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Alexander S. Skorobogatov

THE EFFECT OF CLOSING HOUR RESTRICTIONS ON ALCOHOL USE AND ABUSE IN RUSSIA

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Alexander S. Skorobogatov[*]

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This research estimates the effect of the restriction of trading hours on the use of alcoholic beverages falling under the restriction, and to evaluate the substitution effect for the beverages not under the restriction. The hypotheses tested are that these policies decrease use of factory-made vodka and increase use of home-made vodka (samogon) and factory-made light beverages. Overall use, binge drinking, and the consumption of vodka, samogon, beer, and wine were examined. The conclusions are that the sales restrictions leads to a decrease of factory-made vodka consumption and its partial substitution by samagon for people most exposed to the restriction. A by-product of the restriction is a redistribution of alcohol market in favor of the big shops that resulted in a fall in samogon sales and rise in wine sales.

JEL Classification: I18, J60, K42, L66, P51

Keywords: closing hours, alcohol policy, substitution effect, differences-in-differences

[*] National Research University Higher School of Economics (St. Petersburg, Russia)
e-mail: skorobogat@mail.ru

1. Introduction

One of the recent papers on this topic began by pointing to the 'legendary' alcohol consumption in Russia [Baltagi and Geishecker 2006, 893], which reflects well-known excessive alcohol use [Nemtsov 2000; Pomerleau et al. 2005; Yakovlev 2013] and alcohol-related mortality [Denisova 2010b; Leon et al. 2009; Nemtsov 2002; Nemtsov and Ogurtsov 2005; Norström 2011; Yakovlev 2012]. Alcohol consumption and related mortality substantially increased during the post-Soviet period [Yakovlev 2013]. An important reason for this increase was that alcohol, particularly strong spirits, became available as never before after the previous Soviet regulations for alcohol production and trade were abolished and the anti-alcoholic campaign was stopped [Denisova 2010a]. To address these catastrophic consequences, the state began to restrict alcohol sales. Beginning in 2006, various regions have been introducing and toughening local regulations on alcohol sale hours. Until 2012, the respective restrictions applied only to strong spirits. Russia features widespread 24-hour shops. Moreover, people mostly drink at home rather than in bars [Public Opinion Fund 2014]. Therefore, the newly imposed restrictions actually made strong alcohol less available for 'take-away' and prevented people from beginning or continuing drinking parties. However, the positive effect of these measures has been questioned by most Russians [VCIOM 2009]. These reasons include deep-rooted drinking habits, poor observance of the law, and substantial informally produced alcohol, including home-distilled vodka ('samogon').

Evidence from various countries points to the effectiveness of anti-alcohol restrictions at preventing alcohol abuse and its consequences. In a review of studies of closing times to prevent binge drinking, Plant & Plant [2005] noted that the results had mostly shown effectiveness of these measures. From 15 studies that examined the effect of restricting the time of alcohol sales, Popova et al. [2009] concluded that the majority of these studies confirmed the effectiveness of the time restriction. Hahn et al. [2010] found similar results in their research on the effect of allowable hours of alcohol sales on excessive alcohol consumption and related harms, though the small changes turned out to be insignificant.

Douglas [1998] examined the effect of restricting trading hours on alcohol consumption and related morbidity, mortality and crimes on a special group, namely, the aboriginal Australians who were more inclined to excessive drinking. He noted decreasing trends in alcohol use and related harm after imposing the restrictions. Finally, there is a large body of evidence that favors the effectiveness of time restrictions to prevent alcohol-related consequences such as traffic accidents, violence, etc. [e.g., Chikritzhs and Stockwell 2009; Duailibi 2007; Vingilis et al. 2005]. For example, Rossow & Norström [2011] discovered a substantial relationship between small changes in the opening hours of premises selling alcohol and violent crimes.

Kolosnitsyna et al. [2014] examined the Russian restrictive policy. Their results supported its effectiveness as a means to decrease alcohol consumption without any evidence of substitution of beverages not under the restriction. However, their research contrasted 2009 with 2010 even though the restriction had gradually been imposed since 2006. Therefore, their research did not distinguish between the immediate and lagged effects of the restriction. In addition, they estimated just the association between the policy and drinking without attempting to address confounding

factors such as omitted variable bias.

According to a literature review by Rossow & Norström [2011, p. 531], 'stronger research designs' are needed [p. 531]. Even though studies of the time restrictions have mostly demonstrated effectiveness, some studies have concluded the opposite [e.g., Green et al. 2014; Humphreys and Eisner 2014]. At the same time, many conclusions have been based on examining trends or simple regression analysis. In such cases, the respective associations can be explained by some unobservable covariates. Thus, there is a need for additional and more sophisticated evidence of the effectiveness of the time restrictions. This effect is also unknown in specific social and economic environments featuring poor observance of the law, long tradition of the excessive consumption of strong spirits, and a significant supply of homemade or surrogate alcoholic beverages.

The aim of this study was to determine if there has been any the effect of the time restrictive policies of strong alcohol sales on alcohol use in the aforementioned specific conditions. One particular focus was to determine if there have been any substitutions given the long tradition of home alcohol production. Among the hypotheses to be tested, the first is that these policies decrease use of factory-made strong spirits such as vodka. The second hypothesis to be tested is that these policies increase the use of homemade strong spirits such as samogon. The third hypothesis is that these policies increase use of factory-made light beverages such as beer and dry wine.

Compared with the other research studies, this research examined the effect of the restrictions on the longitudinal data from 2005-2012 from the year in which none of the regions were under restrictions and the time in which all the regions were under the restrictions. It was unknown *a priori* whether the time restriction was violated or avoided by the retailers and buyers. If yes, the effect should be absent. Unlike most studies, this research examines the effect of substituting alcohol not falling under the restriction, namely, samogon and light beverages. In light of opinions from a number of practitioners that the restrictions could induce consumption of various alcohol surrogates, including samogon, this effect could significantly worsen the alcohol situation. Finally, this study uses a differences-in-differences analysis. This method is often used for evaluating effects of various policies [e.g., Green et al. 2014].

2. Empirical analysis

We used a differences-in-differences analysis [Angrist and Pischke 2009], which allowed us to infer the causal link between the policy effect and the result. The method distinguishes between the treatment and control groups, i.e., the respondents exposed to the policy effect and those who are not or less exposed to this effect. If the policy has the effect, a systematic difference in a target policy variable should be observed between the groups.

The unemployed were chosen as the treatment group, and the control group was composed of the rest of the respondents. Contrasting employed and unemployed respondents was motivated by the well-known empirical regularity that job loss causes people to abuse alcohol [see, e.g., Catalano 1993; Dee 2001; Eliason 2014]. This regularity holds in Russia as well (see Panel A of

Table 2 for vodka use, binge drinking, and consumption by the unemployed). Moreover, alcohol abuse strongly correlates with alcohol use at night [Alcohol abuse in the Russian Federation 2009, p. 47]. In addition, the unemployed have relatively more leisure time, and they usually do not need to get up in the early morning, which should incline them towards night-time activities, including drinking parties.

To control for systematic differences between the groups in their unobservable characteristics that may correlate with exposure to the policy and its effect, a differences-in-differences method was exploited. We measured the difference in dynamics between the treatment and control groups in terms of the target variables in the respective regressions. This method allowed us to use repeated cross-sections as panel data were unavailable. A simple comparison of the mean differences in outcomes before and after the policy was sufficient to check whether there was a systematic difference in changes between the treatment and control groups after the beginning of the policy.

Based on available data and drinking traditions of Russia, we used the following four alcoholic beverages to construct our outcome variables: vodka, samogon, beer, and dry wine. Over the period considered the main target of the restrictive policy was vodka as the most popular strong spirit causing the most alcohol-related harm. Samogon was the second most popular strong spirit; however, it did not fall under the restriction because it is homemade, so that one could expect that it was the main substitute for vodka when the latter was unavailable. Beer and wine were the most popular and second most popular light beverages, and they did not fall under the restriction over most of the period. Therefore, they were also expected to substitute for vodka though to a much lesser extent because both were imperfect substitutes for vodka and were much more expensive per unit of pure alcohol.

For each alcoholic beverage, we used the following three dummy variables as outcomes: use, binge drinking, and consumption, which were potential covariates of the problems related to both heavy and low/moderate drinkers [Danielsson et al. 2011]. Regressions of the dummy variables were estimated using a probit estimator, and consumption was estimated using an ordered probit estimator. The latter was applied to the data because the respondents usually reported typical volumes of consumption, so the overall numbers of values for each beverage were relatively small. In all cases, we estimated robust standard errors clustered across the respondents.

The regressions for the alcohol target and substitute latent variables are as follows:

$$a_{it} = \alpha_0 + \alpha_1 u_{it} + \alpha_2 c_{it-1} + \alpha_3 c_{it-1} \times u_{it} + \alpha_4 \mathbf{X}_{it} + \alpha_5 yr_t + \varepsilon_{it},$$

$$s_{it} = \beta_0 + \beta_1 u_{it} + \beta_2 c_{it-1} + \beta_3 c_{it-1} \times u_{it} + \beta_4 \mathbf{X}_{it} + \beta_5 yr_t + \eta_{it}$$

where a_{it} and s_{it} are alcohol target and substitute variables; u_{it} is a dummy for unemployment status to control for the systematic difference between the unemployed and the remaining respondents; c_{it-1} is the lagged closing hours in the region of the ith respondent in the tth year to control for overall tendencies in the drinking measures that potentially goes alongside the policy; $\mathbf{X}_{it}$ is the vector of control variables; yr_t is the tth year fixed effect; ε_{it} and η_{it} are disturbance terms. We used the lagged closing hours to account for some regions where the restriction was imposed

toward the end of a year, which might lead to effects no earlier than the following year. Using the lagged variables is also consistent with the theory of rational addiction which suggests stronger negative price elasticity in the long run compared with the short term [Becker and Murphy 1988; Baltagi and Geishecker 2006]. The same should be true for any restriction of addictive behaviors.

The main variable of interest was the interaction term that allowed us to check whether there was a change in a target variable after beginning the policy, which was specific to the unemployed. The first hypothesis would be supported if $\alpha_3 < 0$. In this case, the unemployed would systematically differ from the rest of the respondents by decreasing alcohol use due to the restriction. The second/third hypotheses would be true if $\beta_3 > 0$, meaning that the unemployed increased their consumption of alcoholic beverages that did not fall under the restriction more than other respondents after the restriction was imposed. Thus, we examined whether there was a decrease in the use of the beverages under the restriction and an increase in the use of the beverages not under the restriction which happened for the unemployed but not for the others.

3. Datasets

Our research was based on data of the Russian Longitudinal Monitoring Survey of HSE (RLMS-HSE).[1] A detailed description of the dataset is available [2005]. This nationally representative survey started from the very beginning of the post-Soviet period to analyze the transitional processes in Russia. The first sample was dropped after four rounds were run. The survey has been annual since 1994 after the sample was changed.

The survey was organized as a split panel [Leslie Kish 1987]. Each round contains data on a representative sample of dwelling units. The actual size of the sample has enlarged as a result of adding new dwelling units without loss of representativeness to offset the attrition. People actually residing in the representative dwelling units are not totally the same from one year to another, mostly due to moving. Thus, interviewers survey both those who lived at the representative addresses in previous years and the new people who recently moved to the location. In addition, people who lived there and moved from there are also interviewed to the extent possible, though they are not included in the representative sample of a current year anymore, and their new addresses are unavailable. Thus, a respondent's region of residence is available only for those in representative samples but not for those who moved from their representative addresses. A researcher can use either pooling representative cross-sections across time or longitudinal data, but including characteristics of a respondent's region only makes sense for the cross-sections across time. Because the region of residence was of the key importance for our analysis and the method allowed us to use pooling data, we used the pooling cross-sections.

Since our data were comprised of representative cross-sections across several years, there were no problems with aging populations that would have been present with longitudinal data. The mean and standard deviation of the respondents' age from year to year were 37 and 11, respectively.

[1] This was initiated by the Carolina Population Center at the University of North Carolina and until recently was coordinated by the same Center as well as the RAS Sociology Institution (Moscow). Now the main coordinator of the survey is the National Research University Higher School of Economics (Moscow).

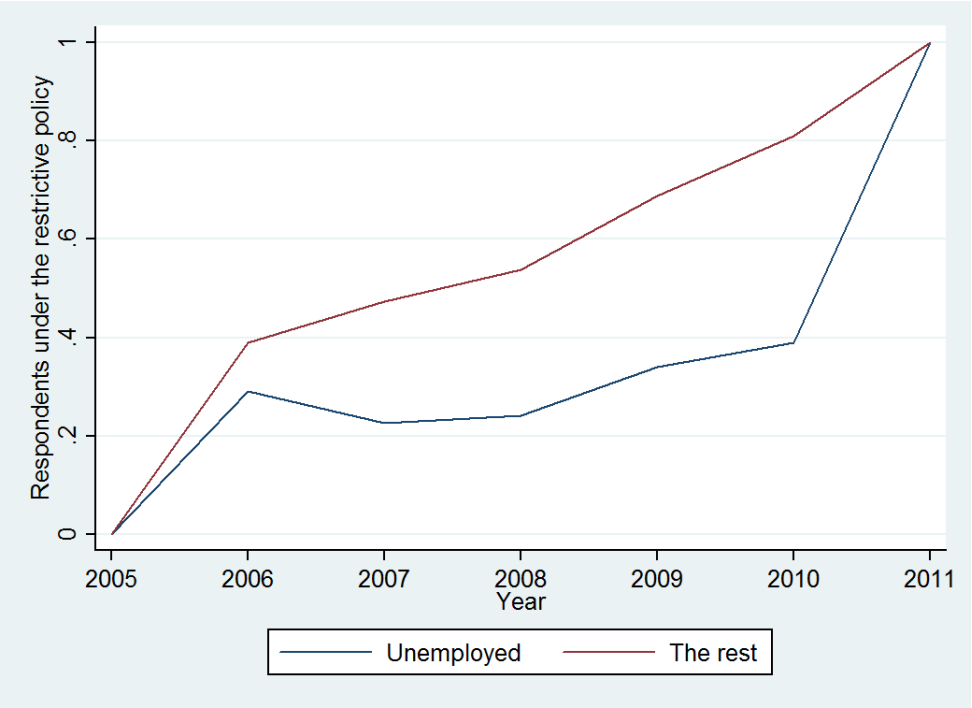

Figure 1. The proportions of the respondents who resided in regions with the laws restricting time of alcohol sale in the treatment and control groups

As of today, the dataset consists of 17 rounds, 5 to 21 rounds for 1994-2012. We used data from eight rounds for 2005-2012 during the period in which the local alcohol restrictions had been imposed. We used a sample of adult respondents before their retirement, i.e., those aged 18-59 for males and 18-54 for females. We also dropped respondents who were in maternity leave. The ultimate sample sizes are 4596, 5993, 5774, 5460, 5237, 9325, 9214, 9033 observations for 2005-2012, respectively. The total number of respondents participating in these rounds was 18217. Of these, approximately 74% responded to questions about use of alcoholic beverages at least once over the period. For a representative sample, the response rate for the alcohol questions was 61% on average across the rounds.

Like other surveys, RLMS tends to understate alcohol consumption [Leon et al. 2009; Nemtsov 2003; 2004]. However, the dataset gives figures that are consistent with or even higher than other surveys [Perlman 2010], and as the literature suggests, the links between alcohol measures and other characteristics are not strongly affected by this understatement [Jukkala et al. 2008; Pomerleau et al. 2005; Treisman 2010]. Finally, the regression specification, extensive use of controls, and the substantial within-variation [Massin and Kopp 2014] allows us to accept the results based on the data as quite reliable. The dataset was used extensively to explore alcohol use and related harm in Russia [Baltagi and Geishecker 2006; Denisova 2010a; 2010b; Leon et al. 2009; Roshchina 2013; Yakovlev 2012; 2013] and to evaluate the effect of the closing hour restrictions in post-Soviet Russia [Kolosnitsyna 2014]. Data on the regional alcohol prices were from Rosstat [2014].

Data about the regional laws restricting the time of alcohol sales were from Consultant plus [2014].

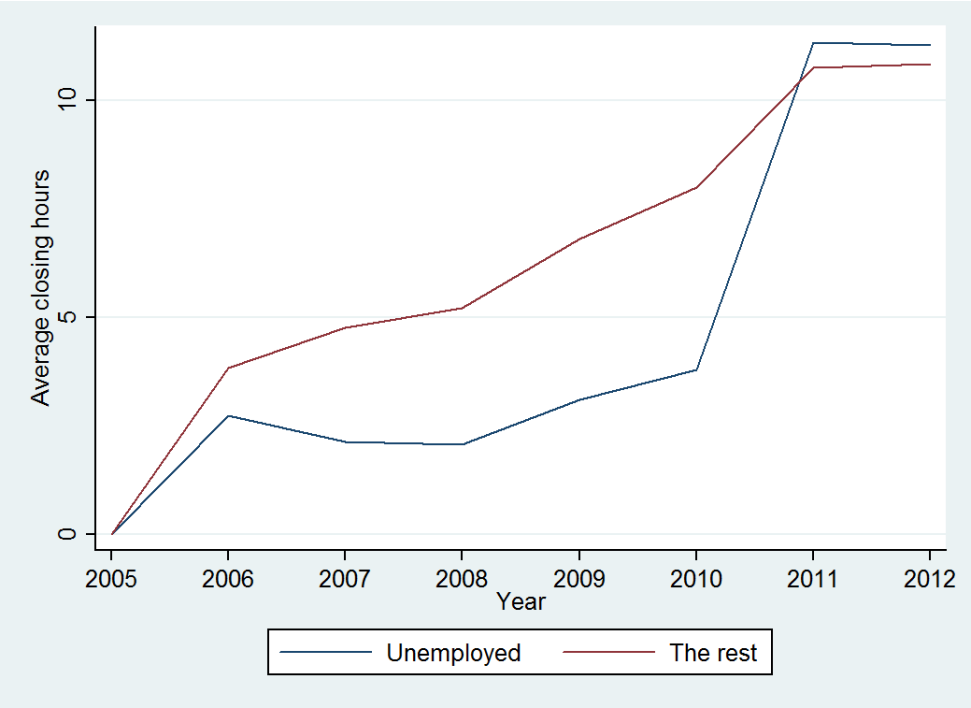

Figure 2. The average number of closing hours for the respondents in the treatment and control groups

4. Data

Figures 1 and 2 show the overall dynamics of the local restrictions for the treatment and control groups from our dataset. Both figures reveal upward dynamics after 2005. The two strongest jumps were seen. First, a jump was seen in 2006 when the restrictions were first implemented in a number of important regions, including Moscow, St. Petersburg, and their neighboring regions, and secondly, a jump was seen in 2011 when the respective federal law was adopted. The first local laws placed approximately 39% of the sample under the time restrictions. Between 2006 and 2010, regions that had already put the restrictions toughened or, sometimes, eased them, and other regions newly placed similar restrictions as well. Therefore, the share of the respondents under the restrictions increased as did the average number of closing hours faced by the respondents. Since 2011, all the respondents have been under the restrictions, though the actual numbers of the closing hours vary across regions and thereby the respondents.

The figures also show an important difference between the groups in their actual exposure to the restrictions between 2005 and 2011. The unemployed tended to reside in the regions which had not yet had the restrictions. For example, in 2010, the share of the unemployed under the restrictions was 39% compared with 81% for the rest of the respondents. The same difference was also seen in the number of closing hours, with the latter group having more than twice the number compared with the unemployed. Hence, the strongest jump in the restrictions for the unemployed group occurred in 2011, while the remaining part of the sample faced a more gradual introduction of the restrictions.

Table 1 presents summary statistics for all the variables we used in our analysis. Because the

Table 1. Sample statistics, 2010 and 2012

	2010						2012					
	All respondents			Unemployed			All respondents			All respondents		
	obs	mean	sd	obs	mean	sd	obs	mean	sd	obs	mean	sd
Dependent variables												
Vodka use	5,681	0.497	0.500	102	0.706	0.458	5,012	0.405	0.491	65	0.338	0.477
Vodka binge drinking	5,652	0.365	0.482	102	0.647	0.480	4,993	0.306	0.461	63	0.286	0.455
Vodka consumption	5,652	130.0	194.4	102	331.1	299.4	4,993	108.6	171.6	63	107.8	197.6
Samogon use	5,653	0.0451	0.208	102	0.0196	0.139	5,012	0.0435	0.204	65	0.169	0.378
Samogon binge drinking	5,646	0.0399	0.196	102	0.0196	0.139	5,008	0.0383	0.192	64	0.156	0.366
Samogon consumption	5,646	13.09	78.02	102	4.902	35.54	5,008	14.65	91.52	64	114.1	301.2
Beer use	5,686	0.608	0.488	102	0.363	0.483	5,012	0.577	0.494	65	0.369	0.486
Beer binge drinking	5,654	0.0543	0.227	102	0.0392	0.195	4,984	0.0630	0.243	63	0.0159	0.126
Beer consumption	5,654	534.7	664.8	102	312.7	538.3	4,984	530.4	670.3	63	249.2	489.9
Wine use	5,677	0.338	0.473	102	0.235	0.426	5,012	0.295	0.456	65	0.200	0.403
Wine binge drinking	5,662	0.0362	0.187	102	0.0294	0.170	5,000	0.0342	0.182	65	0.0769	0.269
Wine consumption	5,662	79.87	179.0	102	67.65	236.0	5,000	71.85	166.2	65	62.31	187.1
Personal characteristics												
Gender (male)	9,325	0.495	0.500	213	0.446	0.498	9,033	0.496	0.500	191	0.419	0.495
Age	9,325	37.13	11.63	213	39.58	10.55	9,033	37.35	11.45	191	36.86	11.85
Marital status												
Officially married	2,316	0.580	0.494	114	0.623	0.487	8,994	0.530	0.499	190	0.479	0.501
Unofficially married	2,316	0.105	0.307	114	0.0439	0.206	8,994	0.132	0.338	190	0.0421	0.201
Divorced	2,316	0.0898	0.286	114	0.0526	0.224	8,994	0.0812	0.273	190	0.0789	0.270
Widow	2,316	0.0419	0.200	114	0.0263	0.161	8,994	0.0260	0.159	190	0.0158	0.125
Social status												
Log personal income	8,983	8.159	3.108	208	6.816	2.488	8,647	8.413	3.177	187	6.912	2.481
Higher education	9,325	0.240	0.427	213	0.141	0.349	8,979	0.251	0.434	190	0.142	0.350
Unemployed	9,325	0.0228	0.149	213	1	0	9,033	0.0211	0.144	191	1	0
Pensioner	9,325	0.0951	0.293	213	0	0	9,033	0.0896	0.286	191	0.00524	0.0724
Self-rated positions on the 1-9 scales												
Rich	9,165	4.089	1.398	210	4.038	1.241	8,851	4.175	1.470	188	4.388	1.285
Powerful	9,115	3.906	1.605	211	4.033	1.405	8,818	4.106	1.631	188	4.441	1.317
Respected	8,990	6.260	1.636	202	5.218	1.527	8,679	6.396	1.581	187	5.449	1.411
Health												
Health problems	9,312	0.261	0.439	213	0.192	0.395	9,013	0.290	0.454	191	0.188	0.392
BMI	9,053	25.43	4.943	207	26.01	4.625	8,775	25.62	5.081	191	25.45	4.845
Locality												
City	9,325	0.390	0.488	213	0.169	0.376	9,033	0.417	0.493	191	0.131	0.338
Town	9,325	0.268	0.443	213	0.117	0.323	9,033	0.251	0.434	191	0.136	0.344
Settlement	9,325	0.0627	0.242	213	0.291	0.455	9,033	0.0641	0.245	191	0.288	0.454
Regional conditions												
Closing hours	9,325	7.812	4.425	213	3.798	4.961	9,033	10.92	1.949	191	11.27	1.421
Local price of ordinary vodka	9,325	227.4	23.85	213	232.6	20.01	9,033	310.5	28.16	191	319.8	23.46
Local price of domestic beer	9,325	55.03	4.381	213	55.80	3.482	9,033	67.99	5.536	191	69.52	4.703
Local price of wine	9,325	204.4	44.46	213	229.3	41.19	9,033	242.3	53.45	191	268.8	45.09

most dramatic change in the actual restrictions for the treatment group occurred in 2011 (Figures 1 and 2), we compared the groups before and after this change. To this end, the statistics are presented for 2010 and 2012 for the whole sample and the unemployed subsample.

For each of the four beverages, we used dummies for whether a respondent consumed the beverage or not. We also constructed dummies for binge drinking, assuming that the alcohol content in vodka, samogon, beer, and wine are 40%, 60%, 5%, and 14%, respectively, and that binge drinking is more than 8 and 6 drinks per occasion for males and females, respectively [NHS Choices website 2012]. Finally, we used consumption of these four beverages measured in milliliters per day. As of 2010, the unemployed used vodka much more whether measured in the proportions of consumers, binge drinkers of vodka, or average consumption.

As of 2012, this difference actually reversed as the unemployed used vodka slightly less as assessed by the same measures. Samogon shows a contrary picture in that the unemployed used less samogon than the rest of the respondents in 2010 and much more in 2012 regardless of samogon

use measured in the proportions of consumers, binge drinkers, or average consumption. Beer and wine were consumed less by the unemployed in both years; however, in 2012, the proportion of binge drinkers of wine among the unemployed became higher than the rest of the respondents. Generally, vodka use decreased in both groups, but more so in the unemployed. Samogon consumption increased in both groups, but this growth was dramatically higher among the unemployed. Beer and wine did not tend to demonstrate similar relationships.

Other variables mostly display substantial differences between the groups, which motivated their use as controls. Sociodemographic and familial characteristics include gender and age; dummies for official and nonofficial marital statuses, being divorced and being widowed; log personal income, dummy for higher education, and dummies for being retired and being unemployed. In addition, we included three self-rated positions on the scales of wealth, power, and respect from other people. Health condition was measured by self-reported presence of health problems and by body-mass index. The latter is defined as $mass/height^2$ and traditionally serves as an objective covariate of an individual health condition. Regional conditions, in addition to the hour restrictions, include local prices for the beverages, as prices are obvious market factors of demand for the respective beverages. Other spatial characteristics we used were dummies for type of a respondent's residence. There is rich theoretical and empirical literature concerning all the included controls as important covariates of alcohol use and abuse [Andrienko and Nemtsov 2006; Baltagi and Geishecker 2006; Dee 2001; Denisova 2010b; Roshchina 2013; Skorobogatov 2012; Stockwell et al. 2011; Treisman 2010; Yakovlev 2012].

Given the timing of the local policies, we used a time frame of 2005-2012 for estimating the policy effect on vodka and samogon and a time frame of 2005-2011 for beer and wine.

5. Results

The main interest variable, the interaction term, was significantly negative in all the specifications for vodka (Panel A of Table 2), was positive in all the specifications for samogon (Panel B of Table 2), was positive in short specifications for using and consuming beer and dry wine (Panels A and B of Table 3). For the treatment group, the marginal effects of the additional closing hour on using and binge drinking vodka were -0.0266 and $-0.0268 - 0.0033$, respectively. For samogon, the same marginal effects equaled to $0.0064 - 0.0023$ and $0.0063 - 0.0020$ (Table 4). Thus, an additional closing hour decreased the probability of using or binge drinking vodka in the treatment group by 3.01% and 2.66%; for samogon, the same probabilities increased by 0.41% and 0.43%. Hence, for people most exposed to the restriction, shorter trading hours decreased the probabilities of using and binge drinking for vodka on average by 33% and 29% and increased these probabilities for samogon by approximately 5% (cf. Table 1).

The respective odds ratios are 0.9264 and $\exp\{\log(0.9223)+\log(0.9900)\} = 0.9131$ for vodka, and $\exp\{\log(0.9777) + \log(1.0658)\} = 1.0420$ and $\exp\{\log(0.9783) + \log(1.0723)\} = 1.0490$ for samogon. The odds ratio for consuming vodka and samogon in the treatment group are $\exp\{\log(0.9926) + \log(0.8997)\} = 0.8930$ and $\exp\{\log(0.9765) + \log(1.0860)\} = 1.0605$ (Ta-

ble 4), respectively. For beer and wine, significant differences between the treatment and control groups were observed only in the short regressions. The effect of the closing hours on the control group for vodka was significantly negative for all the specifications, except for the long regression of vodka use (Panel A of Table 2).

The effect was significantly negative in all the specifications for samogon (Panel B of Table 2). For beer it was significant only in the short regressions of its use and consumption (Panel A of Table 3). The effect was significantly positive in all the specifications for wine, except for long regression of binge drinking (Panel B of Table 3).

The treatment group mostly had systematic time-constant differences in alcohol involvement as follows: the group used vodka more (significantly positive in all the specifications); for samogon, there were no systematic differences; and for beer and wine, significant differences favored the control group for the use and consumption measures (Tables 2-3).

The controls (their output is dropped in Tables 2-4) are mostly significant and have the expected signs [see Cook and Peters 2005; Dee 2001; Gibb et al. 2011; Isabel and Molina 2007; Skorobogatov 2012; Stockwell et al. 2011]. Men were more involved in alcohol use. Involvement in vodka and samogon use and abuse increased with age, while for use and abuse of beer and wine age was a negative factor [cf. Yakovlev 2012]. Alcohol use decreased with a measure of human capital. Log income is mostly an insignificant factor for vodka but was a significantly negative one for samogon, which suggests that samogon is consumed by relatively poor people. Interestingly, local vodka prices turned out not to be significantly linked with vodka use [cf. Kolosnitsyna et al. 2014], but they are highly significantly linked negatively with samogon use. This finding can be explained by some complementarity between vodka and samogon and that the latter is consumed by the poor. Inclusion of the controls substantially increased the quality of the regressions as was seen in pseudo R-squareds in the short and long specifications for all the outcome variables (Tables 2-3).

6. Discussion

Local restrictions on the closing hours for strong alcohol sales had the expected direct and indirect effects on alcohol use of the respondents most exposed to the restrictions. The direct effect was a decrease in vodka use and abuse in the treated people as well as in their overall vodka consumption. The rest also showed a downward trend in their use and abuse of vodka but to a much lesser extent. This result is consistent with other studies supporting the effectiveness of the hour restrictions [Plant & Plant 2005; Popova et al. 2009; Hahn et al. 2010; Chikritzhs and Stockwell 2009; Duailibi 2007; Vingilis et al. 2005; Rossow & Norström 2011; Kolosnitsyna et al. 2014], but it suggests that the restriction mostly affects a particular group of people rather than everyone, which is in line with Douglas [1998].

The indirect effect was an increase in use, abuse, and consumption of samogon in the treated people. However, the net effect of the restrictions on use or abuse of any kind of vodka in the treated participants is strongly negative. By 2012, the average number of closing hours was consistent

Table 2. Estimation results for vodka and samogon (2005-2012)

	Use		Binge drinking		Consumption	
	short	long	short	long	short	long
	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: Vodka					
Time lag of closing hours	-0.0079***	-0.0072	-0.0065***	-0.0101*	-0.0064***	-0.0075*
	(0.0000)	(0.0686)	(0.0001)	(0.0123)	(0.0000)	(0.0321)
Unemployed	0.4919***	0.5361***	0.6231***	0.6222***	0.7682***	0.8362***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Unemployed × Time lag of closing hours	-0.0544***	-0.0764***	-0.0590***	-0.0809***	-0.0777***	-0.1057***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Year fixed effects	No	Yes	No	Yes	No	Yes
Full list of controls	No	Yes	No	Yes	No	Yes
Observations	30,464	13,282	30,363	13,264	30,363	13,264
Pseudo R-squared	0.002	0.119	0.002	0.109	0.001	0.060
	Panel B: Samogon					
Time lag of closing hours	-0.0325***	-0.0226***	-0.0333***	-0.0219**	-0.0328***	-0.0237***
	(0.0000)	(0.0010)	(0.0000)	(0.0024)	(0.0000)	(0.0005)
Unemployed	0.0163	-0.3064	0.0454	-0.3226	0.0122	-0.3057
	(0.8982)	(0.1146)	(0.7252)	(0.1100)	(0.9239)	(0.1170)
Unemployed × Time lag of closing hours	0.0510**	0.0637*	0.0516**	0.0698**	0.0574**	0.0825**
	(0.0030)	(0.0109)	(0.0030)	(0.0062)	(0.0023)	(0.0028)
Year fixed effects	No	Yes	No	Yes	No	Yes
Full list of controls	No	Yes	No	Yes	No	Yes
Observations	30,391	13,255	30,363	13,246	30,363	13,246
Pseudo R-squared	0.016	0.176	0.017	0.186	0.011	0.119

Robust p-values in parentheses

*** p<0.001, ** p<0.01, * p<0.05

with the net estimated effect of -28.6% and -24.6% for use and binge drinking of any vodka among people most inclined to begin or continue their drinking parties at night. The treated people might have substituted vodka with light beverages, with some evidence that they did, but this evidence is not as reliable as the samogon finding, because the respective interest variables are significant only in the short specifications.

There are some expected and unexpected results concerning the closing hour effects on alcohol use of the control group. The policy did not affect the use of beer in the control group, which can be explained by the control group mostly consisting of people who do not drink alcohol at night. The unexpected result is that the policy positively affected their use of wine, and, most surprisingly, negatively affected their use of samogon. The reason is clearly related to a by-product of the policy. Many 24-hour shops closed, because overnight alcohol sales had been one of the main sources of their revenue. These shops might informally sell samogon at night, and their closing deprived samogon producers of their distributors. Redistribution of the alcohol retail market from the 24-hour shops moved the available range of alcohol beverages away from samogon in favor of wine, as the latter was much more available in supermarkets. Beer use was not touched by this by-product because it was sold equally in small and big shops.

Our results concerning the substitution are consistent with Kolosnitsyna et al. [2014] for beer but are different for samogon. As for the latter, our results for substitution confirm that samogon is being substituted for vodka as its price increases [Andrienko and Nemtsov 2006]. As a result of the hour restrictions, the respondents most exposed to this policy substantially increased their use and abuse of samogon, while the rest of the people decreased its use and abuse. Compared with the previous findings, our results suggest that the restriction did cause the substitution of samogon for vodka, but this effect was seen only in the special group, while the rest of the people even

Table 3. Estimation results for beer and wine (2005-2011)

	Use		Binge drinking		Consumption	
	short	long	short	long	short	long
	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: Beer					
Time lag of closing hours	-0.0118***	0.0005	0.0038	0.0083	-0.0048**	0.0041
	(0.0000)	(0.9034)	(0.1990)	(0.2630)	(0.0040)	(0.2991)
Unemployed	-0.5927***	-0.4903***	-0.0793	0.1588	-0.4983***	-0.3411*
	(0.0000)	(0.0001)	(0.6225)	(0.4798)	(0.0000)	(0.0156)
Unemployed × Time lag of closing hours	0.0559***	0.0402	0.0302	-0.0607	0.0504***	0.0312
	(0.0002)	(0.1207)	(0.1946)	(0.2400)	(0.0005)	(0.2364)
Year fixed effects	No	Yes	No	Yes	No	Yes
Full list of controls	No	Yes	No	Yes	No	Yes
Observations	25,464	8,489	25,371	8,476	25,371	8,476
Pseudo R-squared	0.003	0.104	0.000	0.059	0.001	0.056
	Panel B: Wine					
Time lag of closing hours	0.0190***	0.0135**	0.0161***	0.0069	0.0237***	0.0147**
	(0.0000)	(0.0035)	(0.0000)	(0.4130)	(0.0000)	(0.0011)
Unemployed	-0.4470***	-0.5272**	0.0209	0.1900	-0.4626***	-0.6095*
	(0.0000)	(0.0050)	(0.9035)	(0.5064)	(0.0002)	(0.0192)
Unemployed × Time lag of closing hours	0.0375*	0.0418	-0.0048	-0.0322	0.0407*	0.0527
	(0.0182)	(0.1707)	(0.8689)	(0.5436)	(0.0195)	(0.1153)
Year fixed effects	No	Yes	No	Yes	No	Yes
Full list of controls	No	Yes	No	Yes	No	Yes
Observations	25,446	8,857	25,391	8,839	25,391	8,839
Pseudo R-squared	0.005	0.168	0.004	0.082	0.005	0.089

Robust p-values in parentheses

*** p<0.001, ** p<0.01, * p<0.05

Table 4. Odds ratios and marginal effects in the long regressions for vodka and samogon

	Use		Binge drinking		Consumption	
	Vodka	Samogon	Vodka	Samogon	Vodka	Samogon
	(1)	(2)	(3)	(4)	(5)	(6)
T. lag c. h.	0.9928	0.9777***	0.9900*	0.9783**	0.9926*	0.9765***
	(0.9851 - 1.0006)	(0.9646 - 0.9909)	(0.9822 - 0.9978)	(0.9645 - 0.9923)	(0.9858 - 0.9994)	(0.9635 - 0.9897)
	[-0.00252]	[-0.00226]	[-0.00333]	[-0.00198]		
Unemployed	1.7093***	0.7361	1.8631***	0.7242	2.3076***	0.7366
	(1.3222 - 2.2097)	(0.5030 - 1.0771)	(1.4683 - 2.3639)	(0.4876 - 1.0758)	(1.8879 - 2.8204)	(0.5026 - 1.0796)
	[0.187]	[-0.0306]	[0.206]	[-0.0292]		
Interaction	0.9264***	1.0658*	0.9223***	1.0723**	0.8997***	1.0860**
	(0.8951 - 0.9588)	(1.0148 - 1.1194)	(0.8918 - 0.9538)	(1.0200 - 1.1273)	(0.8723 - 0.9280)	(1.0289 - 1.1463)
	[-0.0266]	[0.00637]	[-0.0268]	[0.00631]		
Observations	13,282	13,255	13,264	13,246	13,264	13,246

Robust confidence intervals in parentheses; average marginal effects in square brackets.

*** p<0.001, ** p<0.01, * p<0.05

decreased their use and abuse of samogon along with vodka.

The main findings of this paper are that the direct effect of the closing hour restriction was a decrease in using factory-made vodka and its partial substitution by the homemade vodka; however, the net effect was still a decrease in using vodka in those most exposed to the restriction. In addition, a by-product of the restriction was a redistribution of the alcohol market in favor of big shops that resulted in a fall of samogon sales and the rise of wine sales.

The first implication of these results is that the closing hours are effective in preventing people from binge drinking and simply using strong alcohol, even in a country with poor observance of the law and substantial informal alcohol production. The second implication is that such restrictions induce people to substitute alcohol that does not fall under the restrictions. Finally, the closing hour restrictions may cause redistributions of the alcohol retail market that in turn entails changes in the range of available alcohol. These indirect consequences of the restrictions should be taken

into account by the decision makers.

7. Conclusion

The contribution of this research is threefold: it evaluates the effect of the closing hour restrictions for a specific audience; the results are obtained for the direct and indirect effects of the policy; and this is done by means of a differences-in-differences design.

The strengths of the research are related to the high reliability and robustness of its results. The design allows us to control for systematic differences between people exposed to the restrictions and those not, and thereby to cope with the major confounding factor. The estimates are robust to year fixed effects and many controls. Standard error estimates are robust to clustering across the participants, so that the inference as to the significance is reliable. The results are obtained by the most relevant estimator, though alternative estimators, OLS, Tobit, and Poisson, give very similar results.

However, choice of the treatment group is based on the assumption that the unemployed were the most exposed to the restriction. Therefore, our conclusions are based on whether the drinking behavior of the distinguished groups actually fits this assumption. There is also a problem with the dataset, namely, that the latter does not allow us to distinguish between those using only one type of beverages per occasion from those mixing various beverages, which may understate the actual numbers of binge drinkers.

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Alexander S. Skorobogatov
National Research University Higher School of Economics
e-mail: skorobogat@mail.ru