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USSR Babies: Who Drinks Vodka in Russia?

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USSR babies: who drinks vodka in Russia?*

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Abstract

By analyzing individual-level data on the alcohol consumption of Russian males, this paper finds evidence for a longstanding persistence of habits towards certain type of habit-forming goods. Males who grew up in the USSR are accustomed to vodka – the most popular liquor during the Soviet era – whereas those who entered their twenties in the post-Soviet period after the beer industry expanded prefer beer. This finding emphasizes the importance of policy towards young people when they form their habits. The second finding of this paper is that habits and substitution effects outweigh "stepping stone" effect, in both short and long run periods. Policy simulation shows that a 50% subsidy on beer and 30% tax on vodka will decrease male mortality from 1.41% to 0.95% in 10 years, halving the gap between Russian and western-European mortality rates.

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1 Introduction

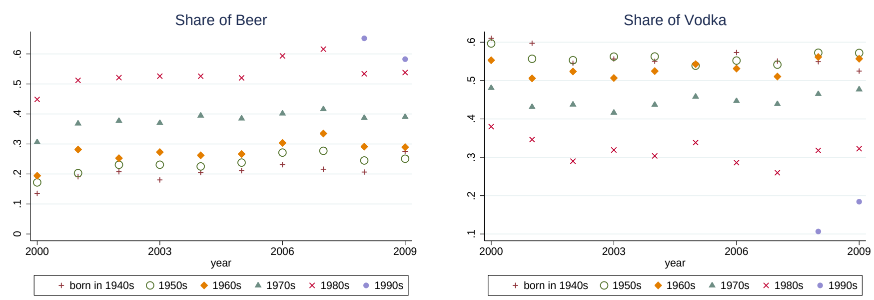
How persistent are habits?

My paper provides evidence that state-dependence may be very longstanding – the initial choice of a habit-forming good affects individual choices even decades later.

Utilizing data on alcohol consumption by Russian males, I show that a person who starts consuming a certain type of alcohol at earlier ages forms strong habits for this type of beverage that last his entire lifetime.

Figure 1 illustrates this point by showing strong cohort differences in patterns of alcohol consumption. Although there is a general trend towards a small increase in beer intake among all age cohorts, preferences regarding beer and vodka (the two most popular alcohol beverages) have not changed significantly over the past ten years – those born in the 1970s or earlier prefer vodka, whereas younger generations prefer beer[1] On average, vodka constitutes 57% of total alcohol intake for males born in the 1970s or earlier, but only 31% for those born in the 1980s, and 16% for those in the 1990s. In contrast, the share of beer in alcohol intake for these age groups constitutes 24%, 56%, and 68% respectively.[2]

Figure 1. Share of Beer and Vodka in total alcohol intake of males of different age cohorts.



Source: RLMS survey. Data on males of age 18-70.

There is a clear explanation for this phenomenon. During the era of the Soviet Union, the vodka industry dominated the alcohol market. In the final twenty years of the USSR (1970-1991), average annual sales of vodka were 1.62 billion liters, and annual sales of beer 3.02 billion liters. In terms of pure alcohol, these numbers correspond to 0.65 billion liters for vodka, and only 0.15 for

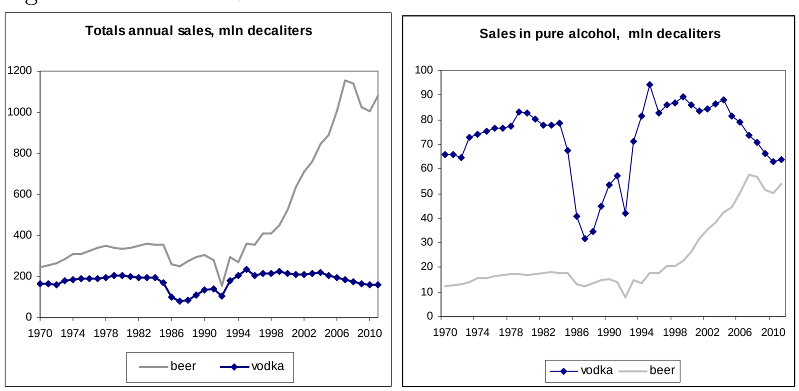
[1]Beer and vodka are the most popular alcohol beverages in Russia. In 2009, the average shares of vodka and beer in total alcohol intake by males were 46.7% and 39.5% respectively. Shares of the third and fourth popular drinks, wine and samogon (home-made liquor), constitute only 8.1% and 4.9% respectively.

[2]In calculated shares, the amount of consumed beverage is measured in pure spirit. Thus, 1 liter of beer corresponds to 0.05 liters of pure spirit, whereas 1 liter of vodka corresponds to 0.4 liters of pure spirit.

beer. [3] Since 1992, however, the beer industry has experienced large-scale expansion because of liberalization of the alcohol market, the arrival of previously-forbidden foreign beer companies[4] and a lower regulatory burden for the beer industry (compared with other alcoholic beverages).[5] In the 10 years since 1992, beer sales have increased four-fold – sales in 2001 exceeded 10.7 billion liters, compared to only 1.55 billion liters in 1993. In contrast, vodka sales have not followed the same trend (see Figure 2 below).[6] Thus, in 2011 total annual sales of vodka were 1.59 billion liters, approximately equal to consumption during the Soviet era.

Although this "natural experiment" resulted in changed drinking patterns among the entire population, the most significant shift in tastes occurred in younger generations. Males who started consuming alcohol during the Soviet period became accustomed to vodka, and so still prefer vodka. Younger generations, however, now prefer beer.

Figure 2. Beer and Vodka sales.



My findings benefit the current literature in several ways.

[3]I do not make price-comparison arguments here because there was no market in the Soviet Union. The alcohol industry was monopolized by the state, and so quantities produced were heavily regulated. As a result, it was difficult (or impossible) to find many goods in stores, and price was not a significant factor.

[4]In 1991 (before the collapse of the USSR), there were no foreign-owned beer breweries in Russia, and no foreign brand was sold. In 2009, the five leading foreign-owned companies – Carlsberg (owner of Baltica brewery), Anheuser-Busch InBev, SABMiller, Heineken, and Efes – produced more than 85% of the total beer sold in Russia.

[5]According to federal laws on the licensing of alcohol beverages (1996, 2000, 2001, 2006, 2010), beer is not subject to many of the restrictions that apply to other products. For example, a ban on advertisement and a time restriction on sales (prohibition of sales in stores at night) is applied to all alcohol beverages except beer. Beer also is subject to a lower excise tax.

[6]Sales of vodka were in the range of 0.16-0.2 billion liters in the 1970s. However, during the Gorbachev anti-alcohol campaign in the mid-1980s, sales of vodka dropped to less than half. With the end of the campaign in 1988 and the liberalization of the alcohol market in 1992, sales of vodka increased until the absolute maximum in 1995 of 0.23 billion liters, and remained at that level until 2004. After 2004, sales of vodka have decreased by 20% to 0.16 billion liters in 2011 (see Figure A1 in the appendix).

First, although rational addiction literature and economic literature on habit formation do emphasize the importance of habits, there is a gap in discussions of how longstanding the state-dependence resulting from initial choice of habit-forming goods might be (See Becker and Murphy 1992, Cook and Moore 2000). My results fill this gap by showing that state-dependence may act on a very long-run horizon.

These results also echo the literature on cohort differences in beliefs and preferences regarding risk-taking in the US (see "depression babies" literature, Malmendier and Nagel, 2011, Guisio, Sapienza, and Zingales, 2004, 2008, Alesina and Fuchs-Schundeln, 2007), and regarding redistribution and state intervention preferences in former communists countries (Denisova, Euler, Zhuravskaya, 2010). This research suggests that the cultural and political environment in which an individual grows up affects preferences over an entire lifetime. In addition to showing cohort differences in preferences, my paper also provides a habit-formation mechanism for why these preferences may differ – individuals born with the same preferences but differing in initial conditions will form habits towards different goods.

Second, my paper adds to the discussion on inter-temporal substitution between different kinds of addictive goods. Both the economic literature on addiction and current policy debates on the legalization of marijuana in California, Colorado and taxation of beer in Russia (and older debates on taxation of alcoholic beverages in Scandinavian countries, as well) raise several important questions regarding substitution patterns between light and hard drugs or alcohol beverages.

On one hand, light alcohol beverages or light drugs might serve as safer substitutes for harder drinks or drugs, and thus prevent people from consuming much unhealthier hard substances. Moreover, consumption of light alcohol beverages or drugs at younger ages may form habits for these goods, and so prevent a person from consuming harder substances in the future (see Becker and Murphy, 1988, Williams, 2005, Cook and Moor, 1995). On the other hand, the literature also emphasizes that light alcohol beverages or drugs may serve as a "stepping-stone" towards harder substances, and so have negative long-run consequences on public health (See Deza, 2012, Mills and Noyes 1984, Van Ours, 2003).[7]

Although habit-formation, stepping-stone, and (contemporary) substitution effects are well known and widely studied, and although all of these forces act simultaneously, the current literature on addiction nonetheless lacks in discussing these important points together. In particular, there are few attempts to analyze which of these forces will prevail in the long run, and to quantify the cumulative long-run effects of regulatory taxation of light alcohol beverages on public health and welfare. In this paper, I perform such an analysis.

My second set of findings relates to the connections between different consumption habits. I find that beer is indeed a substitute for vodka consumption:

[7] Current literature finds modest stepping-stone effects for marijuana and alcohol consumption towards harder drugs, although to my knowledge no paper discusses stepping-stone effects within only alcohol beverages.

there is a significant positive cross-price elasticity of vodka to beer. I also find that beer consumption has little stepping-stone effect, but rather forms habits for future beer consumption. Drinking beer at earlier ages results in higher beer consumption, but also results in lower consumption of hard drinks (like vodka) compared both to those who started with vodka and even to abstainers. Further, drinking vodka forms habits for future vodka consumption.

Finally, I simulate the effects of regulatory policy on mortality rates and welfare. I find that even under current pricing and regulatory policy, the mortality of Russian males will decrease by one-fifth in ten years. This will happen simply because the new generation will be more accustomed to beer, and will replace an older generation that drinks vodka.

To go further and simulate the effects of different regulatory policy on mortality rates, I estimate the effects of consumption of different kinds of beverages on the hazard of death. I find that beer is a more healthy drink compared to hard alcohol beverages – only the consumption of hard beverages, but not of beer, affects hazard of death. Although the most effective policy to decrease mortality rates is the simultaneous taxation of beer and vodka, I find that taxation of only beer will not decrease mortality rates, but will decrease consumer welfare.[8] Beyond this, taxation of only beer will have severe long-run consequences, creating a new generation that is accustomed to vodka and therefore is subject to much higher health risks in future. Conversely, I find that a policy simultaneously taxing vodka but subsidizing beer may not hurt consumer welfare, and will result in a sharp drop in mortality. For example, a 30% tax on vodka and 50% subsidy on beer consumption will not hurt consumer welfare, but will result in a decrease in mortality by one-sixth in four years. The long-run effect of such a policy is much higher – in ten years, this policy would decrease mortality rates by one-third.

This paper is organized as follows. In the following section, I describe my data and the variables employed in my analysis. Section 3 presents a model. Section 4 offers estimations of cohort differences and effect habits. In section 5, I estimate the effect of alcohol consumption on hazard of death, and Section 6 provides simulation experiments. Section 7 concludes.

2 Data and variables

2.1 Data

In this study, I utilize data from the Russian Longitudinal Monitoring Survey (RLMS).[9]The RLMS is a nationally-representative annual survey that covers

[8]In fact, subsidizing beer consumption will decrease mortality, and result in an increase in welfare.

[9]This survey is conducted by the Carolina Population Center at the University of Carolina at Chapel Hill, and by the High School of Economics in Moscow. Official Source name: "Russia Longitudinal Monitoring survey, RLMS-HSE," conducted by Higher School of Economics and ZAO "Demoscope" together with Carolina Population Center, University of North Carolina at Chapel Hill and the Institute of Sociology RAS. (RLMS-HSE web sites:

more than 4,000 households (between 7413 and 9444 individual respondents), starting from 1992. My study utilizes rounds 5 through 18 of the RLMS, a time span from 1994 to 2009, but excludes 1997 and 1999.[10] The data cover 33 regions – 31 oblasts (krays, republics), plus Moscow and St. Petersburg. Two of the regions are Muslim. Seventy-five percent of respondents live in an urban area. Forty three percent of respondents are male. The percentage of male respondents decreases with age, from 49% for ages 13-20, to 36% for ages above 50. The data cover only individuals older than 13 years.

The RLMS data have a low attrition rate, which can be explained by low levels of labor mobility in Russia (See Andrienko and Guriev 2004). Interview completion exceeds 84%, lowest in Moscow and St. Petersbug (60%) and highest in Western Siberia (92%). The RLMS team provides a detailed analysis of attrition effects, and finds no significant effect from attrition.[11]

My primary object of interest for this research is males of ages 18 to 65. Summary statistics for primary demographic characteristics are presented in Table 1.

2.2 Alcohol consumption variables and the drinking patterns of Russian males

My primary measures of alcohol consumption are shares of beer and vodka consumption in the total alcohol intake of males, calculated in milliliters of pure alcohol intake.[12] Vodka and beer are the most popular alcohol drinks among Russian males – the average share (across all years) of vodka in total alcohol intake is 54%, and of beer is 27%. The share of beer for the average person increases and the share of vodka decreases during the time span of the survey: in 1994, the average share of vodka was 72.5% and beer was 10.6% of the total alcohol intake of males, whereas in 2009 the these shares were 46.7% and 39.5%, respectively.

Figure 3a shows that drinking patterns change for males from different age strata: older males prefer vodka, whereas beer is the most popular drink among males below age 24. Share of beer consumption drops from 56% at age 18 to only 11% at age 65, while share of vodka increases from 28% at 18 to 61% at 65. Figure 3b, however, shows the opposite evidence in terms of how drinking patterns change with age for a particular person after age 16: after subtracting the personal average share of beverages (among periods of observation), one can observe a (small) increase in share of beer over time.[13]

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http://www.cpc.unc.edu/projects/rlms-hse, http://www.hse.ru/org/hse/rlms).

[10] I do not utilize data on rounds earlier than 5 because they were conducted by another institution, have different methodology, and are generally agreed to be of worse quality.

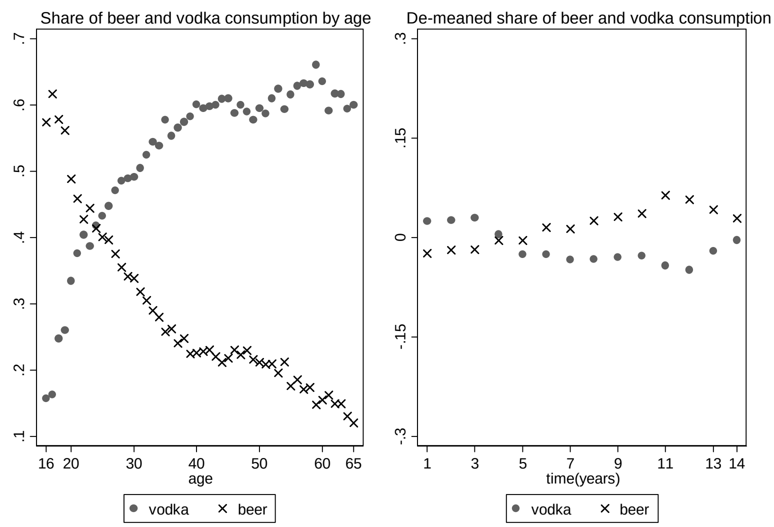
[11] See http://www.cpc.unc.edu/projects/rlms-hse/project/samprep

[12] To construct the variables I use data on amount of certain beverages consumed during the last month. I assume that beer contains 5% of pure alcohol, and vodka contains 50% of pure alcohol.

[13] For figure with demeaned data, I use only a subset of data with more than one observation per person.

In addition to shares of alcohol beverages in alcohol intake in my simulation experiments, robustness checks, and estimations of hazard of death, I also use indicators of whether a person drinks vodka or beer during the past month, a log of reported monthly alcohol consumption, and indicators of whether a person is a heavy drinker of beer or/and vodka[14] Table 1 shows summary statistics of different measures of alcohol consumption.

Figure 3. Share of beer and vodka consumption by age.



3 The longstanding effect of initial patterns of consumption: a model

Most of the empirical addiction literature focuses on short-run evidence habits. Relatively short-run panels and the absence of strong shocks in consumptions in other countries do not allow researchers to track changes in consumption patterns over longer periods. Short-run studies, however, do not allow us to answer several questions that are important for policy makers. What are the long-run effects of current regulatory policy? Will an increase in the price of hard alcoholic drinks force everyone to switch from vodka to other, healthier beverages? Or, are different equilibria with different levels of consumption possible?

Below, I present a simple model that shows several things. First, depending on initial conditions, different groups of individuals with the same preferences

[14]The heavy-drinking variables are defined as follows: for every beverage, I use a dummy variable that equals 1 if a person belongs to the top quarter by consumption of this beverage (among males of working age).

can end up consuming either vodka or beer. Second, current regulatory policy (an increase in the price of one good) may not force everybody to avoid consuming this good – people who are accustomed to this good will still prefer this good. Third, initial choice of good may affect patterns of consumption over an entire lifetime – future changes in price may not make people accustomed to one good change the pattern of consumption. The latter point implies in particular that current policy influencing the initial choice of younger generations will have consequences over the entire lifetimes of these young people.

Model

The aim of this model is to illustrate that for a situation wherein people consume two addictive goods, several steady-state consumption patterns are possible – in this case with both high and low levels of vodka consumption. A person will end up conforming to a steady state depending solely on his or her initial consumption pattern.

In my model, consumers of alcohol spend all their budget on two addictive goods: beer and vodka. For simplicity, I assume that consumers are myopic (that is, they maximize only current utility and there is no saving), that there are no outside goods, and that consumer income does not change over time.

Consumer utility of drinking vodka and beer depends on the current consumption of vodka v_t, beer b_t and on stock of habits S_t^v,S_t^b:

$$U() = u(v_t, b_t, S_t^v, S_t^b)$$

I assume that the utility of consumers satisfies utility assumptions that are common in rational addiction literature: $u_v(.) > 0$, $u_b(.) > 0$, $u_{vv}(.) < 0$, $u_{bb}(.) < 0$, $u_{s_v s_v}(.) < 0$, $u_{s_b s_b}(.) < 0$, and $u_{vs_v}(.) > 0$, $u_{bs_b}(.) > 0$. These assumptions imply in particular that the marginal utilities of consuming beer or vodka are positive, and increase with higher levels of stock of habits of the corresponding good.

The stock of habits rule of motion is as follows:
$S_{t+1}^v = \delta(S_t^v + v_t)$; $S_0^v \geq 0$, $\delta \in [0,1]$
$S_{t+1}^b = \delta(S_t^b + b_t)$; $S_0^b \geq 0$, $\delta \in [0,1]$
I assume that depreciation of habits, δ, is similar for both goods.
The budget constraint of consumers is $Y_t = p_{v_t} v_t + b_t$.
To guarantee an interior solution I also assume that $u_v \to \infty \; as \; v \to 0$, $u_b \to \infty \; as \; b \to 0$.

Then, the first-order condition for constraint utility maximization looks like this:

$$u_v(v_t, Y_t - p_{v_t} v_t, S_t^v, S_t^b) - p_{v_t} u_b(v_t, Y_t - p_{v_t} v_t, S_t^v, S_t^b) = 0$$

I concentrate on an analysis of the steady state consumption of agents.

In steady state with stable pricing $v_t = v$, $b_t = b$, $p_{v_t} = p_v$, $Y_t = Y$; $S_t^v = S^v = [\delta/(1-\delta)]v$, $S_t^b = S^b = [\delta/(1-\delta)]b$.

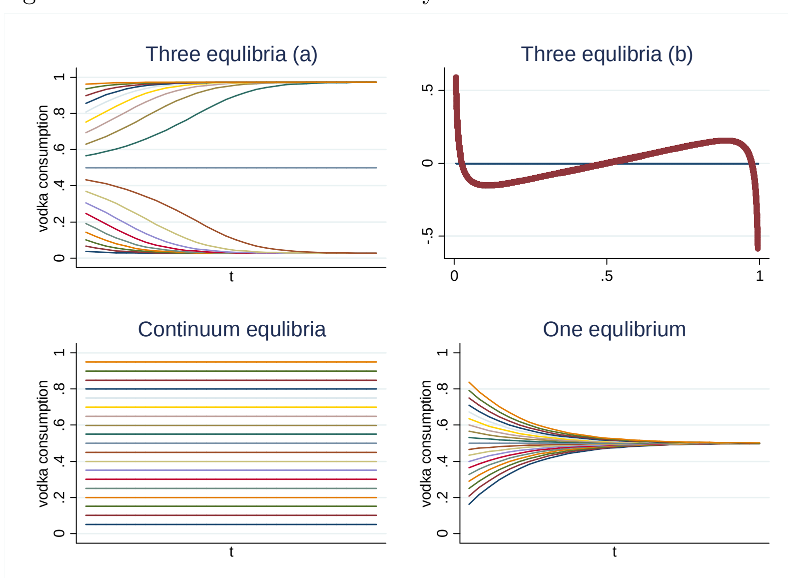
Then, the steady-state first order condition can be rewritten as follows:

$$u_v(v,\ Y - p_v v,\ [\delta/(1-\delta)]v,\ [\delta/(1-\delta)][Y - p_v v])$$
$$-p_v u_b(v,\ Y - p_v v,\ [\delta/(1-\delta)]v,\ [\delta/(1-\delta)][Y - p_v v]) = 0$$

Left-hand side of the steady-state FOC is a non-monotonic function in v. Depending on parameterization of utility function $u()$ this equation may have a different number of solutions –for some parameterizations the equation has a unique solution, but for many other parameterizations several steady states exist (up to a continuum).[15]

Figure 4 illustrates this point. Depending on parameterization of the utility function, I have one, three, and infinite (a continuum) steady states. In a situation with several equilibria, the steady state in which a person ends up depends on initial conditions. If person initially consumes primarily vodka, then in steady state he or she will prefer vodka.

Figure 4. Different numbers of steady states



Note: parameterization of utilities, and parameters are as follows: $Y = 1,\ p_v = 1, \delta = 1/2$
one equilibrium: $U = (v^{1/2} - 1)ln(Sv) + (b^{1/2} - 1)ln(Sb)$
three equilibria : $U = (v^{1/2} - 1)ln(1.1 + Sv) + (b^{1/2} - 1)ln(1.1 + Sb)$
continuum # of equilibria: $U = (v^{1/2} - 1)Sx^{1/2} + (y^{1/2} - 1)Sb^{1/2}$

[15] For further proof, see Proof A1 in the appendix. One can get similar results for forward-looking agents because a steady-state Euler equation is also non monotonic.

4 Tests of cohort difference and state dependence

In this section, I check whether patterns of alcohol consumption differ among cohorts, also check for the presence of long-run and short-run state-dependence, and finally test my own explanation for the nature of cohort differences against alternatives.

To check for the presence of a cohort effect, I estimate the following OLS regression

$$share\ of\ good_{ait} = \beta_0 + D_{cohort} + \Gamma' C_{it} + \rho_t + \rho_r + e_{it}$$

Subscript i stands for an individual, subscript a stands for the good {vodka, beer}, and subscript t stands for time. D_{cohort} in these regressions stands for cohort fixed effects, and ρ_t and ρ_r stand for time and region fixed effects. Set of controls C_{it} includes personal health status, age, weight, education, marital status, and log income. I estimate regressions for both vodka and beer.

The results of these regressions are presented in Table 2.

After controlling for time and regional fixed effects, as well as for age and other personal demographic characteristics, the results show that younger generations still tend to consume more beer and less vodka. Columns 3 and 6 of Table 2 show that for those born in the 1990s the average share of beer in total alcohol intake is 30 percentage points (pp) higher, and share of vodka is 30 percentage points lower, than for those born before the 1970s. For those born in the 1980s, the average share of beer is 18 pp higher, and of vodka 17 pp lower, than for those born before the 1970s. Finally, those actually born in the 1970s have 6 pp lower share of vodka, and 5 pp higher share of beer, than those born earlier.

My explanation for these differences is that, although people have similar tastes regarding alcohol beverages, they differ in their initial choice of which addictive good to consume. However, there are also two possible alternative explanations. First, individuals born in different times may have different preferences for certain types of alcohol because of cultural and other differences, and not because of different initial choices and subsequent habit formation. Second, these observed cohort differences may be the result of a stepping-stone effect: young generations start with the consumption of beer or other light drinks, and then eventually switch to harder drinks.

I begin my discussion by showing that drinking patterns do in fact demonstrate longstanding state dependence.

To test for the presence of longstanding (and short-term) state dependence, I employ the following OLS (and IV) regressions:

$$share\ of\ good_{it} = \beta_0 + \beta_2 share\ of\ good_{it-k} + \beta_1 controls_{it} + \rho_t + \rho_r + e_{it}$$

D_{cohort} in these regressions stands for cohort fixed effects, and $shareof\ vodka_{it-k}$ stands for lagged (with lag of k years) share of vodka consumption. I chose two specifications: $k = 7$ (long-run), and $k = 1$ (short-run).[16] The set of controls and fixed effects is the same as in previous specifications. Together with the OLS specification, I employ IV regression where lagged share of good is instrumented by year of birth. The final regression is an estimate of the effect of habits under the assumption that individuals born in different times have the same preferences (controlling for demographics), and differ only by initial levels of consumption. I discuss this assumption later. Table 3 illustrates the results of these regressions. Both lagged shares significantly affect personal decision regarding which good to drink. Thus, those who chose to drink only beer seven years ago have on average a 19-percentage-point (half of standard deviation) higher share of beer consumption, while those who drank only vodka seven years ago have on average a 16-percentage-point higher share of vodka consumption.

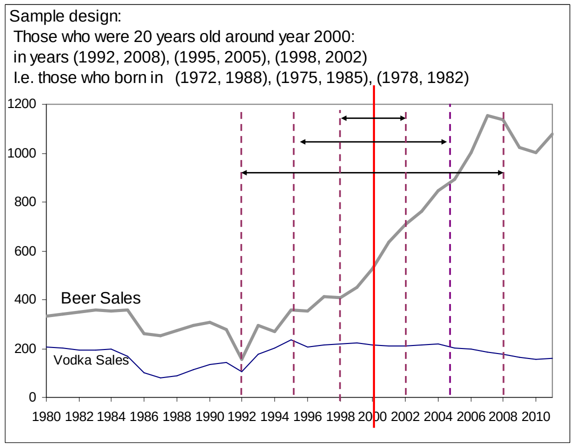
The first alternative explanation for the observed heterogeneity is that individuals born in different times grew up in different cultural environments, and because of this have different preferences regarding hard and light drinks. To test my explanation against this alternative, I use a argument similar to "regression discontinuity" analysis: I take the relatively-narrow period of time when the beer industry experienced rapid growth, and look at individuals of college age (20 years old) at the time.[17] Presumably, because culture (and other characteristics) are slow-changing (Roland, 2004), people born within a narrow time range do not have sources of difference other than in initial consumption. Figure 5 below illustrates the choice of timing for my analysis, and Table 4 shows the results of these regressions.[18]

Figure 5. Choice of timing in a analysis.

[16] $share\ of\ vodka_{it-7}$ is a calculated as average between $share\ of\ vodka_{it-7}$ and $share\ of\ vodka_{it-8}$. For cases where a data point is not available, I choose the nearest available $z \geq 7$ for which I have data on $share\ of\ vodka_{it-z}$. The choice of long-run period timing ($t = 7$) is subjective, and driven by data availability – the RLMS dataset covers a 15-year period, and I simply divide time coverage by 2.

[17] Because there is no discontinuous break my regressions are not regression-discontinuity per se.

[18] The samples in my regression-discontinuity regressions described in Table 6 are as follows. Time span is the years 2001 to 2009, because I have data on $lag7$ only starting from 2001. Of all respondents, I chose those born in years 1970-1990, 1973-1987, 1975-1985, 1976-1984, 1977-1983, and 1978-1982. The biggest sample covers individuals born in a 21-year span, and the smallest covers individuals born in a 5-year span (see Figure 5)



Results show a strong effect of initial choice for all samples. OLS specifications show that an increase in lag7 of share of beer consumption by 10 percentage points results in an increase in share of beer consumption by 1.9 percentage points. IV estimates show a larger effect of initial consumption – an increase in lag7 of share of beer consumption by 10 pp results in an increase in share of beer consumption by 3.6 pp. Although the statistical significance of results decreases with the contracting sample size, most of results are nonetheless significant. OLS estimates are statistically significant even for the smallest sample chosen (those born between 1978 and 1982), and IV estimates are statistically significant for those born between 1976 and 1984 and for all larger sample sizes.

Similar results are shown for the consumption-of-vodka estimates. OLS results show that an increase in lag7 of share of vodka by 10 percentage points results in an increase in share of vodka consumption by 1 percentage point. IV estimates show that an increase in lag7 of share of vodka consumption by 10 pp results in an increase in share of vodka consumption by 3 pp. For these regressions, OLS estimates are statistically significant for even the smallest sample chosen, but IV estimates are not significant for most specifications.

Besides I check whether a year of birth is correlated with shares of vodka and beer for males who were born in different time. Figure 7 shows coefficients from regressions of shares of goods on year of birth for different age cohorts. Samples for these regressions are constrained by ten-year periods of birth years. Figure 7 illustrates that year of birth correlates with shares of beer and vodka only for those who born after year 1975.

Table 5a shows results of regressions of share of goods on year of birth controlling for both age and year fixed effects. After controlling for age and year fixed effects year of birth is negatively correlated with share of beer consuming and positively correlated with share of vodka. The correlation is much higher for those who was born after year 1980, i.e. for those who formed their preferences when structure of alcohol market has changed.

Table 5b explores regional variation in sales of different types of alcohol. Table 5b shows results of regressions of share of goods on lag7 of regional sales of beer divided by lag7 of regional sales of vodka. Again share of beer is positively correlated with independent variable whereas lag share of vodka is negatively correlated. The correlation is much higher for younger generation.

In addition to these regressions, I also provide several robustness tests. First I check whether people who grew up in rural areas tend to consume more vodka. People in many rural areas in Russia, especially during the Soviet era, often use their own equipment to produce a home-made vodka called samogon.[19]

As such, a person who grew up in a rural area has a higher chance to start alcohol consumption with samogon, and so to be accustomed to vodka. Table 6a illustrates this point: after controlling for covariates, we see that those born in a village have 3 pp smaller share of beer consumption, and 3 pp higher of vodka. The results of these regressions hold for those who live in cities, and for those who have lived in their current location for at least the past seven years.[20]

Moreover, cohort effect on patterns of consumption is stronger for those who born in village: Table 6b shows that, after controlling for covariates, the share of vodka is 10.4 pp higher for those who born before 1980s and grew up in a city, and 13.8 pp higher for those who born before 1980s and grew up in a rural area. The difference between these two groups is statistically significant. Besides, table 6b shows that cohort effect is stronger for those who grew up in cold regions: these people also tend to have higher share of vodka.[21]

Second I check whether people who grew up in the vine-making areas of the Soviet Union (Moldova, Ukraine, and the former Caucasus republic) now prefer wine. Table 7 shows that those born in these areas on average have a 3 pp higher share of wine consumption, although the statistical significance of results disappears when I restrict samples to those who have lived in their current location for the past seven years.

The second alternative explanation for cohort difference is a stepping-stone (or "gateway") effect with beer.

Beer may serve as a stepping-stone for harder substances such as vodka – people may start with the consumption of beer, but eventually switch to harder drinks. In that case, the observed cohort difference would just be an effect of aging.

This stepping-stone effect is widely studied in health economic literature. Several recent studies have tested hypotheses regarding a stepping-stone effect against alternative explanations, with unobserved individual heterogeneity in

[19]Production of samogon requires space and produces an unpleasant smell, so it is not popular in urban areas where people live in multistory buildings. Table A1 in the appendix shows the distribution of share of samogon in rural and urban areas. In mid-sized and small cities, the average share of samogon constitutes 2.5%, whereas in small cities and rural areas this share is 14.3%.

[20]The specification of regressions are as follows:
$share\ of\ good_{it} = \beta_0 + \beta_1 I(born\ in\ rural\ area)_i + \beta_2 controls_{it} + \rho_t + e_{it}$

[21]The specification of regressions are as follows: $share\ of\ good_{it} = \beta_0 + \beta_1 I(born\ before\ 1980)_i + \beta_2[I(born\ in\ rural\ area)_i * \beta_2 I(born\ before\ 1980)_i] + \beta_3 controls_{it} + \rho_r + \rho_t + e_{it}$, and
$\underline{share\ of\ good_{it}} = \beta_0 + \beta_1 I(born\ before\ 1980)_i + \beta_2[(annual\ temperature_r - \overline{annual\ temperature_r}) * I(born\ before\ 1980)_i] + \beta_3 controls_{it} + \rho_r + \rho_t + e_{it}$

preferences, and reached various conclusions. Deza (2012) and Mills and Noyes (1984) have found evidence of a modest stepping-stone effect with marijuana and alcohol leading to the consumption of harder drugs. Beenstock and Rahav (2002) have found a stepping-stone effect in smoking cigarettes leading to the later consumption of marijuana. Van Ours (2003) found that unobserved individual heterogeneity and a stepping-stone effect explains patterns of drug consumption. It is interesting, however, that as far asa I know, no study shows a stepping-stone effect of beer towards harder alcohol beverages.

In this paper, I provide evidence to indicate that beer does not serve as a stepping-stone to vodka, but rather forms habits towards future beer consumption. First, Figure 3 above (the second graph) indicates that for any particular person, there is no evidence of an increased share of vodka consumption with increasing age – this graph indicates that during the past ten years people tend to consume more vodka and less beer as they became older. Second, the simulations below presents a multivariate choice model showing that both habits and a substitution effect outweigh any stepping-stone effects – a decrease in the price of beer results in the substitution of beer for vodka; moreover, this effect grows over time (see Figure 8 and Table 12).

Finally, Table 7 reports the conditional probabilities of drinking vodka at age 25 and older, conditioned on drinking different alcohol substances as a teenager. Table 7 shows that those who drink only beer in teenage years have smaller chances of later drinking vodka, compared both to those who drank vodka as teenagers and even to those who abstained as teenagers. According to Table 7, the probability that a person drinks vodka after age 25 if he was an abstainer as a teenager is 0.66, whereas the probability that he drinks vodka after drinking beer as a teenager is only 0.57. The probability of later drinking vodka for those who drank vodka as a teenager is 0.81.

5 Hazard-of-death regression

Russian males are notorious for their hard drinking. The most notable example of the severe consequences of alcohol consumption is the male mortality crisis – male life expectancy in Russia is only 60 years. This is eight years below the average in the (remaining) BRIC countries, five years below the world average, and below even the life expectancy in Bangladesh, Yemen, and North Korea. High alcohol consumption is frequently considered to be the main cause of this (see for example Treisman 2010, Leon et al. 2007, Nemtsov 2002, Bhattacharya et al. 2011, Brainerd and Cutler 2005, Denisova, 2010, Yakovlev, 2012). Approximately one-third of all deaths in Russia are related to alcohol consumption (Nemtsov 2002). Most of the burden lies on males of working age – more than half of all deaths in working-age men are caused by hazardous drinking (Leon et al. 2007, Zaridze et al. 2009).

In this section, I estimate the hazard of death as a function of not only overall alcohol consumption, but specifically the consumption of hard drinks (vodka) or beer. Beer is generally agreed to be a much safer drink than vodka, and presumably has less of an effect on mortality rates.

Large-scale studies in demographics literature (see for example Zaridze et al. (2009) study of 48 557 adult deaths) support the observation that the main cause of male death in Russia is so-called dose-related excess: a hazardous event occurring when the amount of pure alcohol consumed by a person is too high.[22] Table 9b shows that preferences towards beer are associated with lower level of alcohol intake whereas preferences towards hard alcohol drinks positively correlated with level of pure alcohol intake.[23]

Besides, most alcohol-related deaths in Russia are not due to diseases that result from long-time alcohol consumption (such as cirrhosis), but rather to (probably occasional) one-time hazardous drinking. First, 6% of all deaths of Russian males are caused by alcohol poisoning. The main cause of poisoning is not poor quality of alcohol, but rather drinking so much alcohol that the amount in the blood causes the heart to stop (see Zaridze et al 2009, Djoussé and Gaziano 2008). Thus, it takes binging with vodka only once to result in death. In contrast, beer consumption is safer – one must consume eight times more beer to produce the same amount of alcohol in the blood.

Second, another 35% of deaths are due to external causes – vehicular and other accidents, or homicides, for example – that occur largely under the effects of alcohol intoxication. Again, even with moderate average vodka consumption, it is enough to binge only once and get into an accident. However, beer consumption does not result in an increase of death hazard, and people who drink beer have a smaller chance of death compared to those who drink vodka, and to those who do not drink or drink beverages other than beer or vodka. The number of non-drinkers in Russia is very low (less than 10% of males reported that they did not drink in the previous month over three consecutive years), and there is possible negative selection to non-drinkers – non-drinkers have smaller incomes and lower levels of education, do not perform more physical training, and do not have lower rates of disease.

Table 9a estimates the effect of alcohol consumption on hazard of death for the following hazard specification:

$$\lambda(t,x) = exp(x\beta)\lambda_0(t)$$

where$\lambda_0(t)$ is the baseline hazard, common for all units of population. I use a semi-parametric Cox specification of baseline hazard. The set of explanatory variables includes alcohol consumption variables, log of family income, health status, weight, age, employment status, and educational level.

[22]Zaridze et al. 2009 studied the death events of 48,557 residents aged 15-54 in three typical Russian cities. They found that alcohol-associated excess accounted for 59% of the deaths of males, and 33% of the deaths of females. This study also indicated that 8% of death are directly due to alcohol poisoning, and 37% are due to accidents and violence that primarily occurred during alcohol intoxication. See also Leon et all 2007, Denisova, 2012, Treisman 2010, and Yakovlev, 2012.

[23]The specification of regressions shown in Table 9a as follows:
$log(alcohol\ intake_{it}) = \beta_0 + \beta_1 share\ of\ beer_{it} + \beta_2 share\ of\ hard\ drinks_{it} + e_{it}$

Table 9a shows that the probability of death is strongly positively-related with the consumption of vodka. As such, drinking vodka increases the hazard of death twice (= $exp(0.68)$). However, the hazard of death is high even for males who reported only moderate average monthly vodka consumption. This is because, even with moderate average consumption, a person can still die as the result of one-time hazardous binge drinking.

Extension: (Speculative) Discussion: The Russian Mortality Crisis

This subsection offers a speculative analysis of the relationship between the "Russian mortality crisis" and the consumption of vodka and beer. The mortality crisis refers to surge in male mortality in post-Soviet Russia: in the fifteen years starting from 1989, the male mortality rate increased to more than double its previous level. Alcohol abuse after the end of Gorbachev's anti-alcohol campaign (in 1988) and the liberalization of the alcohol market (in 1992) is widely cited as the main cause of this change (see Figure A1 in the appendix).

Table A3 in the appendix shows yearXcountry-level regressions of mortality rates on sales of beer and vodka for the period of the Russian mortality crisis. This ("twenty-point") regression finds a positive correlation between sales of vodka and mortality rates, but no effect from beer sales on male mortality. Table A4 in the appendix shows yearXregion-level regressions of mortality rates on regional per-capita retail sales of beer and vodka for the period of 1997 to 2009.[24] Again, the regressions show a positive correlation between male mortality rates and sales of vodka, and again no (or negative) correlation between beer sales and male mortality rates.[25]

6 Simulations

In this section, I simulate the effect of taxation on alcohol consumption, consumer welfare, and mortality rates. To do this, I estimate a dynamic model of consumer choice among the different kinds of alcoholic beverages.

In my models, agents are assumed to be myopic. Consumers have four choices: drink both vodka and beer $(1,1)$, drink only vodka $(1,0)$, drink only beer $(0,1)$, or drink neither beer nor vodka $(0,0)$. Indirect utilities of consumers are assumed to have linear parameterization:

$$\begin{aligned} U(k,j) = \quad & \alpha_{kj} + \gamma_{kj} P_{beer,it}/P_{vodka,it} + D_{cohort} + \beta_{vkj} I(drink\, vodka)_{it-1} \\ & + \beta_{bkj} I(drink\, beer)_{it-1} + \Gamma' D_{itjk} + \delta_{rkj} + \nu_i + e_{itkj} \end{aligned}$$

[24] The data for these regressions are collected from Rosstat (the Russian statistical agency, www.gks.ru). Regional-level data on retail sales of beer and vodka are available for the period of 1997-2009.

[25] The specifications of regional-level regressions are as follows

$$mortality\, rate_{rt} = \beta_0 + \beta_1 log(sales\, vodka)_{rt} + \beta_2 log(sales\, beer)_{rt} + \beta_3 I(Caucasus)_r + \rho_t + e_{it}$$

I use two specifications: unweighted regression, and regression weighted by regional population size.

Indexes $k, j \in \{0, 1\}$ stand for personal choices. The indirect utility of non-drinking is normalized to zero: $U(0, 0) = 0$; and γ is normalized to zero for the (0,1) choice, "drink only beer": $\gamma_{01} = 0$. In my model, I normalize price of vodka to 1. With this normalization, a change in beer price results in a change in P_{beer}/P_{vodka}.[26] In this modelβ_{b10} represents a stepping-stone effect for the choice "drink only vodka". β_{b11} captures both the stepping-stone effect of beer and beer habit formation for the choice "drink both vodka and beer." β_{b01} captures habit formation for the choice "drink only beer." Vodka habit formation effects are captured by β_{v10} andβ_{v11}. D_{it} is a set of demographic characteristics that affect utility. This set of demographic characteristics includes log(family income), health status, age, I(Muslim), I(college degree), and personal body weight. δ_{rkj} stands for (unobservable to the researcher, but observable to the individual) regional-specific factors that affect utility, such as official religion, temperature, and so on. e_{itkj} is a choice-specific utility component that is unobservable to a researcher, but observable to a consumer. I assume that e_{itkj} has logistic distribution.

Finally, ν_i stands for an individual-specific taste for alcohol, unobservable to the researcher but observable for the individual. This term captures unobserved personal heterogeneity in tastes for alcohol consumption that do not vary across time and kinds of alcohol. Further, I provide estimation of two utilities, with and without ($\nu_i = 0$) allowing for unobserved heterogeneity in tastes.

Estimates of utility parameters are shown in Tables 10a and 10b.[27] Tables 10a and 10b show strong habit-formation effects, but rather small (if at all) stepping-stone effects. In fact, Tables 10a and 10b show positive switching costs for changing patterns of drinking (from drinking only beer to drinking vodka), and a strong effect of habits over the same pattern of consumption. Drinking only beer in a previous period positively affects the utility of drinking only beer now, and negatively affects the utility of drinking vodka (with or without beer). Table 6 also shows that the relative price of beer has a negative effect on consumer utility specific to the choice of drinking beer.

My first simulation exercise estimates the consequence on male mortality rates in 10 years if the prices of beer and vodka stay at their current levels. I find that current price policy will result in a decrease in mortality rates from 1.41% to 1.16% (that is, a decrease of about one-fifth). This decrease in mortality is driven by a new generation that prefers beer replacing an older generation that drinks vodka.

My next exercise simulates the effects of different government policies on consumer drinking patterns, consumer welfare, and mortality rates. I consider two policies: taxation and subsidization of beer consumption. Figure 8 and Table 11 demonstrate the effect of these policies over a four-year period.

[26] See also Appendix for estimation of elasticity using hedonic regressions.

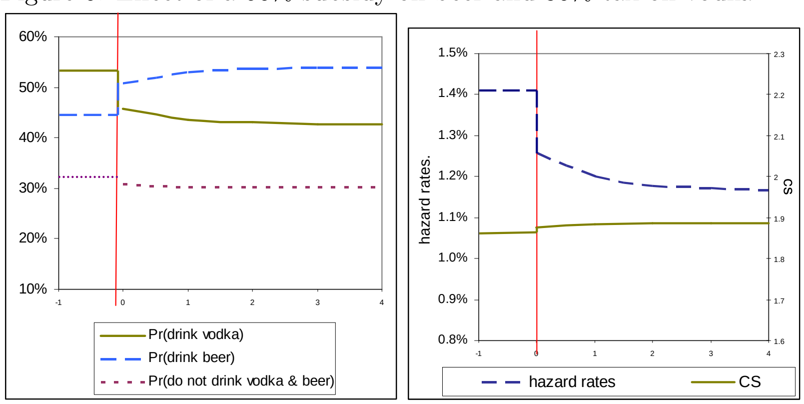
[27] Table 9b shows estimation results for following parameterization of indirect utility

$$\begin{aligned} U(k, j) = \quad & \alpha_{kj} + \gamma_{kj} P_{beer,it}/P_{vodka,it} + \beta_{vkj} I(\textit{drink only vodka})_{it-1} + \beta_{bkj} I(\textit{drink only beer})_{it-1} \\ & + \beta I(\textit{drink vodka\&beer})_{it-1} + \Gamma' D_{itjk} + \delta_{rkj} + \nu_i + e_{itkj} \end{aligned}$$

Table 11 shows the effect of taxing (and subsidizing) beer, specifically the effect of a one-half decrease or two-times increase in the price of beer. The simulation shows that taxing only beer will not decrease mortality, and will result in a decrease in consumer surplus. Thus, the taxation of beer results in a decrease in the share of beer drinkers from 46% to 37%, and a corresponding increase in the share of vodka drinkers from 53 to 55%, and of those who drink neither beer nor vodka from 31% to 41%. This policy also results in a 21% decrease in consumer welfare, and an increase in mortality rates from 1.4% to 1.68%.[28]

Figure 6 shows the simulation results for simultaneously subsiding beer and raising taxes on vodka (specifically, halving the price of beer, and increasing the price of vodka by 30%). The mortality rate falls from 1.41% to 1.18% in four years. Moreover, in ten years the male mortality rate decreases from 1.41% to 0.95% – by fully one-third.

Figure 6: Effect of a 50% subsidy on beer and 30% tax on vodka



7 Conclusion

Using individual-level data on the alcohol consumption of Russian males, this paper finds evidence of longstanding persistence of habits towards certain types of addictive goods. People who grew up in the USSR became accustomed to vodka (the most popular liquor during the Soviet era) and still prefer it; however, those who reached the age of twenty in the post-Soviet period (when the beer industry significantly expanded) prefer beer.

These findings demonstrate that the effect of policy may be very long-lasting, and so emphasize the importance of policy on young people when they form their habits: depending on the initial choice of alcohol beverage, a person may end up drinking that type of alcohol for the rest of his life. The paper also finds that habits and a substitution effect will outweigh any stepping-stone effect.

[28]See Train (2003) for a description of the estimation of model parameters, choice probabilities, and consumer welfare.

For example, a decrease in the price of beer will result in decreased vodka consumption, not only in the short run but also for long-run horizons.

Policy simulations indicate that the government policy toward the substitution of vodka and other hard drinks with safer beer will result in significant reduction to male mortality rates. As a result, a 50% subsidy on beer and 30% tax on vodka will decrease male mortality from 1.41% to 0.95% in 10 years, halving the gap between Russian and western-European mortality rates. This policy will not decrease consumer surplus, and so might have a greater chance of being implemented by a populist government.

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Tables

Table 1. Summary statistics.

Variable	Obs	Mean	Std. Dev.	Min	Max
Alcohol intake (in ml of pure spirit)	50141	110.9	138.5	0	2690
I(abstainer)	50141	0.274	0.446	0	1
share of vodka	36405	0.532	0.392	0	1
share of beer	36405	0.288	0.346	0	1
share of vine	36405	0.072	0.203	0	1
share of samogon	36405	0.087	0.240	0	1
I(drink beer)	36405	0.630	0.483	0	1
I(drink vine)	36405	0.181	0.385	0	1
I(drink samogon)	36405	0.136	0.343	0	1
beer drunk last month (ml)	36280	600.7	727.4	0	8000
vine drunk last mont (ml)	50141	47.6	170.4	0	4000
vodka drunk last month (ml)	36263	225.0	260.5	0	5000
samogon drunk last month (ml)	36359	47.4	155.8	0	3000
lag7 share of beer	11593	0.163	0.244	0	1
lag7 share of vodka	11593	0.655	0.343	0	1
lag7 share of vine	11593	0.071	0.180	0	1
lag7 abstainer	7423	0.074	0.263	0	1
health status	49937	2.648	0.685	1	5
I(college)	50127	0.408	0.492	0	1
Body weight	46031	76.33	13.45	35	250
Age	50141	38.72	13.04	18	65
Log income	45778	0.000	0.736	-5.51	5.41
birth year	50141	1963.7	14.0	1929	1991
born in rural area	27056	0.529	0.499	0	1
born in Georgia	50141	0.005	0.070	0	1
born in Ukraine	50141	0.032	0.177	0	1
born in Moldova	50141	0.002	0.044	0	1

Table 2. Cohort differences in patterns of alcohol consumption.

	(1)	(2)	(3)	(4)	(5)	(6)
	Share of beer			Share of vodka		
born in 1990s	0.557	0.161	0.312	-0.496	-0.152	-0.31
	[0.032]***	[0.049]***	[0.036]***	[0.025]***	[0.051]***	[0.030]***
born in 1980s	0.414	0.051	0.183	-0.338	-0.03	-0.169
	[0.009]***	[0.031]	[0.012]***	[0.010]***	[0.038]	[0.013]***
born in 1970s	0.211	-0.054	0.053	-0.177	0.052	-0.06
	[0.008]***	[0.025]**	[0.009]***	[0.010]***	[0.030]*	[0.010]***
born in 1960s	0.099	-0.081	omitted	-0.074	0.084	omitted
	[0.007]***	[0.018]***		[0.010]***	[0.022]***	
born in 1950s	0.06	-0.05	omitted	-0.04	0.056	omitted
	[0.007]***	[0.012]***		[0.011]***	[0.015]***	
born in 1940s	omitted	omitted	omitted	omitted	omitted	omitted
Year FE	NO	YES	YES	NO	YES	YES
Regional FE	NO	YES	YES	NO	YES	YES
Demographics	NO	YES	YES	NO	YES	YES
Observations	36206	30649	30649	36206	30649	30649
R-squared	0.15	0.19	0.19	0.08	0.15	0.15

Note: * significant at 10%; ** significant at 5%; *** significant at 1%. Robust standard errors clustered on individual level are in brackets. In regressions (2) and (5) pairwise tests of equality of cohort FE are rejected for all pairs except I(born in 1970s)=I(born in 1950s).

Table 3. State dependence in patterns of alcohol consumption.

	Share of beer					
Lag7(share of beer)	0.193	0.185	0.194			
	[0.024]***	[0.024]***	[0.024]***			
Lag1(share of beer)				0.316	0.305	0.316
				[0.010]***	[0.011]***	[0.010]***
Year of birth			-0.018			0
			[0.014]			[0.007]
born in 1950s		-0.022			-0.037	
		[0.024]			[0.014]***	
born in 1960s		-0.036			-0.069	
		[0.038]			[0.021]***	
born in 1970s		-0.002			-0.054	
		[0.055]			[0.031]*	
born in 1980s		0.047			-0.001	
		[0.072]			[0.039]	
born in 1990s		no data			0.105	
					[0.060]*	
Observations	7351	7351	7351	16178	16178	16178
R-squared	0.09	0.09	0.09	0.22	0.23	0.22
	Share of vodka					
Lag7(share of vodka)	0.159	0.155	0.159			
	[0.020]***	[0.020]***	[0.020]***			
Lag1(share of vodka)				0.328	0.32	0.328
				[0.010]***	[0.010]***	[0.010]***
Year of birth			0.021			0.005
			[0.016]			[0.008]
born in 1950s		0.018			0.046	
		[0.029]			[0.016]***	
born in 1960s		0.032			0.072	
		[0.045]			[0.024]***	
born in 1970s		-0.017			0.051	
		[0.065]			[0.034]	
born in 1980s		-0.08			0.004	
		[0.083]			[0.042]	
born in 1990s					-0.07	
					[0.058]	
Observations	7351	7351	7351	16178	16178	16178
R-squared	0.1	0.1	0.1	0.19	0.2	0.19

Table 4. "Regression-discontinuity" regression results.

	Born in 1970-1990	Born in 1973-1987	Born in 1975-1985	Born in 1976-1984	Born in 1977-1983	Born in 1978-1982	
			Share of beer				
Lag7(share of beer)	0.198	0.174	0.195	0.174	0.147	0.196	OLS-1
	[0.037]***	[0.041]***	[0.047]***	[0.052]***	[0.058]**	[0.070]***	
Lag7(share of beer)	0.397	0.337	0.518	0.331	0.095	0.359	IV-1
	[0.119]***	[0.118]***	[0.142]***	[0.181]*	[0.236]	[0.355]	
F-test	156.45	156.14	81.89	46.1	27.52	12.29	
Year of birth	0.02	0.022	0.023	0.023	0.02	0.019	OLS-2
	[0.002]***	[0.002]***	[0.003]***	[0.003]***	[0.005]***	[0.007]***	
Lag7(share of beer)	0.181	0.154	0.161	0.162	0.15	0.19	OLS-3
	[0.039]***	[0.044]***	[0.051]***	[0.054]***	[0.060]**	[0.069]***	
Year of birth	0.009	0.01	0.021	0.01	-0.003	0.011	
	[0.005]*	[0.006]	[0.009]**	[0.011]	[0.016]	[0.024]	
			Share of vodka				
Lag7(share of vodka)	0.093	0.09	0.105	0.094	0.089	0.129	OLS-1
	[0.031]***	[0.036]**	[0.040]***	[0.049]*	[0.059]	[0.068]*	
Lag7(share of vodka)	0.193	0.204	0.271	0.159	-0.372	-0.034	IV-1
	[0.127]	[0.144]	[0.160]*	[0.207]	[0.258]	[0.381]	
F-test	117.16	86.67	56.82	34.24	24.22	9.93	
Year of birth	-0.013	-0.013	-0.014	-0.013	-0.008	-0.006	OLS-2
	[0.002]***	[0.002]***	[0.003]***	[0.003]***	[0.004]*	[0.007]	
Lag7(share of vodka)	0.086	0.083	0.093	0.09	0.115	0.135	OLS-3
	[0.033]***	[0.038]**	[0.043]**	[0.052]*	[0.061]*	[0.067]**	
Year of birth	-0.004	-0.005	-0.009	-0.004	0.029	0.01	
	[0.006]	[0.007]	[0.009]	[0.011]	[0.015]*	[0.023]	
# of obs.	1855	1288	826	633	462	331	OLS-1,3; IV-1
# of obs.	10224	8317	6396	5282	4160	3022	OLS-2

Figure 7. Coefficients from regressions of shares of good on year of birth for different age cohorts. Samples are constrained by ten-year periods of birth year (are shown on horizontal axes).

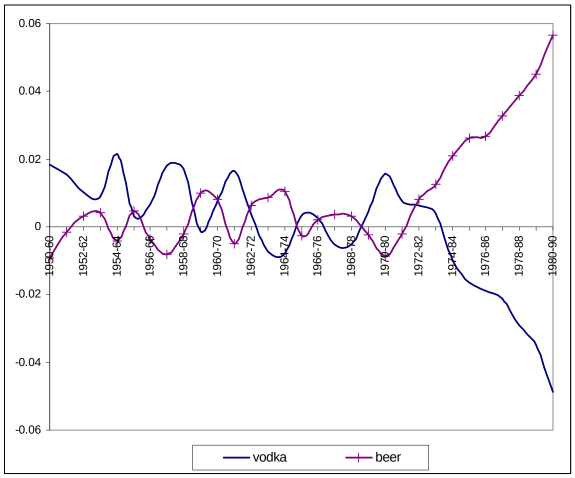


Table 5a. Share of good and year of birth.

	share of vodka			share of beer		
	all sample	born after 1980	born before 1980	all sample	born after 1980	born before 1980
Year of birth	-0.007	-0.033	-0.002	0.011	0.024	0.008
	[0.004]*	[0.009]***	[0.005]	[0.004]***	[0.010]**	[0.004]*
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Age FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	25240	4391	20849	25240	4391	20849
R-squared	0.07	0.04	0.02	0.13	0.03	0.06

Robust standard errors clustered at individual level in brackets
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 5b. Share of good and lagged regional sales.

	share of beer		share of vodka	
lag7 $\frac{regional\ sales\ beer}{regional\ sales\ vodka}$	0.01	0.006	-0.017	-0.014
	[0.003]***	[0.003]**	[0.003]***	[0.003]***
lag7 $\frac{regional\ sales\ beer}{regional\ sales\ vodka}$ *I($age \leq 30$)		0.018		-0.014
		[0.004]***		[0.004]***
Observations	13730	13730	13730	13730
R-squared	0.05	0.05	0.02	0.02

Robust standard errors clustered at individual level in brackets
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 6a. Beer and vodka consumption for those who born in rural/urban areas.

	whole sample	live in this place≥7 yrs	live in city	live in city, live in this place≥7 yrs
	Share of beer			
I(born in village)	-0.02	-0.022	-0.025	-0.038
	[0.007]***	[0.010]**	[0.011]**	[0.016]**
Observations	16469	9779	7013	3718
R-squared	0.16	0.13	0.15	0.12
	Share of vodka			
I(born in village)	0.028	0.036	0.043	0.057
	[0.009]***	[0.012]***	[0.012]***	[0.017]***
Observations	16469	9779	7013	3718
R-squared	0.14	0.13	0.12	0.11

Table 6b. Regional differences in cohort effect.

		share of vodka	
I(born before 1980)	0.106	0.117	0.104
	[0.011]***	[0.012]***	[0.018]***
I(born before 1980) X		-0.002	
average temperature in 1997		[0.001]**	
I(born before 1980) X			0.034
I(born in village)			[0.012]***
Health evaluation	-0.004	-0.003	-0.002
	[0.005]	[0.005]	[0.008]
I(college degree)	-0.008	-0.008	-0.018
	[0.008]	[0.008]	[0.012]
Weight	0.002	0.002	0.002
	[0.000]***	[0.000]***	[0.000]***
Age	0.005	0.005	0.004
	[0.000]***	[0.000]***	[0.001]***
Log(income)	0.016	0.016	0.02
	[0.004]***	[0.004]***	[0.006]***
Year FE	Yes	Yes	Yes
Regional FE	Yes	Yes	Yes
Observations	21284	21284	10754
R-squared	0.1	0.1	0.09

Standard errors clustered at individual level in brackets
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 7. Beer and vodka consumption for those who born in rural/urban areas.

	share of wine	
	whole sample	live in current place≥7 yrs
Born in Moldova	0.039*	0.004
Born in Georgia	0.036**	0.027
Born in Ukraine	0.013**	0.002

Table 8. Estimators of $Pr(drink\, vodka|Y_{t-1})$

	Pr(drink vodka when 25 and older | .)				
	Obs	$\hat{Pr}()$	Std. Dev.	Min	Max
Pr(.|abstainer when teen)	182	0.659	0.475	0	1
Pr(.|try only beer when teen)	104	0.577	0.496	0	1
Pr(.|try vodka when teen)	301	0.817	0.387	0	1
	Summary Statistics				
Variable	Obs	Mean	Std. Dev.	Min	Max
Try beer when teen	2867	0.513	0.500	0	1
Try vodka when teen	2867	0.341	0.474	0	1
Abstainer when teen	2867	0.388	0.487	0	1
Try only beer when teen	2867	0.242	0.428	0	1

Table 9a. Hazard of death estimates

	Hazard of death					
I(drink vodka)	0.68	0.82				
	[0.156]***	[0.165]***				
I(drink beer)		-0.516				
		[0.212]**				
I(heavy drinker: beer)			-0.503	-0.687		
			[0.280]*	[0.279]**		
I(heavy drinker: vodka)			0.555	0.935		
			[0.206]***	[0.224]***		
I(moderate drinker: beer)				-0.542		
				[0.290]*		
I(moderate drinker: vodka)				0.907		
				[0.183]***		
Log(beer consumption)					-0.14	
					[0.056]**	
Log(vodka consumption)					0.171	
					[0.034]***	
Share of vodka in alcohol consumption						0.301
						[0.080]***
Log(alcohol consumption)						-0.151
						[0.080]*
log(family income)	-0.323	-0.311	-0.314	-0.31	-0.31	-0.295
	[0.021]***	[0.022]***	[0.021]***	[0.022]***	[0.022]***	[0.023]***
Age	-0.278	-0.279	-0.272	-0.286	-0.279	-0.263
	[0.017]***	[0.017]***	[0.017]***	[0.018]***	[0.017]***	[0.017]***
Health evaluation	-0.576	-0.573	-0.562	-0.574	-0.579	-0.524
	[0.132]***	[0.132]***	[0.132]***	[0.132]***	[0.132]***	[0.140]***
I(smokes)	0.473	0.464	0.5	0.456	0.445	0.493
	[0.132]***	[0.132]***	[0.134]***	[0.133]***	[0.133]***	[0.146]***
I(college)	-1.836	-1.767	-1.841	-1.754	-1.753	-1.825
	[0.298]***	[0.300]***	[0.297]***	[0.301]***	[0.300]***	[0.308]***
Body weight	-0.002	-0.002	-0.003	-0.002	-0.002	-0.004
	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]	[0.005]
I(employed)	-0.727	-0.696	-0.574	-0.683	-0.674	-0.559
	[0.145]***	[0.144]***	[0.144]***	[0.146]***	[0.144]***	[0.151]***
Observations	7069	7069	7069	7069	7069	6516

Standard errors in brackets; * significant at 10%; ** significant at 5%; *** significant at 1%

Table 9b. Preferences towards beer are negatively correlated with alcohol intake

	alcohol intake	log (alcohol intake)
Share of beer in alcohol intake	-89.18	-0.512
	[3.565]***	[0.020]***
Share of hard drinks in alcohol intake	30.642	0.652
	[3.264]***	[0.018]***
Constant	158.721	4.439
	[2.995]***	[0.017]***
Observations	32637	32637
R-squared	0.08	0.22

Standard errors in brackets
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 10a. Estimates of utility parameters. Multivariate logit. Main Specification.

	U(only beer)	U(only vodka)	U(vodka&beer)
$P_{beer,it}/P_{vodka,it}$	**-0.925**		**-0.388**
	0.202		0.152
$I(drink\,vodka)_{it-1}$	**-0.423**	**0.898**	**0.818**
	0.049	0.043	0.042
$I(drink\,beer)_{it-1}$	**0.972**	**-0.271**	**0.980**
	0.050	0.048	0.044
Income	**0.001**	**-0.001**	**0.001**
	0.000	0.000	0.000
Born in 1980s	**1.748**	**-2.386**	**-0.076**
	0.233	0.200	0.193
Born in 1970s	**1.503**	**-1.291**	**0.413**
	0.194	0.154	0.158
Born in 1960s	**0.876**	**-0.677**	**0.466**
	0.143	0.111	0.115
Born in 1950s	**0.528**	**-0.402**	**0.208**
	0.103	0.076	0.082
age	**0.018**	**-0.024**	**-0.010**
	0.006	0.005	0.005
health status	**0.221**	**0.131**	**0.164**
	0.054	0.046	0.046
I(college degree)	**0.262**	**-0.144**	**0.147**
	0.046	0.043	0.041
weight	**-0.008**	**-0.003**	**0.002**
	0.002	0.002	0.001
I(Muslim)	**-0.266**	**-0.258**	**-0.419**
	0.112	0.097	0.097

Note: standard errors in italic.

Table 10b. Estimates of utility parameters. Multivariate logit. Alternative Specifications.

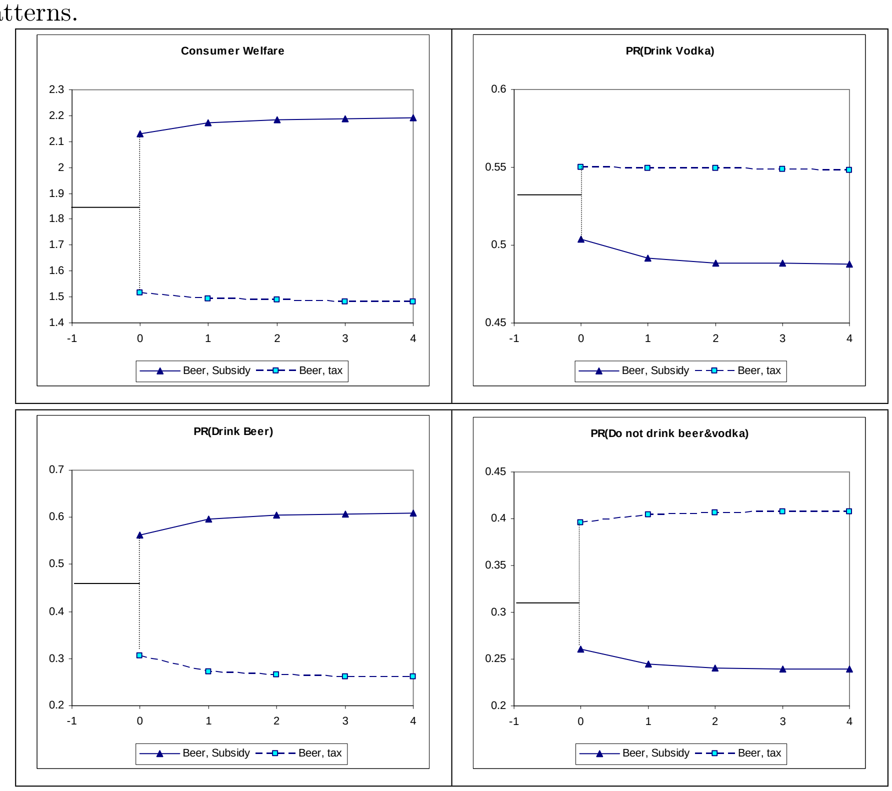
	U(only beer)	U(only vodka)	U(vodka&beer)
$P_{beer,it}/P_{vodka,it}$	**-0.801**		**-0.259**
	0.204		*0.153*
$I(drink\ only\ vodka)_{it-1}$	**-0.812**	**0.316**	**-1.032**
	0.077	*0.060*	*0.058*
$I(drink\ beer\&vodka)_{it-1}$	**0.551**	**0.634**	**1.729**
	0.063	*0.058*	*0.055*
$I(drink\ only\ beer)_{it-1}$	**0.502**	**-0.718**	**-0.906**
	0.072	*0.085*	*0.069*
Born in 1980s	**2.588**	**-2.688**	**0.577**
	0.289	*0.239*	*0.237*
Born in 1970s	**2.283**	**-1.564**	**1.004**
	0.252	*0.194*	*0.203*
Born in 1960s	**1.575**	**-0.905**	**0.984**
	0.206	*0.148*	*0.161*
Born in 1950s	**1.149**	**-0.586**	**0.667**
	0.170	*0.111*	*0.129*
Born in 1940s	**0.713**	**-0.193**	**0.512**
	0.155	*0.088*	*0.112*
Born in 1930s	*omitted*	*omitted*	*omitted*
log(income)	**0.001**	**0.000**	**0.001**
	0.000	*0.000*	*0.000*
age	**0.026**	**-0.029**	**-0.003**
	0.006	*0.005*	*0.005*
health status	**0.222**	**0.123**	**0.172**
	0.055	*0.046*	*0.046*
I(college degree)	**0.241**	**-0.124**	**0.124**
	0.047	*0.043*	*0.041*
weight	**-0.008**	**-0.002**	**0.001**
	0.002	*0.002*	*0.001*
I(Muslim)	**-0.268**	**-0.254**	**-0.418**
	0.112	*0.097*	*0.097*

Note: standard errors in italic.

Table 11. Share of drinkers and mortality rates under alternative regulatory policies

	No tax/subsidy	Subsidy on beer	Tax on beer
Drinking patterns:			
Do not drink beer/vodka	0.31	0.24	0.41
Drink only beer	0.15	0.27	0.04
Drink only vodka	0.22	0.15	0.33
Drink beer&vodka	0.31	0.34	0.22
Hazard of death (1)	0.0137	0.0113	0.0168
Hazard of death (2)	0.0152	0.0149	0.0154
CS	1.87	2.19	1.48

Figure 8. Effect of government policy on consumer welfare and on drinking patterns.



APPENDIX

Table A1. Share of home-made vodka (samogon) in total alcohol intake.

Variable: share of samogon	Obs	Mean	Std.Dev	Min	Max
sample: small-size cities and rural areas	23344	0.143	0.305	0	1
sample: middle-size and big cities	17790	0.025	0.124	0	1

Estimation of elasticity of alcohol consumption: hedonic regressions

This section presents the results of hedonic regressions for the price of alcohol.

Table 1 presents OLS and tobit estimates for own and cross-price elasticities for different measures of vodka and beer consumption, as well as for total alcohol intake measures, for the following hedonic regressions:

(1) $Y_{it} = \alpha + \gamma_b Log(P_{beer})_{it} + \gamma_v Log(P_{vodka})_{it} + \Gamma' D_{it} + \delta_r + e_{it}$

(2) $Y_{it} = \alpha + \gamma_{bv} P_{beer}/P_{vodka} + \Gamma' D_{it} + \delta_r + e_{it}$

Y_{it} stands for alcohol consumption, D_{it} is a set of demographic characteristics, and δ_r is the regional fixed effects. The set of demographic characteristics includes log(family income), health status, age, I(Muslim), I(college degree), and personal body weight.

Table 2 below and Table 2a at the end of the section illustrate significant negative own and positive cross-price elasticities. According to tobit estimates, a decrease in the price of beer by 10% results in an increase in consumption of beer by 6% and a decrease in the consumption of vodka by 7%. Similarly, a decrease in the price of vodka by 10% will result in an increase in consumption of vodka by 9% and a decrease in the consumption of beer by 10%.

Estimated own-price elasticities (-0.6 for beer and -0.9 spirits) are within the range of those obtained in other studies. Leung and Phelps (1993) and Fogarty (2010) survey estimates of price sensitivity of demand for alcoholic beverages. Leung and Phelps (1993) find that average estimates for the elasticity of beer and spirits are -0.3 and -1.5 correspondingly. Fogarty (2010) finds that average own elasticities are -0.44 for beer and -0.73 for spirits.

Table A2. Demand elasticities: price hedonic regression.

	Log(beer consumption)		Log(vodka consumption)	
	OLS	Tobit	OLS	Tobit
$Log(P_{beer})$	-0.33	-0.582	0.358	0.673
	[0.085]	[0.195]	[0.110]	[0.208]
$Log(P_{vodka})$	0.5	1.029	-0.48	-0.894
	[0.068]	[0.155]	[0.089]	[0.168]

Standard errors are in brackets

Proof A1

Myopic agents:

Steady state FOC as a funcrion of v is as follows:

$F = u_v(v,\ Y - p_v v,\ [\delta/(1-\delta)]v,\ [\delta/(1-\delta)][Y - p_v v]) - p_v u_b(v,\ Y - p_v v,\ [\delta/(1-\delta)]v,\ [\delta/(1-\delta)][Y - p_v v]) = 0$

then

$dF/dv = u_{vv} - p_v u_{vb} + \delta/(1-\delta) u_{vSv} - p_v \delta/(1-\delta) u_{vSb} - p_v[u_{bv} - p_v u_{bb} + \delta/(1-\delta) u_{bSv} - p_v \delta/(1-\delta) u_{bSb}]$

We know that

$u_{vv}(.) < 0$, $u_{bb}(.) < 0$, $u_{s_v s_v}(.) < 0$, $u_{s_b s_b}(.) < 0$, and $u_{v s_v}(.) > 0$, $u_{b s_b}(.) > 0$.

so some terms in expression for dF/dv are positive ($\delta/(1-\delta) u_{vSv}$, $p_v^2 \delta/(1-\delta) u_{bSb}]$), some terms are negative (u_{vv}, $p_v^2 u_{bb},$), and so sign of overall sum is unknown.

Table A3. Sales of vodka and beer; and mortality rates: countryXyear-level regressions

	1985-2009	1992-2009
	Male mortality	
Vodka sales	0.035***	0.02***
Beer sales	0.001	0.0003

Figure A1. Sales of vodka and beer; and mortality rates

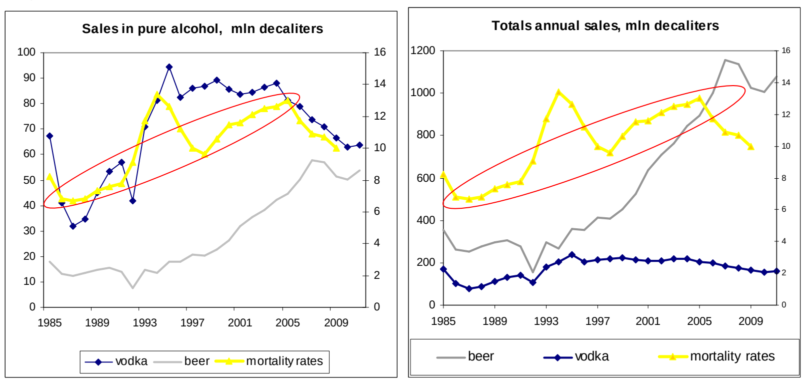


Table A4. Sales of vodka and beer; and mortality rates: regional-level regressions

	# of deaths per 1000 of working age males	
Log Vodka sales	0.809	0.554
per capita	[0.175]***	[0.254]**
Log Beer sales	-0.147	-0.66
per capita	[0.134]	[0.171]***
I(Caucasus)	-4.935	-6.341
	[0.296]***	[0.527]***
Year FE	YES	YES
Weighted?	NO	YES
Constant	13.99	10.658
	[0.299]***	[1.888]***
Observations	949	949
R-squared	0.49	0.37

Standard errors in brackets; * significant at 10%;
** significant at 5%; *** significant at 1%