Alcohol consumption and happiness: an empirical analysis using Russian panel data

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Abstract: This paper is based on the idea that the consumption of addictive goods is very likely to rely on an imperfect decision process and gains being analysed through subjective satisfaction data. It uses data from the RLMS-HSE (Russia Longitudinal Monitoring Survey – Higher School of Economics) to examine the links between alcohol consumption and subjective well-being. In most subsamples, we find that the correlation between satisfaction and alcohol consumption is hump-shaped, but that satisfaction is linearly decreasing with the quantity consumed when the causal effect of alcohol on satisfaction is isolated. The study of changes in consumption habits indicates that moderate-high drinking is associated with durable low levels of satisfaction, but that heavy drinking could work as an efficient self-medication device.

Key words: subjective well-being, alcohol consumption, panel data, Russia.

1. Introduction

The study of choice in general and of consumption decisions in particular is at the core of neoclassical economics. This school of thought, however, turns away from the question of the quantitative evaluation of the relationship between choices and satisfaction[2], since it stipulates that individuals are perfect utility-maximisers, so that any choice they make necessarily enhances their well-being in the best possible way, given their preferences.

Nevertheless, for a few years there has been an increasing recognition, through the influence of behavioural economists, that individuals can be subject to imperfect rationality in their decisions because of systematic anomalies and biases (e.g. self-control problems or misprediction of future costs and benefits, see Camerer, Loewenstein, & Rabin, 2003). In such cases, there is no guaranty that choices maximise, or even enhance, well-being. At the same time, reported subjective well-being measures from surveys are becoming widely accepted as a valid proxy for experienced utility thanks to a better understanding of what responses to subjective questions really capture and to the greater availability of such data in large samples, especially in the form of panels, which enables the treatment of individual

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[2] We use the terms "satisfaction", "happiness", "well-being" and "utility" as synonyms in this paper.

heterogeneity (Frey & Stutzer, 2002; Kahneman & Krueger, 2006). Because of these two fundamental evolutions, the quantitative study of the relationship between choices and satisfaction has become both necessary (in cases where non-standard decision processes are suspected at least) and possible.

Substance use can lead to substance abuse, or addiction, which is often considered a typical irrational behaviour, addicts being involuntarily stuck in consumption patterns that reduce their well-being (e.g., see Bernheim & Rangel, 2004; Gruber & Köszegi, 2001; O'Donoghue & Rabin, 1999). For this reason, Graham (2008) notes that behaviours such as smoking, drinking or drug use constitute a "[privileged] area where a choice approach is limited and happiness surveys can shed light". Surprisingly, however, while the use of subjective satisfaction data has recently been applied to important daily consumption decisions, such as fast food and soft drink consumption (Chang & Nayga, 2010) and TV watching (Frey, Benesch, & Stutzer, 2007), little attention has been paid to the links between substance use and declared well-being.

This paper aims to contribute to filling this gap by providing large-scale evidence on the relationship between alcohol consumption and reported life satisfaction, using data from the Russia Longitudinal Monitoring Survey-Higher School of Economics (RLMS-HSE). Studying alcohol consumption in Russia is of particular interest given the importance of drinking in the Russian culture and its disastrous consequences in terms of public health. Its role in the current mortality crisis is well documented (Norström, 2011; Zaridze, Brennan, Boreham, Boroda, Karpov, Lazarev et al., 2009). Investigations about the links between alcohol consumption and well-being can contribute to a better understanding of the causes and consequences of drinking and can potentially lead to useful public policy recommendations.

The remainder of the paper is organised as follows. Section 2 introduces the main theoretical arguments that can justify a specific relationship between drinking and well-being and reviews previous studies on the subject. Section 3 presents the dataset. Section 4 displays the empirical results. Section 5 concludes.

2. Alcohol consumption and well-being: theoretical insights and previous studies

Alcohol consumption seems to have a subtle and ambiguous relation to well-being. On the one hand, reasonable drinking performs certain psychological functions (enjoying the taste of beverages, relaxing, improving one's mood), as well as several social functions (facilitating contact with others, celebrating important dates and events, among others). There also seems to be a clear beneficial health effect of regular light to moderate drinking (Rehm, Room, Monteiro, Gmel, Graham, Rehn et al., 2004). As such, it can be considered as a pleasurable activity, associated with high well-being. On the other hand, alcohol abuse has important detrimental effects. The International Classification of Diseases (ICD 10, World Health Organisation) distinguishes acute intoxication due to occasional but very intense

consumption from dependence syndrome, due to repeated consumption. Both can be responsible for different kinds of physical and psychological disorders (such as high blood pressure, pancreatic damages and depression), injuries (accidents or violence), as well as social exclusion (see also Rehm, Room, Monteiro et al., 2004). For this reason, we expect heavy alcohol consumption to be associated with low levels of well-being.

From these elementary conceptual elements, it seems reasonable to assume a hump-shaped relationship between alcohol consumption and well-being, "moderate" drinking being positively correlated and "excessive" drinking being negatively correlated with satisfaction. A simple analysis of reported consumption and satisfaction data should allow us to check for this relationship and to assess the levels of "moderate" and "excessive" drinking.

We identified seven studies that provide some measure of the correlation between alcohol consumption and life satisfaction. Their results are quite heterogeneous. When testing for simple cross-sectional linear relationships, results are not significant (Bakker & VandeBerg, 1974; Schulz, Költringer, Norden, & Tüchler, 1985), except in Else-Quest et al. (2005), where the correlation is significantly positive. Three studies tend to confirm the plausibility of a hump-shaped relationship. First, Brenner (1967) finds that light drinkers who have not encountered problems due to drinking report being "very happy" more frequently than others (abstainers included), while medium and heavy drinkers who have encountered problems due to drinking report being "not too happy" more frequently than others. Second, Ventegodt (1995) reports that correlations are low and not significant, but a reversed U-pattern seems plausible: moderate drinkers tend to be happier than abstainers and heavy drinkers. The greatest satisfaction is reached at 3-4 glasses consumed the week prior. Third, Cummins (2008) notices that drinking a small amount of alcohol each day is generally associated with high well-being, but also that important differences appear when gender and age are taken into account. On the contrary, the results of Levy et al. (1980) rather speak in favour of a U-shaped relationship: excluding heavy drinkers, a decreasing linear relationship is found between drinking and perceived satisfaction. Surprisingly, however, heavy drinkers report a higher satisfaction than moderate drinkers.

All these studies report very basic correlations between alcohol consumption and satisfaction. These two variables are, nonetheless, probably linked by a complex causal relationship, which needs to be investigated. Alcohol consumption can certainly, to some extent, cause satisfaction. But consumption can also be caused by satisfaction. Happy events are often celebrated with alcohol and unhappy people tend to "drink to forget". Both can also be simultaneously determined by a confounding variable. For instance, a sociable personality makes you both have many friends and feel happy, which in turn may offer you more occasions to drink, while being unemployed may make you both unhappy and lead to having plenty of time to drink. Isolating these effects is a difficult task and requires a careful identification strategy. Our approach consists in trying to take advantage of the

richness of the RLMS-HSE dataset, especially of its longitudinal nature, in order to isolate the causal effect of alcohol consumption on satisfaction.

This issue is of particular interest due to the fact that drinking is habit-forming. Economic theories of addiction describe several hypotheses about the way individuals cope with habit formation. Becker and Murphy (1988) assume that individuals are perfectly capable of anticipating habit formation and choose, at each moment, the level of drinking that maximises their current and future utility. This approach does not necessarily rule out the possibility that heavy drinking has a negative causal impact on well-being (i.e., that individuals would be happier if they could drink less) at some points in time, but requires that this negative effect is more than compensated by a positive causal impact at some other points in time, typically before. The positive causal effect of heavy drinking on satisfaction is often referred to as self-medication. Becker and Murphy (1988) indeed recognise that people often become addicted precisely because they are unhappy. Substance use may help them deal with life's difficulties, at least for some time. For this reason, a negative correlation between heavy consumption and happiness would primarily be explained by a selection effect of unhappy people into heavy use.

Several recent contributions, notably Gruber and Köszegi (2001), O'Donoghue and Rabin (1999) and Bernheim and Rangel (2004), develop a very different view on addiction. They consider that addicts are not fully capable of controlling their consumption because of time-inconsistent preferences, modelled via hyperbolic discounting or cue-triggered decision processes. In such cases, individuals tend to focus on immediate benefits and fail to consider future costs adequately. They are involuntarily stuck in consumption patterns that reduce their overall well-being, that is, the negative effects of drinking dominate the positive effects over the course of their lives.

Discriminating between these theories is difficult. Fehr and Zych (1998) report the results of an experiment in which addictive preferences were induced. They show that "addicts" consume systematically too much compared to the optimal consumption decision described by the theory of rational addiction of Becker and Murphy (1988). Another common approach is to search for evidence of the use of external commitment devices by addicts because such devices prove time consistency wrong. For instance, Gruber and Mullainathan (2005) show that higher cigarette excise taxes make those who have a propensity to smoke happier. This is clearly inconsistent with rational views of smoking and can be interpreted as a sign that smokers have self-control problems. In this paper, we explore to what extent a direct measurement of the causal impact of alcohol consumption on subjective well-being can inform the debate. The task is not easy. Since addiction is a dynamic pattern, satisfaction is likely to vary both with the quantity consumed and the moment of the drinkers' career. Unfortunately, we have little information on the latter. Considering that the pool of drinkers in our dataset gathers drinkers randomly distributed according to the moment of their career, testing whether being a drinker has a beneficial or detrimental effect on satisfaction is informative. Indeed, finding

that being a drinker has a negative effect on satisfaction would provide evidence that, on average, drinkers have self-control problems. On the contrary, finding that being a drinker has a positive effect on satisfaction would indicate that, on average, drinkers are capable of keeping control over their consumption (even though this would not demonstrate that they actually behave in a perfectly rational way). In addition to this simple test, an analysis of the impact of the quantity consumed on satisfaction could provide an indication of the average quantity from which the detrimental aspects of addiction appear (whatever the degree of control over consumption), which would help calibrate public policies.

3. Data and sample selection

Our study is based on data from the RLMS-HSE, conducted by the 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. This is a comprehensive survey carried out on a representative sample of Russian households and individuals since 1992. The survey consists of two phases. Since only phase II contains a panel component, we restrict our analysis to this phase. It has 14 rounds (rounds 5 through 18) running from 1994 to 2009.

3.1. Life satisfaction

Our explained variable is declared life satisfaction. The question of the RLMS-HSE is formulated this way: "To what extent are you satisfied with your life in general at the present time?". Respondents must tick one of the following answers: fully satisfied, rather satisfied, both yes and no, less than satisfied, not at all satisfied. We consider the responses as a proxy for individual utility. Two main difficulties arise when considering such measures.

First, it is likely that individuals anchor their scale at different levels, making interpersonal comparisons of responses meaningless. The use of a panel survey, where the metric used by individuals is time-invariant over the period of observation, precisely aims to avoid this problem since a fixed effects estimator will make inference based on intrapersonal, rather than interpersonal, comparison of satisfaction. Since the analysis will focus on within-individual changes in alcohol consumption and life satisfaction, we exclude from the sample individuals who participated in only one round.

Second, there is a debate concerning the nature of the "life satisfaction" variable: should it be considered as a discrete ordinal variable or as a continuous one? Put differently, should we consider that the difference in happiness between "fully satisfied" and "rather satisfied" is the same as between "less than satisfied" and "not at all satisfied" for any individual (as usually assumed by psychologists) or not (as usually assumed by economists)? Ferrer-i-Carbonell and Frijters (2004) have shown via estimates based on the German Socio-Economic Panel (GSOEP) that assuming ordinality or cardinality of happiness scores makes little difference. For this reason, we choose to consider happiness scores as a continuous variable ("not at all satisfied"

is rated 1 and "fully satisfied" is rated 5). This enables us to estimate linear regression models. In the robustness analysis, we check that ordinal estimation methods produce similar qualitative results.

3.2. Alcohol consumption

Alcohol consumption is our main explanatory variable. The survey asks respondents whether they consumed any alcohol during the last 30 days. In the first five rounds of phase II of the survey (rounds 5 to 9), what should be considered as an alcoholic beverage is not specified. From the 6th round (round 10) on, beer is explicitly designated as being an alcoholic beverage. Data indicate that about 10% of respondents who spontaneously declare being non drinkers do in fact drink beer. This means that in rounds 5 to 9, some respondents are inappropriately excluded from the sample of drinkers. For this reason, we decided to exclude these rounds from our analysis.

To describe alcohol consumption, we construct an indicator that measures the monthly quantity of pure alcohol consumed. This is done by combining two types of information available in the survey: the frequency of consumption (from "never in the past 30 days" to "every day") and the average daily consumption defined in grams by type of beverage (beer, dry wine, fortified wine, home-made liquor, vodka and other hard liquor, as well as other alcoholic beverages). Since different types of beverages contain different percentages of ethanol (pure alcohol), alcohol consumption is calculated as a weighted average of the ethanol typically found in each beverage. Following Baltagi and Geishecker (2006), we assume that the amount of ethanol is 5% in beer, 10% in dry wine, 19% in fortified wine, 45% in homemade liquor, 40% in vodka and 20% for other alcoholic beverages.

Self-reported measures of alcohol consumption have already been pointed out as potentially subject to important biases (see for instance Midanik, 1989; Nemtsov, 2003; 2004). In our data, large under-reporting can easily be detected. Tapilina (2007) estimates that per capita pure alcohol consumption was about 15 litres in 2000 in Russia, and it seems that it has been increasing since then (WHO, 2011). With our data, we obtain an average of only 5.6 litres. Memory bias and voluntarily under-reporting are two possible explanations for this low figure. This can clearly generate important problems in the empirical analysis if the biases are not random, but there seems to be no easy way to overcome this limitation.

3.3. Control variables

We use typical control variables in happiness studies: age, gender, marital status, occupational status, real household income, health condition, settlement type and geographical area of living. We add some variables that are very likely to influence both alcohol consumption and life satisfaction: smoking status, body mass index (BMI) and pregnancy status.

3.4. Description of the final sample

Individuals with missing information on the two key variables (life satisfaction and alcohol consumption) are excluded from the sample. Combined with the sample restrictions previously discussed (first five rounds and individuals who participated once excluded), this finally leaves us with 17,458 individuals, providing 95,474 observations. Table 1 provides descriptive statistics for the main variables of interest (life satisfaction and alcohol consumption) in the full sample and six subsamples defined by age and gender.

	Full sample	Men			Women		
		Age<30	30<Age<50	Age>50	Age<30	30<Age<50	Age>50
% of full sample		14.0	15.7	12.8	15.5	18.7	23.3
Life satisfaction (mean)	2.94	3.31	2.97	2.84	3.22	2.83	2.67
Drinker (%)	56.5	62.6	74.8	69.1	51.9	60.7	56.7
Monthly quantity (mean)	369.3	491.1	910.2	675.7	142.0	178.8	70.4
1st decile	25.0	50.0	95.0	62.5	20.0	20.0	12.0
2nd decile	50.0	90.0	187.5	112.5	30.0	38.0	20.0
3rd decile	85.0	125.0	262.5	200.0	50.0	55.0	30.0
4th decile	125.0	212.5	370.0	280.0	75.0	80.0	45.0
5th decile	200.0	300.0	500.0	400.0	100.0	112.5	62.5
6th decile	300.0	450.0	680.0	520.0	150.0	162.5	100.0
7th decile	450.0	640.0	1,000.0	800.0	212.5	225.0	147.5
8th decile	750.0	1,000.0	1,550.0	1,300.0	320.0	325.0	200.0
9th decile	1550.0	1,950.0	2,900.0	2,550.0	600.0	585.0	366.5

Table 1. Descriptive statistics for the main variables of interest (life satisfaction and alcohol consumption) in the full sample and six subsamples

4. Empirical analysis

The empirical analysis is conducted in four stages. First, we run simple pooled (cross sectional) OLS regressions. This serves a descriptive goal. Next, we try to isolate the causal impact of alcohol consumption on life satisfaction. This is done by using a GMM dynamic panel estimator. Then, we conduct a transitional analysis (i.e. an analysis of the lags and leads) of changes in drinking habits. Finally, a robustness analysis is provided.

4.1. Simple pooled regressions results

The empirical model is simply:

$$LS_{it} = \alpha + \beta AL_{it} + \varepsilon_{it} \quad (1)$$

where LS is life satisfaction, AL alcohol consumption and ε the error term for each individual i at each time period t. Since we consider LS as a continuous variable, we

use OLS regressions. We use three different specifications for alcohol consumption: a simple dummy for being a drinker, the monthly quantity consumed[3] and finally, since we suspect a non-linear relationship, a quadratic specification that includes the monthly quantity consumed and its square. The results are reported in Table 2.

In the full sample, we find a hump-shaped relation between satisfaction and alcohol consumption. The greatest satisfaction is reached for a monthly quantity of approximately 100 grams. When testing for a linear relationship, we obtain a significantly negative coefficient, which indicates that the decreasing part of the relationship dominates. Overall, drinkers report, however, being happier than abstainers. We find the same general pattern in four subsamples, namely those of men and women over 30. The quantity that is associated with the greatest satisfaction varies widely between men and women: approximately 130 grams for the former and 40 grams for the latter. Note also that male drinkers between 30 and 50 do not report being significantly happier or unhappier than abstainers. The case of young people (men and women under 30) is of particular interest. In these subsamples, we find, first, that drinkers report being unhappier than abstainers and, second, that satisfaction is linearly decreasing with satisfaction, the quadratic specification being insignificant.

4.2. Causal impact of alcohol consumption on life satisfaction

Formally, we want to estimate the following equation:

$$LS_{it} = \alpha + \beta AL_{it} + \beta' X_{it} + \beta'' LS_{it-1} + \delta_t + \mu_i + \varepsilon_{it} \quad (2)$$

where *X* is the vector of time-variant control variables (age, health, income[4], smoking status, BMI, marital status, occupation and pregnancy status). The lagged value of life satisfaction is included on the right-hand side to capture persistence in satisfaction (Bottan & Perez Truglia, 2011). δ_t is a round fixed effect and μ_i is an individual fixed effect, which captures time-invariant factors (both observed ones such as gender, settlement type and geographical area, and unobserved ones, such as personality traits).

When estimating this model, we are confronted with an endogeneity problem because (i) the regressor LS_{it-1} is mechanically correlated with ε_{is} for $s < t$ and (ii) reverse causality (impact of satisfaction on alcohol consumption) is highly plausible, as stated before. This makes OLS regressions inappropriate. To overcome this difficulty, we use the system GMM estimator developed by Arellano and Bover (1995) and Blundell and Bond (1998). This estimator, as well as the difference GMM estimator established by Arellano and Bond (1991) are designed for 1) "small T, large

[3] In order to minimise the influence of skewed data, the natural logarithm of the monthly quantity consumed is used. Non-drinkers are thus excluded from such regressions.

[4] In order to minimise the influence of skewed data, the natural logarithm of real household income is used. However, a pure logarithmic transformation cannot be implemented due to the presence of zero income. As a consequence, the variable is redefined as Log(real household income+1).

Dependent variable: Life satisfaction (pooled OLS regressions)			
	Full sample		
Drinker	0.080***		
	(0.011)		
Log(Quantity)		-0.026***	0.173***
		(0.004)	(0.021)
Log(Quantity)²			-0.019***
			(0.002)
Constant	2.897***	3.115***	2.627***
	(0.009)	(0.024)	(0.054)
Observations	95,474	53,305	53,305
R-squared	0.001	0.001	0.004
Maximal satisfaction reached for a quantity of:			*104.6*

	Men								
	Age<30			30<Age<50			Age>50		
Drinker	-0.087***			-0.028			0.070**		
	(0.025)			(0.028)			(0.031)		
Log(Quantity)		-0.060***	-0.016		-0.082***	0.277***		-0.052***	0.253***
		(0.010)	(0.056)		(0.010)	(0.059)		(0.013)	(0.071)
Log(Quantity)²			-0.004			-0.029***			-0.026***
			(0.005)			(0.005)			(0.006)
Constant	3.366***	3.620***	3.505***	2.989***	3.475***	2.417***	2.789***	3.174***	2.318***
	(0.022)	(0.057)	(0.154)	(0.026)	(0.063)	(0.179)	(0.027)	(0.075)	(0.202)
Observations	13,366	8,248	8,248	15,026	11,090	11,090	12,174	7,894	7,894
R-squared	0.001	0.006	0.007	0.000	0.010	0.015	0.001	0.004	0.008
Maximal satisfaction reached for a quantity of:						*118.6*			*137.3*

	Women								
	Age<30			30<Age<50			Age>50		
Drinker	-0.098***			0.064***			0.164***		
	(0.023)			(0.023)			(0.023)		
Log(Quantity)		-0.049***	0.044		-0.031***	0.113**		-0.023*	0.110**
		(0.011)	(0.051)		(0.011)	(0.052)		(0.013)	(0.052)
Log(Quantity)²			-0.010*			-0.015***			-0.015**
			(0.005)			(0.005)			(0.006)
Constant	3.267***	3.399***	3.196***	2.791***	3.000***	2.676***	2.611***	2.872***	2.601***
	(0.019)	(0.051)	(0.118)	(0.020)	(0.052)	(0.123)	(0.016)	(0.055)	(0.114)
Observations	14,790	7,592	7,592	17,857	10,746	10,746	22,261	7,735	7,735
R-squared	0.002	0.004	0.004	0.001	0.001	0.003	0.005	0.001	0.002
Maximal satisfaction reached for a quantity of:						*46.7*			*40.1*

Robust standard errors in parentheses.*** p<0.01, ** p<0.05, * p<0.1.

Table 2. Simple regressions results

N" panels (few time periods, many individuals); 2) a linear functional relationship; 3) a single left-hand side variable that is dynamic, depending on its own past realisations; 4) independent variables that are not strictly exogenous, meaning correlated with past and possibly current realisations of the error; 5) fixed individual effects; and 6) heteroskedasticity and autocorrelation within individuals but not across them (Roodman, 2006). Our preference for system GMM over difference GMM relies on the main argument that, when using unbalanced panels, which is our case, it is better to avoid difference GMM estimation because it magnifies gaps (Roodman, 2006).

In practice, we implement this estimator using *xtabond2* Stata command. As it is quite a heavy procedure, we distinguish two stages in our estimation. First, we estimate a pooled OLS regression of life satisfaction on all time-variant control variables (alcohol consumption being excluded). Formally, we estimate:

$$LS_{it} = \alpha + \beta' X_{it} + \varepsilon_{it} \quad (3)$$

Afterwards, we use the residuals from this regression to create a variable that captures each respondent's "unexplained satisfaction" (i.e. satisfaction that is not explained by usual time-variant demographic and socioeconomic determinants) and we test whether alcohol consumption can explain this residual satisfaction by estimating:

$$\varepsilon_{it} = \alpha' + \beta AL_{it} + \beta'' \varepsilon_{it-1} + \delta_t + \mu_i + \varepsilon'_{it} \quad (4)$$

This procedure, partly inspired by Graham et al. (2004), allows us to get rid of the set of time-variant control variables during the second stage, which makes the GMM procedure easier to implement. For alcohol consumption, we use the same successive specifications as in simple regressions (a dummy for being a drinker, the monthly quantity alone and the monthly quantity and its square).

To save space, the results of the first-stage regressions are not reported. They are consistent with standard results in happiness studies. Satisfaction is U-shaped with age, with the lowest level of satisfaction reached at 53. Having had any health problem in the last 30 days, being a smoker, being unemployed and being divorced are negatively correlated with satisfaction. Income, being a student, being married, living together and being pregnant are positively correlated with satisfaction. BMI is usually hump-shaped with satisfaction.

The results of the second-stage regressions are reported in Tables 3 and 4. Table 3 displays the results for the full sample. In addition to GMM results, pooled OLS and fixed effects OLS are reported as a comparison. Table 4 displays GMM results for the subsamples. The standard set of GMM diagnostics (as recommended by Roodman, 2006; 2007) is also reported. First, following Arellano and Bond (1991), the GMM estimator requires that there is first-order serial correlation (*AR(1) test*) but no second-order serial correlation (*AR(2) test*) in the residuals. Second, we test for overidentifying restrictions. Two tests are reported. The *Sargan test* is not robust, but not weakened by many instruments. The *Hansen test* is robust, but can be weakened

	Dependent variable: Residual life satisfaction								
	Pooled OLS	Fixed effects OLS	System GMM	Pooled OLS	Fixed effects OLS	System GMM	Pooled OLS	Fixed effects OLS	System GMM
Residual life satisfaction $_{t-1}$	0.383***	-0.079***	0.066	0.376***	-0.094***	0.352	0.376***	-0.094***	0.306
	(0.005)	(0.006)	(0.163)	(0.006)	(0.008)	(0.233)	(0.006)	(0.008)	(0.247)
Drinker	0.026***	0.011	0.145						
	(0.009)	(0.012)	(0.244)						
Log(Quantity)				-0.010***	-0.010	0.197	0.053***	0.052*	0.962
				(0.004)	(0.006)	(0.154)	(0.020)	(0.027)	(1.342)
Log(Quantity)^2							-0.006***	-0.006**	-0.058
							(0.002)	(0.003)	(0.112)
Constant	0.032***	0.051***	-0.026	0.108***	0.128***	-0.987	-0.047	-0.024	-3.267
	(0.007)	(0.008)	(0.140)	(0.021)	(0.034)	(0.815)	(0.052)	(0.073)	(3.731)
Number of instruments			23			21			22
AR(1) test: p-value			0.002			0.002			0.003
AR(2) test: p-value			0.692			0.103			0.184
Sargan test: p-value			0.574			0.315			0.474
Hansen test: p-value			0.685			0.348			0.446
Observations	57,775	57,775	57,775	33,045	33,045	33,045	33,045	33,045	33,045
R-squared	0.150	0.009		0.147	0.012		0.147	0.012	
Number of individuals		15,504	15,504		11,360	11,360		11,360	11,360

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Round dummies included.

Table 3. Second-stage regressions results for the full sample

	Dependent variable: Residual life satisfaction (System GMM)								
	Men								
	Age<30			30<Age<50			Age>50		
Residual life satisfaction $_{t-1}$	0.293	0.106	0.027	0.267	0.267	-0.042	0.213	0.089	0.105
	(0.222)	(0.144)	(0.145)	(0.206)	(0.187)	(0.164)	(0.207)	(0.193)	(0.205)
Drinker	0.050			0.286			0.185		
	(0.306)			(0.289)			(0.254)		
Log(Quantity)		-0.219**	-0.087		-0.284***	-0.631		-0.272**	-0.543
		(0.100)	(0.837)		(0.107)	(0.671)		(0.125)	(0.686)
Log(Quantity)^2			-0.008			0.028			0.016
			(0.068)			(0.051)			(0.055)
Constant	-0.012	1.317**	0.851	-0.170	1.779***	2.820	-0.070	1.673**	2.675
	(0.198)	(0.570)	(2.439)	(0.214)	(0.657)	(2.119)	(0.167)	(0.740)	(2.068)
Number of instruments	28	30	42	38	51	49	42	30	42
AR(1) test: p-value	0.004	0.000	0.002	0.001	0.000	0.005	0.004	0.006	0.006
AR(2) test: p-value	0.465	0.253	0.450	0.152	0.151	0.961	0.232	0.516	0.500
Sargan test: p-value	0.224	0.391	0.222	0.492	0.384	0.232	0.374	0.386	0.634
Hansen test: p-value	0.342	0.528	0.463	0.337	0.391	0.325	0.527	0.447	0.724
Observations	7,254	4,606	4,606	8,946	6,568	6,568	7,190	4,648	4,648
Number of individuals	2,571	1,966	1,966	2,749	2,369	2,369	2,113	1,683	1,683

	Women								
	Age<30			30<Age<50			Age>50		
Residual life satisfaction $_{t-1}$	0.184	0.125***	0.130***	0.190	0.232	0.133	0.308	0.338	0.288
	(0.145)	(0.037)	(0.037)	(0.186)	(0.219)	(0.150)	(0.229)	(0.243)	(0.204)
Drinker	0.171			0.794**			-0.048		
	(0.280)			(0.345)			(0.479)		
Log(Quantity)		-0.264**	-0.964		0.232*	0.528		0.120	0.693
		(0.119)	(0.678)		(0.135)	(0.584)		(0.165)	(0.768)
Log(Quantity)^2			0.076			-0.032			-0.086
			(0.068)			(0.055)			(0.083)
Constant	-0.039	1.279**	2.775*	-0.429**	-1.023	-1.640	0.066	-0.432	-1.174
	(0.166)	(0.556)	(1.634)	(0.211)	(0.638)	(1.488)	(0.164)	(0.694)	(1.667)
Number of instruments	42	44	55	38	26	38	18	26	45
AR(1) test: p-value	0.000	0.000	0.000	0.000	0.002	0.000	0.002	0.003	0.001
AR(2) test: p-value	0.938	0.116	0.207	0.425	0.208	0.249	0.189	0.136	0.141
Sargan test: p-value	0.261	0.299	0.353	0.392	0.759	0.641	0.911	0.919	0.619
Hansen test: p-value	0.480	0.802	0.956	0.595	0.880	0.912	0.916	0.930	0.500
Observations	5,652	3,256	3,256	10,564	6,471	6,471	11,358	3,886	3,886
Number of individuals	2,135	1,485	1,485	3,041	2,343	2,343	3,378	1,765	1,765

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Round dummies included.

Table 4. Second-stage regressions results for the subsamples

by many instruments. Third, following Bond (2002), we check that the estimated coefficient on the lagged dependent variable lies between pooled OLS and static fixed effects OLS estimators (pooled OLS estimation of a dynamic model is biased upwards and fixed effects model is biased downwards). Finally, we report the number of instruments. Roodman (2006; 2007) notes that too many instruments can overfit endogenous variables and fail to expunge their endogenous components. There is however no clear rules concerning how many instruments is "too many". Two rules of thumb are that the number of instruments should not exceed the number of observations and that the *Hansen test* should report a p-value higher than conventional 0.05 or 0.10 levels, at least probably 0.25, but strictly lower than 1.00. The number of instruments in each regression was chosen in order to fulfil all these conditions in the best possible way.

The main results are the following. In the full sample, none of the GMM coefficients are significant. This may be explained by quite heterogeneous patterns in subsamples. Indeed, when studying the relationship between the quantity consumed and satisfaction, quadratic specifications are never significant, but we find a linearly decreasing relation for all men and for women under 30, and a linearly increasing relation for middle-aged women. The latter result is quite surprising. It seems to indicate that middle-aged female drinkers are not subject to addictive behaviours, in the sense that they are never stuck (voluntarily or involuntarily) in consumption patterns that reduce their well-being. In these conditions, middle-aged female drinking looks like a positive habit in the sense of Becker and Murphy (1988) and we do not have to fear that middle-aged women overconsume because of self-control problems (this seems confirmed by the fact that being a middle-aged female drinker significantly increases satisfaction), but possibly that they underconsume because they do not perceive the benefits of more intensive drinking. On the contrary, the results for all men and women under 30 indicate that these groups are at risk of self-control problems for any quantity. Testing the impact of being a drinker on satisfaction in these groups could indicate whether controlled drinking or uncontrolled drinking dominates on average. The coefficients are, however, not significant. This could possibly indicate that controlled drinking and uncontrolled drinking compensate for each other.

4.3. Transitional analysis

The preceding approach tries to relate life satisfaction to alcohol consumption at a point in time. As a complement, it can be interesting to study the evolution of satisfaction around transitions between different types of drinking habits. Following the approach used by Clark et al. (2008) for important life events (unemployment, marriage, birth of a child and so forth), we implement a lags and leads analysis of changes in drinking habits. In order to implement this transitional analysis, we define four types of drinking patterns, based on the monthly quantity deciles:

- Light use: a quantity strictly greater than 0 and lower than the 3rd decile.
- Moderate-low use: a quantity strictly greater than the 3rd decile and lower than the 6th decile.

- Moderate-high use: a quantity strictly greater than the 6th decile and lower than the 9th decile.
- Heavy use: a quantity strictly greater than the 9th decile.

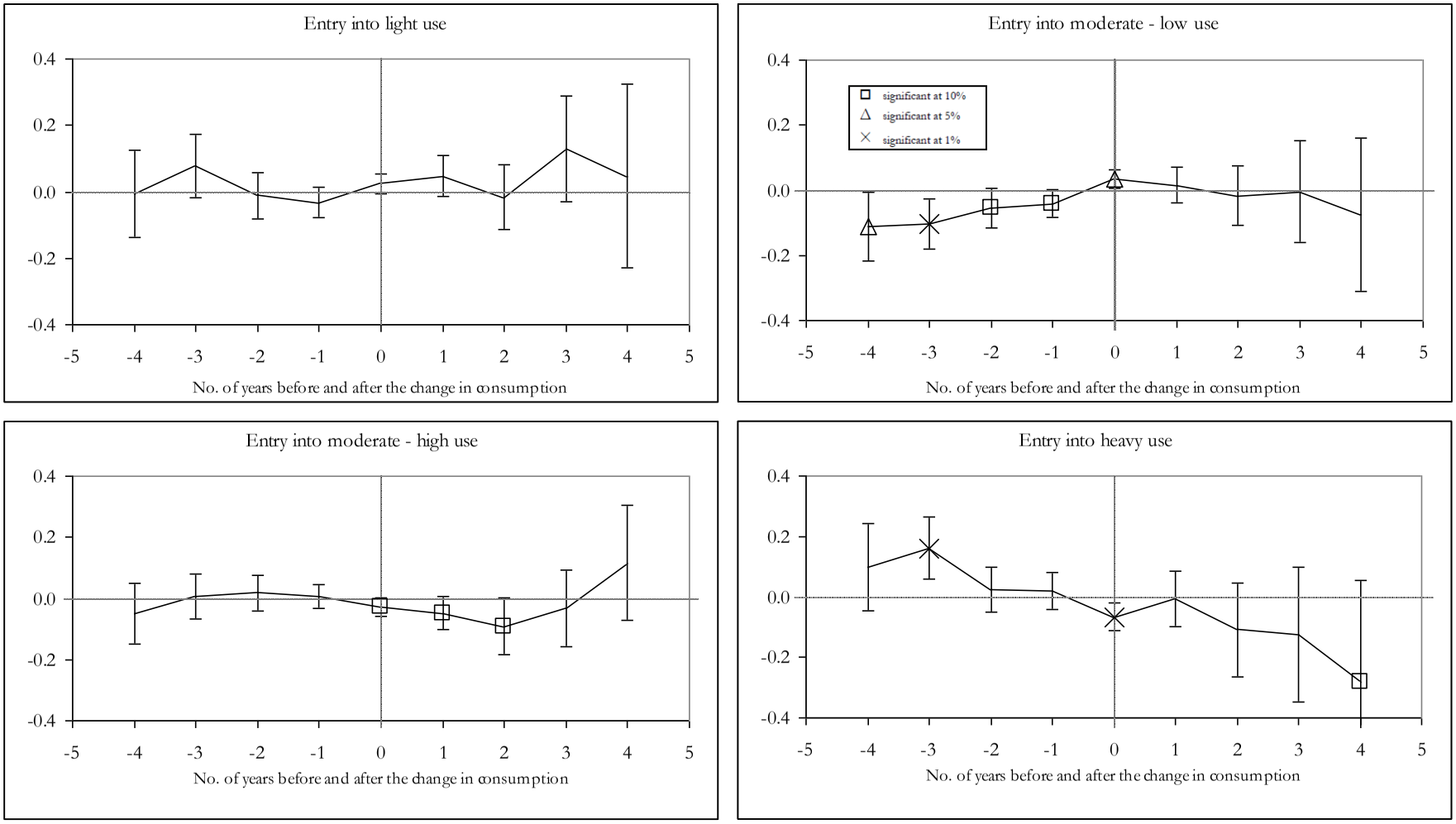
We study the transitions into a higher drinking pattern (i.e. from abstinence to light use, from abstinence or light use to moderate-low use, and so on). We run separate regressions for the analysis of lags and leads. In both cases, we estimate a regression of the form:

$$LS_{it} = \alpha + \theta_n L_{nit} + \beta' X_{it} + \delta_t + \mu_i + \varepsilon_{it} \quad (5)$$

where L stands for the lags and leads and consists of a set of n dummies, which are defined separately for the analysis of lags and leads.

For the analysis of lags, the series of dummies show whether the individual has entered a certain type of alcohol use during the last year, 1-2 years ago, 2-3 years ago, and so on up to 4-5 years ago, with no observable change in the meantime. For the analysis of leads, the series of dummies show whether the individual will enter a certain type of alcohol use in the next 0-1 years, 1-2 years, and so on up to 3-4 years, also with no observable change in the meanwhile. Regressions are run for the full sample only because the number of observations for the lags and leads becomes rapidly very low in subsamples. Individual fixed effects are used, so that we are following the same individual through different durations of a consumption pattern, and the results do not represent a selection of happy/unhappy personalities into alcohol consumption.

The results are represented graphically in Figure 1. For entry into light use, none of the coefficients are significant. This "event" does not seem related to any particular change in well-being, either before or after it happens. Entry into moderate-low use is preceded by a period of four years of relative unhappiness (which seems decreasing however). It is associated with a slight rise in happiness during the first year, but not thereafter, which indicates a rapid adaptation to this new drinking habit. On the contrary, entry into moderate-high use is not preceded by any specific pattern of happiness, but is associated with a decrease in happiness during the first three years. It is difficult to determine whether this decrease in satisfaction is attributable to alcohol consumption itself, or to some specific event that has caused the entry into moderate-high use. However, in the latter case, this would mean that moderate-high drinking does not work as a very efficient self-medication device or, at least, that it is less efficient than heavy use. Indeed, entry into heavy use is followed by three years of no significant change in happiness. More precisely, this change in drinking habit is preceded by a significantly higher level of happiness 2-3 years before and is associated with a decrease in happiness during the first year and after four years. Non-significant intermediary coefficients (i.e., coefficients of 1-2 and 0-1 years before and 1-2, 2-3 and3-4 years after entry into heavy use) are not easy to interpret. A possible explanation is that entry into heavy use refers to two or more different types of trajectories that diverge widely in terms of satisfaction at these



Vertical bars around each point: 95% confidence interval.

Figure 1. Evolution of life satisfaction before and after the entry into light, moderate and heavy use

particular moments, but are merged in our sample. For instance, we can imagine that entry into heavy use results either from a loss of control due to addiction or from a negative shock in well-being that individuals try to mitigate with drinking. Each type of situation would lead to different levels of happiness over time. In the first case, we can think of a regular, smooth decrease in happiness over the entire period of time considered. On the contrary, in the second case, we can imagine a huge decrease in happiness somewhere during the two years preceding the transition. If we admit that alcohol use can serve as a self-medication device in this type of situation, insignificant coefficients after the transition could be explained by a buffer effect played by heavy drinking. This buffer effect seems, however, temporary since well-being becomes significantly negative after four years of heavy drinking. Further investigations are needed to confirm these interpretations.

4.4. Robustness

Sample selection

Panel data are vulnerable to sample attrition. If sample attrition is non random, estimates can be biased. In order to assess the extent and impact of sample attrition, we can compare the characteristics of individuals in our sample with those of individuals in the balanced panel. The balanced panel is made up of the 3,907 individuals that are present in all nine rounds. It appears that the characteristics of the two samples are quite similar. Average life satisfaction is a little lower in the balanced panel (2.86 vs. 2.94), as well as the monthly quantity consumed (339 vs. 369). When regressions are re-run using the balanced panel, results are very similar.

Life satisfaction as a discrete ordinal variable

To account for the fact that life satisfaction may be considered as a discrete ordinal variable instead of a continuous one, we re-run all regressions, except GMM regressions, using a statistical technique that respects the ordinality of the dependent variable. We use ordered logits for simple regressions (equations 1 and 3) and conditional fixed effect logits for the transitional analysis (equation 5). For the latter, we recoded life satisfaction into a binary variable: 1-2 vs. 3-5. The results are qualitatively unchanged.

Having children as an additional control variable

Having children is a usual control variable in happiness studies. In our data, it is easily available only from round 13 on. We did not include it in the main analysis in order to keep as much information as possible. When integrated into our set of control variables in equation 3 (either as a dummy for the fact of having one or several children, or as the number of children), we obtain a negative coefficient for this variable in the full sample (significant for the dummy, insignificant for the number), which is in accordance with previous literature. In GMM regressions, we observe two noticeable changes: satisfaction becomes significantly linearly increasing with the quantity consumed in the full sample, while the negative linear relationship between satisfaction and consumption in the subsample of men under 30 becomes insignificant. In the transitional analysis, we notice one important change: the

negative coefficient after four years of heavy use becomes insignificant. Therefore, we cannot exclude that heavy use can serve as a durable self-medication device.

5. Conclusion

This paper uses data from the RLMS-HSE to study the links between alcohol consumption and declared life satisfaction. The results indicate that, overall, drinkers report being happier than abstainers and our intuition of a hump-shaped correlation between these two variables is generally confirmed. Important differences must, however, be noticed by gender and age categories. Indeed, in subsamples of men and women under 30, we find that drinkers report being unhappier than abstainers and that satisfaction is linearly decreasing with the quantity consumed. Moreover, in subsamples of people over 30, the quantity that is associated with the greatest satisfaction varies widely between men and women: approximately 130 grams for the former and 40 grams for the latter (note that these amounts should be treated with caution given the large under-reporting in our alcohol consumption data).

The study of the causal impact of drinking on happiness provides two important results. First, middle-aged female drinkers do not seem subject to addictive behaviours, in the sense that they are never stuck (voluntarily or involuntarily) in consumption patterns that reduce their well-being. Second, among men over 30 and women under 30, we consistently find that satisfaction is linearly decreasing with the quantity consumed. We are not able to determine whether this phenomenon is primarily due to self-control problems. Insofar as the less quantity consumed, the better in terms of well-being, public policies aiming to reduce the quantity consumed in these groups seem, nevertheless, advisable.

Finally, the transitional analysis raises our attention about the fact that moderate-high drinking is associated with a durable decrease in satisfaction, but that heavy drinking might serve as an efficient self-medication device. Complementary analyses are needed to confirm our interpretation. It would be of particular interest to determine how long what we interpret as a buffer effect is likely to last. Indeed, if the detrimental effects of heavy use finally gain the upper hand, alternative medication devices should rather be proposed to individuals in need. Data collected on a more frequent basis (e.g. monthly) could probably allow a better understanding of the dynamics linking alcohol consumption and happiness.

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