0.057***	–0.08***	–0.082***	–0.057***	–0.083***	–0.084***
Gender (m — 0, f — 1)	–0.724***	–1.626***	–1.646***	–0.734***	–1.663***	–1.675***
Village (0/1)	–0.297***	–0.09**	–0.099**	–0.332***	–0.05	–0.056
Urban village (0/1)	–0.455***	–0.147**	–0.16**	–0.373***	–0.167**	–0.173**
Regional center♦♦ (0/1)	0.211***	0.112***	0.117***	0.21***	0.079**	0.082**
Const	2.257***	3.789***	3.753***	–2.138***	3.059***	2.965***
Number of obs.	13369	13369	13369	13372	13372	13372
Censored obs.	1308	1308	1308	1308	1308	1308
Uncensored obs.	12061	12061	12061	12064	12064	12064

♦ — The sample consists of drinkers at least in one round no matter how many rounds they are observed and abstainers defined as respondents participated at least in 4 rounds out of 7 and never drank. Here and below stars mean significance levels: * — 10%, ** — 5%, *** — 1%.

♦♦ — Here and below cities other than regional capitals are taken as base in a regression.

Table 14. Participation equation, probit model with random effect.

Income per head, log	0.216***	0.212***
Price on ethanol, log	–0.201***	
Price on vodka, log		0.025
Price on beer, log		–0.086***
Price on wine and other, log		–0.047**
Price on sugar, log	–0.011	–0.018
Price on tobacco, log	0.024	–0.008
Age	0.041***	0.043***
(Age–40)×1 {Age>40}	–0.063***	–0.067***
Gender (m — 0, f — 1)	–0.394***	–0.429***
Village (0/1)	–0.021	–0.024
Urban village (0/1)	–0.08	–0.101*
Regional center** (0/1)	0.006	0.010
Const	–0.209	–0.228
Mills inverse ratio	–2.191***	–2.069***
Number of obs.	55686	55686
Number of respondents	16277	16277

Table 15. Survey questions.

Calculated variable	Question*
Drinker, dummy	In the last 30 days have you used alcoholic beverages? (Yes, No).
Frequency, times a day	How often have you used alcoholic beverages in the last 30 days? (Every day, 4–6 times a week, 2–3 times a week, once a week, 2–3 times in the last 30 days, once in the last 30 days).
Beer, home-brewed beer Dry wine, champagne Fortified wine Home-made liquor Vodka or other hard liquor Anything else	Tell me, please, which of these you drank in the last 30 days and, for those, you drank, how many grams you usually consumed in a day?

Calculated variable	Question*
Income per head	What was the monetary income of entire family in the last 30 days? Include here all the money received by all members of the family: wages, pensions, stipends, and any other money received, including hard currency converted into rubles.
Price on vodka Price on beer Price on wine and other alcohol	Did your family buy in the last 7 days? (Yes, No) If Yes: How much litres? How many roubles in all did you pay?
Price on sugar	Did your family buy in the last 7 days? (Yes, No) If Yes: How much kilograms? How many roubles in all did you pay?
Price on tobacco products	Did your family buy in the last 7 days? (Yes, No) If Yes: how many packs? How many roubles in all did you pay?

* — Every answer has options: doesn't know, refused to answer.

Table 16. Descriptive statistics of variables in econometric models*.

Variable	Obs.	Mean	St. dev.	Min	Max
Drinker, dummy	55686	0.55	0.50	0	1
Ethanol, daily average	55700	14	49	0.03	1842
Frequency, times a day	56217	0.09	0.16	0.01	1
Total dose of ethanol	55939	64	115	0.1	2579
Dose of vodka	56387	39	84	0.1	1200
Dose of beer	56387	7	17	0.1	286
Dose of wine	56387	8	24	0.1	606
Dose of moonshine	56387	8	42	0.1	1170
Dose of other	56387	2	16	0.1	1140
Income per head	56387	2.8	3.8	0.01	189
Price on ethanol	56387	0.43	0.17	0.08	3.5
Price on vodka	56387	0.27	0.07	0.08	0.6
Price on beer	56387	0.81	0.28	0.27	3.5
Price on wine and other	56387	0.56	0.20	0.07	2.9
Price on sugar	56387	0.020	0.004	0.006	0.046
Price on tobacco	56387	0.0083	0.0030	0.0020	0.0311
Mills	56387	0.21	0.23	0.001	1.88

* — Doses and ethanol consumption are in millilitres of ethanol; income and prices are divided on price of 25-food basket.

Table 17. Demand for alcohol, Tobit static model with random effect.

	Total ethanol, log	Total ethanol, log	Frequency, log	Dose, log
Income per head, log	0.452***	0.434***	0.258***	0.572***
Price on ethanol, log	–0.66***			
Price on vodka, log		0.027	0.084**	–0.064
Price on beer, log		–0.181***	–0.116***	–0.213***
Price on wine and other, log		–0.09**	–0.046*	–0.14**
Price on sugar, log	–0.009	–0.022	–0.087**	0.009
Price on tobacco, log	0.102*	–0.013	0.004	–0.018
Age	0.102***	0.107***	0.055***	0.138***
(Age–40)×1 {Age>40}	–0.16***	–0.171***	–0.085***	–0.213***
Gender (m — 0, f — 1)	–1.569***	–1.69***	–0.798***	–1.572***
Village (0/1)	0.056	0.044	–0.029	0.13
Urban village (0/1)	–0.116	–0.169	–0.085	–0.169
Regional center (0/1)	0.0005	0.021	0.029	–0.038
Const	–1.029**	–1.099***	–4.239***	–1.012
Mills inverse ratio	–5.478***	–5.076***	–2.778***	–8.289***
Number of obs.	55700	55700	56217	55939
Number of respondents	16277	16277	16333	16302
Number of uncensored obs.	30607	30607	31030	30764
Number of left censored obs.	25093	25093	25187	25175

Table 18. Demand for alcohol by types of drink, Tobit static model with random effect.

	Dose of vodka, log	Dose of beer, log	Dose of wine, log	Dose of moonshine, log	Dose of other, log
Income per head, log	0.524***	1.114***	1.304***	–1.049***	2.415***
Price on vodka, log	–1.774***	4.132***	–1.537***	5.598***	0.465
Price on beer, log	0.785***	–3.017***	1.195***	–5.076***	0.186
Price on wine and other, log	0.293***	–0.567***	–1.045***	–0.949***	–0.246
Price on sugar, log	0.802***	–1.005***	–0.644**	2.126***	–2.874***
Price on tobacco, log	0.152	0.957***	0.318*	–1.804***	1.345**
Age	0.25***	–0.003	–0.004	0.262***	–0.035
(Age–40)×1 {Age>40}	–0.36***	–0.154***	–0.082***	–0.213***	–0.102**
Gender (m — 0, f — 1)	–4.075***	–3.085***	4.629***	–5.522***	1.503***
Village (0/1)	–0.059	–0.765***	–1.047***	4.218***	–2.226***
Urban village (0/1)	–0.844***	–1.285***	0.39	2.888***	–1.265
Regional center (0/1)	0.277**	0.265***	1.111***	–5.14***	0.99***
Const	–2.743***	4.54***	–18.52***	–14.39***	–33.61***
Mills inverse ratio	–6.695***	–6.66***	–11.64***	–12.97***	–5.036**
Number of obs.	56387	56387	56387	56387	56387
Number of respondents	16348	16348	16348	16348	16348
Number of uncensored obs.	20304	12817	10305	3569	1556
Number of left censored obs.	36083	43570	46082	52818	54831

Table 19. Myopic and rational addiction Tobit models.

	Myopic	Myopic♦	Rational	Rational♦
Lag of consumption, log	0.645***	0.123**	0.487***	0.167***
Lead of consumption, log			0.522***	0.181***
Income per head, log	0.315***	0.432***	0.272***	0.415***
Price on vodka, log	0.177**	0.16**	0.114	0.221**
Price on beer, log	–0.222***	–0.21***	–0.152**	–0.221***
Price on wine and other, log	–0.175***	–0.209***	–0.07	–0.198***
Price on sugar, log	0.21**	–0.067	–0.179*	–0.145
Price on tobacco, log	0.049	0.099	0.079	0.258***
Age	0.016***	0.06***	0.012***	0.035***
(Age–40)×1 {Age>40}	–0.041***	–0.111***	–0.022***	–0.069***
Gender (m — 0, f — 1)	–0.794***	–1.504***	–0.234***	–1.187***
Village (0/1)	0.056	0.171**	0.058	0.132
Urban village (0/1)	0.001	0.029	0.055	0.259
Regional center (0/1)	–0.029	–0.065	–0.082*	–0.098
Const	1.492***	0.628	–0.875*	1.442**
Mills inverse ratio	–3.585***	–4.139***	–2.846***	–2.915***
Number of obs.	40215	37729	28269	25710
Number of respondents	12610	11766	9788	8812
Number of uncensored obs.	22318	21209	15525	14357
Number of left censored obs.	17897	16520	12744	11353

♦ — Past and future consumption are fitted values from the static model.

Table 20. Demand for ethanol (log) by gender, Tobit static model with random effect.

	Males	Females
Income per head, log	0.351***	0.534***
Price on vodka, log	–0.128	0.198**
Price on beer, log	–0.163**	–0.229***
Price on wine and other, log	–0.082	–0.104*
Price on sugar, log	0.103	–0.171
Price on tobacco, log	–0.055	0.031
Age	0.148***	0.067***
(Age–40)×1 {Age>40}	–0.208***	–0.144***
Village (0/1)	0.049	–0.054
Urban village (0/1)	–0.402**	–0.114
Regional center (0/1)	–0.058	0.171**
Const	–3.941***	–3.599***
Mills inverse ratio	–5.501***	–3.904***
Number of obs.	24019	31681
Number of respondents	7369	8908
Number of uncensored obs.	16350	14257
Number of left censored obs.	7669	17424

Table 21. Demand for ethanol (log) by income groups, Tobit static model with random effect.

	Lower	Middle	Higher
Income per head, log	0.373***	0.752***	0.269***
Price on vodka, log	0.182	0.039	–0.021
Price on beer, log	–0.294***	–0.192**	–0.108
Price on wine and other, log	–0.246***	–0.093	–0.001
Price on sugar, log	–0.136	–0.002	0.038
Price on tobacco, log	0.122	0.02	0.007
Age	0.111***	0.1***	0.09***
(Age-40)×1 {Age>40}	–0.171***	–0.161***	–0.154***
Gender (m — 0, f — 1)	–2.112***	–1.697***	–1.493***
Village (0/1)	0.395***	–0.076	–0.276***
Urban village (0/1)	–0.618***	–0.071	–0.094
Regional center (0/1)	0.005	–0.068	0.109
Const	–0.665	–0.825	–0.123
Mills inverse ratio	–5.129***	–5.005***	–4.84***
Number of obs.	18259	18664	18777
Number of respondents	8861	10112	9466
Number of uncensored obs.	8502	10242	11863
Number of left censored obs.	9757	8422	6914

Table 22. Tobit static model with random effect (robustness check).

	Total ethanol, log	Total ethanol, log	Frequency, log	Dose, log
Income per head, log	0.295***	0.274***	0.205***	0.375***
Price on ethanol, log	–0.647***			
Price on vodka, log		0.027	0.087***	–0.068
Price on beer, log		–0.107***	–0.095***	–0.136***
Price on wine and other, log		–0.05*	–0.034*	–0.092**
Price on sugar, log	0.015	0.003	–0.08**	0.032
Price on tobacco, log	0.145***	0.018	0.007	–0.015
Age	0.069***	0.074***	0.043***	0.096***
(Age–40)×1 {Age>40}	–0.112***	–0.122***	–0.067***	–0.15***
Gender (m — 0, f — 1)	–1.436***	–1.546***	–0.707***	–1.241***
Village (0/1)	0.078	0.076	–0.035	0.091
Urban village (0/1)	–0.086	–0.125	–0.07	–0.144
Regional center (0/1)	–0.025	0.008	0.034	–0.03
Const	0.987***	0.887***	–3.646***	1.04**
Mills inverse ratio	–3.476***	–3.093***	–1.991***	–5.303***
Number of obs.	55700	55700	56217	55939
Number of respondents	16277	16277	16333	16302
Number of uncensored obs.	26955	26955	31030	30760
Number of left censored obs.	28745	28745	25187	25179

Table 23. Demand for alcohol by types of drink, Tobit static model with random effect (robustness check).

	Dose of vodka, log	Dose of beer, log	Dose of wine, log	Dose of moonshine, log	Dose of other, log
Income per head, log	0.339***	0.648***	0.794***	–0.7***	1.489***
Price on vodka, log	–1.182***	2.4***	–0.937***	3.702***	0.311
Price on beer, log	0.517***	–1.778***	0.724***	–3.37***	0.091
Price on wine and other, log	0.197***	–0.327***	–0.636***	–0.621***	–0.14
Price on sugar, log	0.532***	–0.576***	–0.397**	1.411***	–1.772***
Price on tobacco, log	0.098	0.566***	0.194*	–1.201***	0.834**
Age	0.166***	–0.0004	–0.002	0.175***	–0.022*
(Age–40)×1 {Age>40}	–0.241***	–0.094***	–0.053***	–0.143***	–0.063**
Gender (m — 0, f — 1)	–2.801***	–1.9***	2.751***	–3.7***	0.901***
Village (0/1)	–0.041	–0.446***	–0.635***	2.796***	–1.377***
Urban village (0/1)	–0.58***	–0.783***	0.214	1.912***	–0.791
Regional center (0/1)	0.171**	0.159***	0.678***	–3.404***	0.596**
Const	–0.138	4.148***	–9.809***	–7.994***	–19.21***
Mills inverse ratio	–4.288***	–3.663***	–7.039***	–8.566***	–3.118**
Number of obs.	56387	56387	56387	56387	56387
Number of respondents	16348	16348	16348	16348	16348
Number of uncensored obs.	20304	12806	10305	3569	1556
Number of left censored obs.	36083	43581	46082	52818	54831

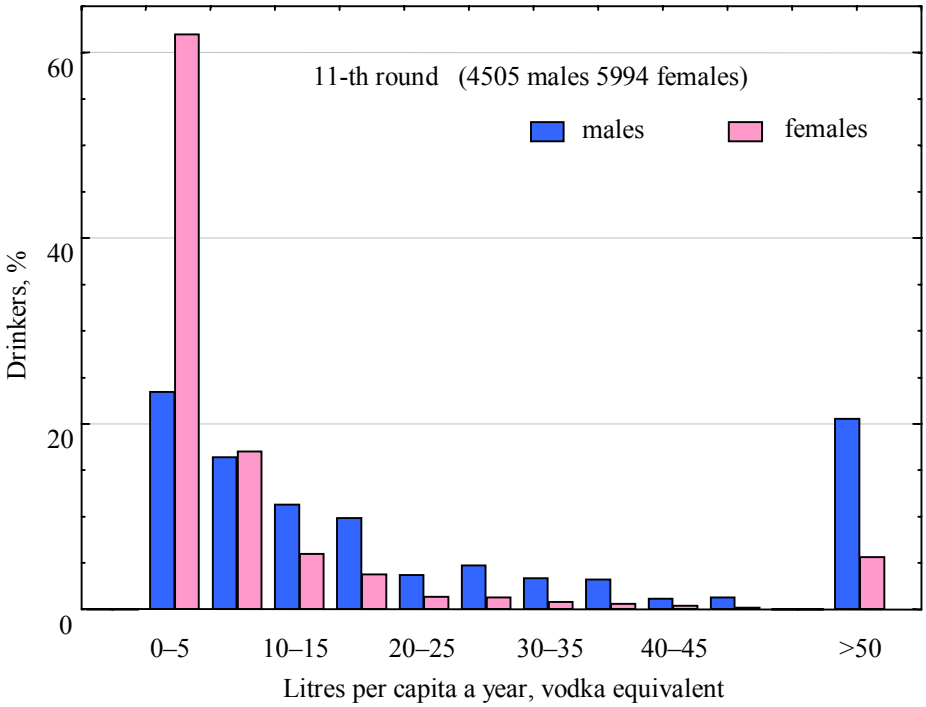
11-th round (4505 males 5994 females)
males
females
Drinkers, %
60
40
20
0
0–5
10–15
20–25
30–35
40–45
>50
Litres per capita a year, vodka equivalent

Fig. 2

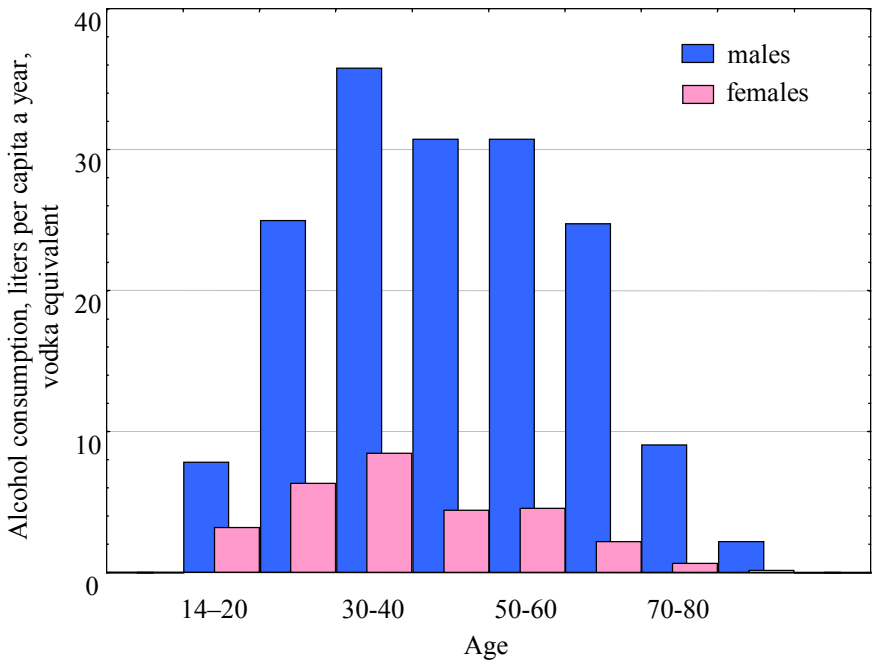
males
females
Alcohol consumption, liters per capita a year, vodka equivalent
40
30
20
10
0
14–20
30-40
50-60
70-80
Age

Fig. 3

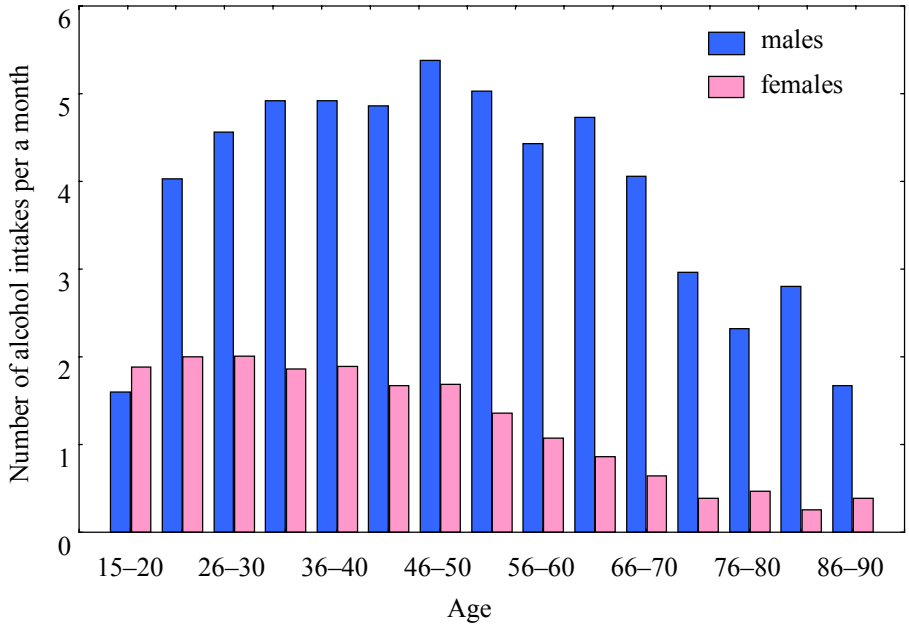
Number of alcohol intakes per a month
0
1
2
3
4
5
6
males
females
15–20
26–30
36–40
46–50
56–60
66–70
76–80
86–90
Age

Fig. 4

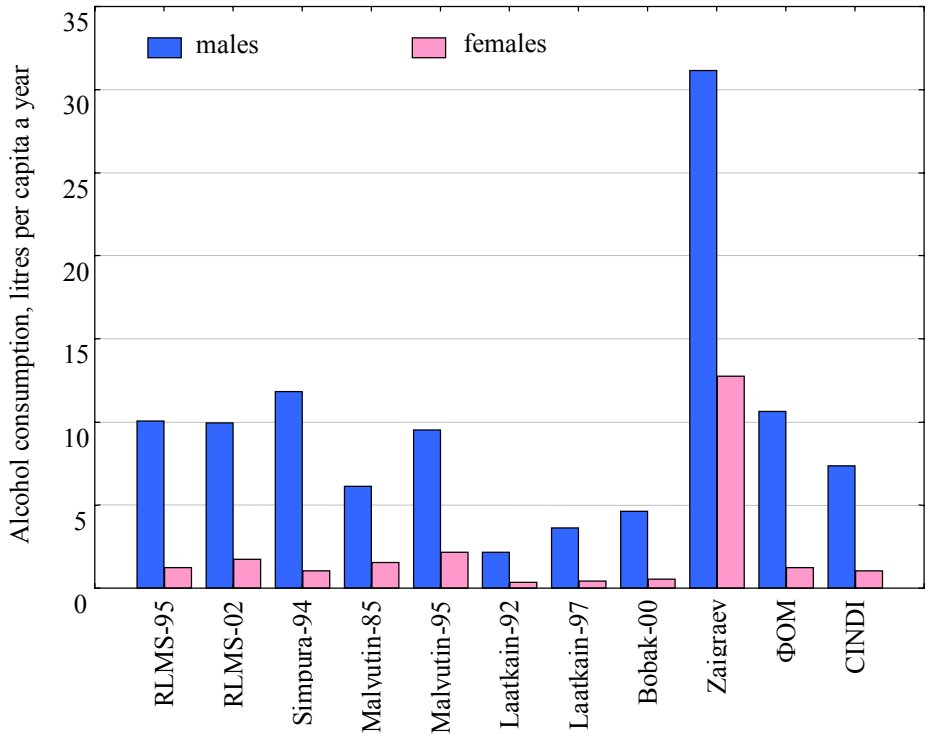
Alcohol consumption, litres per capita a year
0
5
10
15
20
25
30
35
males
females
RLMS-95
RLMS-02
Simpura-94
Malvutin-85
Malvutin-95
Laatkain-92
Laatkain-97
Bobak-00
Zaigraev
ФОМ
CINDI

Fig. 6

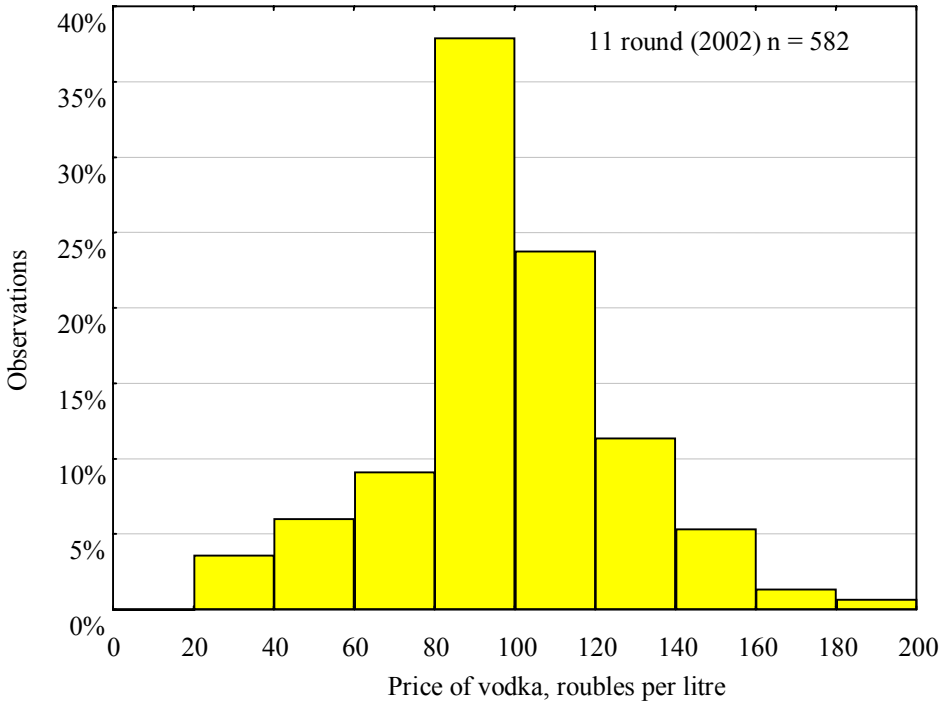

Fig. 7

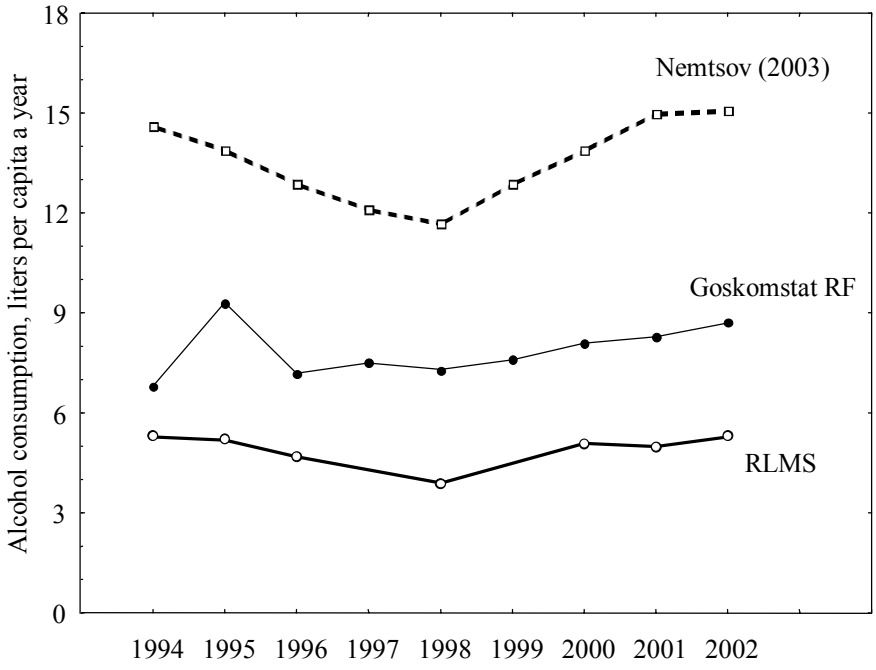

Fig. 8. RLMS data were calculated per adult above 14 years of age.

Table 24. Quantity and frequency of alcohol consumption in Russia (continuation see below).

Source	RLMS				Simpura (1997)		Bobak (1999)		Malyutina (2001)			
Region					Moscow				Novosibirsk			
Size	>10,000*				>900		>1500*		>4500			
Year of survey	6th round 1995		11th round2002		1994		1996		1985–1986		1994–1995	
No.	1		2		3		4		5		6	
Gender	M	F	M	F	M	F	M	F	M	F	M	F
Ethanol, ml a day	27.7	3.6	27.4	4.9	29.9***	2.7***	n/a		17.1	4.4	2.3	5.9
Frequency of intake, %												
Every day	2.3	0.3	3.3	0.5	1	n/a	10	2	n/a			
20 times a month	2.9	0.4	3.7	0.6	1							
10 times a month	12.3	2.4	15.2	3.3	6							
4 times a month	17.0	6.5	19.2	9.7	7		40	10	27	0.6	38	6.5
2 times a month	21.3	16.1	18.0	17.6	4				n/a			
1 time a month	11.4	17.9	9.2	17.2	7		21	18				
Less or never	32.8	56.5	30.5	51.2	74		29	71				

Source	Malyutina (2002)	Laatkainen (2002)				Bobak (2003)♦		Bobak (2004)		Zaigraev (2004)	
Region		Karelia								3 rural areas	
Size	>6300	>1500**				>2000*		>900		>200	
Year of survey	1984–1995	1992		1997		2001		1999–2000		2001	
No.	7	8		9		10		11		12	
Gender	M	M	F	M	F	M	F	M	F	M	F
Ethanol, ml a day	n/a	6.2	1.0	10.1	1.3	n/a		12.9	1.6	85.5	35.1
Frequency of intake, %											
Every day	8	n/a				9	2	5	0.6	65	23
20 times a month								31	5	26	36
10 times a month	23										
4 times a month						8	1			9	37
2 times a month	57					15	3	35	26		
1 time a month						16	5	14	43	0	4
Less or never	12					41	83	14	26	0	0

Source	NOBUS		FPO		CINDI (2001)	
Region					Moscow	
Size	>100,000*		1500*		>1600	
Year of survey	2003		2002		2000–2001	
No.	13		14		15	
Gender	M	F	M	F	M	F
Ethanol, ml a day	n/a		Litres per capita a year (see Fig. 6)***		Litres per capita a year (see Fig. 6)***	
Frequency of intake, %						
Every day	3.1	0.4	6	0	Strong drinks: time per 7 days Beer: time per 4 days	Strong drinks: time per 40 days Beer: time per 4 days
20 times a month	9.0	1.6	16	2		
10 times a month						
4 times a month	17.1	5.3	23	9		
2 times a month	18.1	9.9	20	17		
1 time a month	23.0	35.6	22	51		
Less or never	29.8	47.3	12	20	13.5	20.5

♦ — In Bobak *et al*. (2003) the share "unknown" is equal to 11% for males and 6% for females. In other cases it does not exceed 1%.

* — National sample.

** — The first method of estimation out of two explored by the authors.

*** — Our recalculation.

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