Further evidence about alcohol consumption and the business cycle

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Questions

- Questions we are interested in:
  1. Is there any link between Business Cycle and alcohol consumption?
  2. In particular, does unemployment raise alcohol consumption?
- Why do we care about that?
  1. It could be that health costs associated with alcohol abuse increase among those 'structural' unemployed
  2. If that's the case, then public policy should be concerned with the double human capital loses

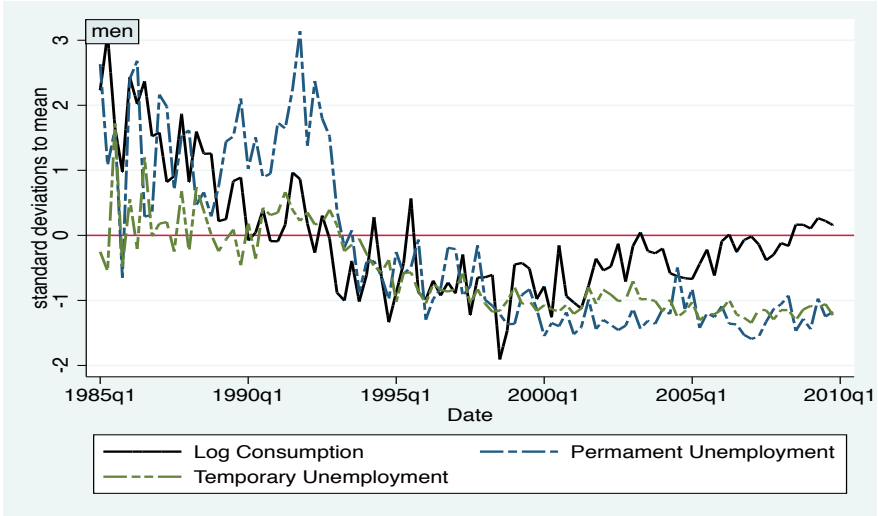
- Regular light to moderate drinking can be good for the heart.
- However, heavy or at-risk (binge) drinking carry out greater risks, including:
  - Health problems.
  - Drunk driving causes a third of car crash deaths, resulting in the loss of 13,000 lives per year
  - Other Injuries.
- The toll from all the psychiatric effects, injuries and other alcohol-related problems is 85,000 deaths a year (CDC).

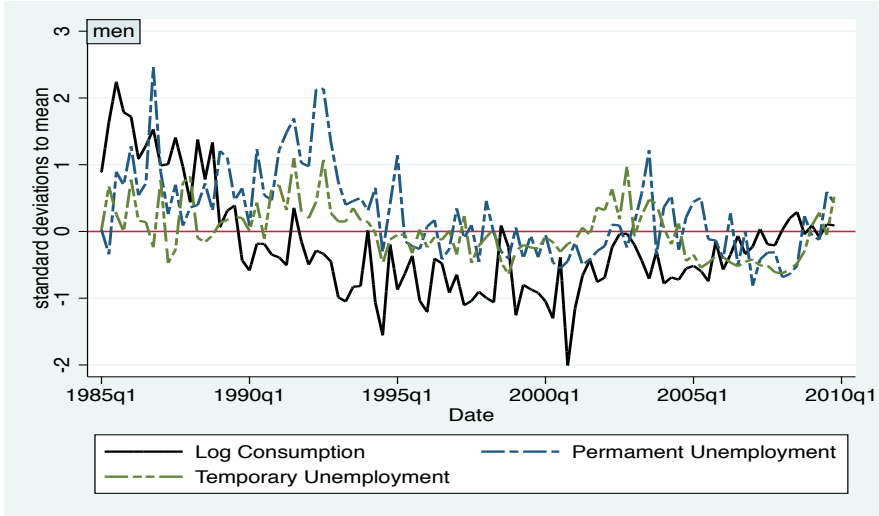
- Nearly 17 million Americans have a serious problem with alcohol
- Health care costs related to alcohol abuse are not limited to the user.
  1. Birth defects.
  2. Children of alcoholics who are admitted to the hospital average 62 percent more hospital days and 29 percent longer stays.
- Alcohol abuse costs the US an estimated $185 billion annually, according to the NIAAA. (compared to $114.2 billion for other drug problems and $137 billion for smoking.)

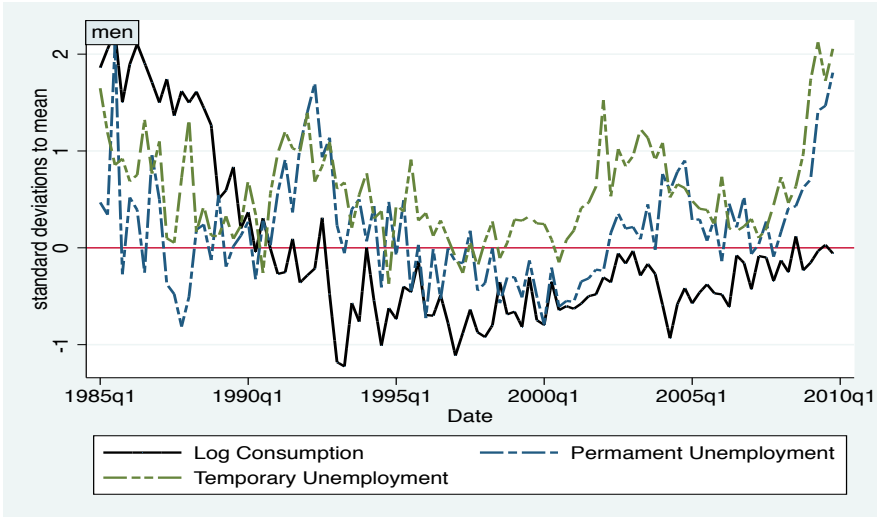
Potential Channels

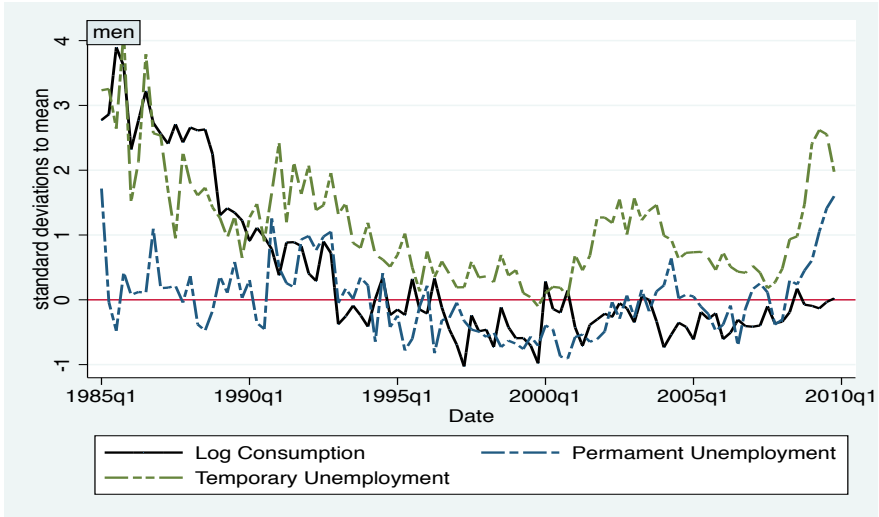
- What does psychology and microeconomic theory can tell us?
  1. Unemployment may lead to financial stress and psychological depression, making a person to start drinking or to abuse alcohol.
  2. Moreover, because an unemployed person has more spare time, he can allocate more of it to ludic activities
  3. 'Substitution' effect should increase alcohol consumption (Kessler(1987), Crawford(1987), Catalano(1993), Peirce(1994))
  4. Unemployment decreases income and therefore consumption possibilities.
  5. If alcohol is a normal good, the income effect would say that alcohol consumption should be reduced (Cook and Allan(1983), Ettner(1997), Ruhm and Black (2002))

Mean consumption and (short/long) unemployment by age cohorts. 1985-2009.









Source: BRFSS 1985-2009

Literature Review

- Micro data 1: Dee 2001 (HE)

  $$Y_{ismt} = \alpha + \beta X_{ismt} + \gamma_1 INC_{smt} + \gamma_2 UR_{smt} + \delta_s + \delta_t + \delta_m + e_{ismt}$$

- Findings
  - Participation not affected
  - Volume and chronic drinking pro-cyclical
  - Binge drinking counter-cyclical. An increase of 5% in the unemployment rate increases by 8% the probability of binge drinking.
- Comments
  - Price of alcohol not included
  - Does not controls for unobservables, which can be correlated with the unemployment rate through omitted variables
  - Health status also not controlled for, includes retirees from 18 to 21 years.

- Micro data 2: Ruhm & Black 2002 (JHE),

$$Y_{ismt} = \alpha + \beta X_{ismt} + \delta_p PA_{smt} + E_{mjt}\gamma + \delta_s + \delta_m + \alpha_s T_{smt} + e_{ismt}$$

- Findings:
  - Drinking decreases in bad economic times.
  - Most of the variation is due to existing drinkers switching from heavy to moderate levels of consumption
- Comments:
  - Share some of the previous critics, plus uses state linear time trend instead of yearly dummies
  - Includes personal income, which is potentially endogenous

Contributions of the paper

- Use pseudo-panel data methods to control for cohort unobserved heterogeneity in order to mitigate the effect of misspecification caused by unobservables.
- Check if business cycle has medium term consequences
- Take into consideration habit formation in the drinking decision
- Show that when there is a high percentage of zero observations in demand equations using individual data, it is necessary to consider the underlying reasons generating them

Findings

- Replication of Dee (2001) and Ruhm & Black (2002) shows that their results are driven by both the period of analysis and the lack of clustering of the standard errors.
- When we control for unobservables, alcohol consumption does not seems to be related to the employment status, except for binge drinking (counter-cyclical).
- However, we find positive peer effects coming from others being unemployed at the same moment.
- Also, long run unemployment is associated with lower alcoholic intake during crisis. However, the opposite seems to be the case for short term unemployed (but not significant).
- We do not find evidence of medium term effects.
- When we incorporate habits to the demand equation, unemployment does not affect the volume of alcohol intake

Description of the Data

- BRFSS from 1985 to 2009. Individuals from 21 to 70. Sample size is 3,644,491 obs.
- Main variables relating to alcohol:
  1. Drinker: 1 if individual has consumed alcohol in the last month
  2. Consumption: Log # of alcoholic beverages consumed in last month
  3. Binge Drinking: consumption of 5 or more drinks in the same occasion
  4. Chronic Drinking: consumption of more than 60 in the case of men (30 for women) in the last month
- Other relevant variables
  - HH income, unemployed, race, gender, children, health status, education, BMI.
  - State Unemployment rate (BLS) and Real Per Capita Income (BEA)
  - Tax on beer and excise tax on tobacco (FTA)
  - Long term unemployed is defined as more than six months in the unemployment, while six or less is short term unemployment

Table: Unemployment status and alcoholic participation and intake.

	Full Sample		Employed		Unemployed					
					All		Short Term		Long Term	
Variable	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
Drink	0.50	0.50	0.50	0.50	0.48	0.50	0.53	0.50	0.41	0.49
Binge Drinking	0.12	0.32	0.12	0.32	0.16	0.37	0.19	0.39	0.12	0.327
Chronic Drinking	0.08	0.269	0.08	0.26	0.09	0.29	0.10	0.30	0.08	0.27
Uncond # Drinks	10.05	26.01	9.95	25.5	12.20	35.63	13.67	36.66	10.17	34.05
Cond # Drinks	20.28	34.83	20.25	33.07	26.13	48.53	26.42	47.56	25.60	50.22
Observations	4,033,103		3,861,180		171,923		99,822		72,101	

Model and pseudo panel methodology

- As in R&B we consider the following latent variable model $Y^*_{ismt} = \alpha + \beta X_{ismt} + \gamma EC_{ismt} + \delta_s + \delta_m + \delta_t + \eta_i + e_{ismt}$ where EC include: State UR, State INC, HH Inc and unemployment condition
- Lack of panel data imposes that $\eta_i = \eta$ for OLS to be consistent or that $Corr(X, \eta_i) = 0$
- However, assumption it is not realistic enough since preferences might affect both occupation and drinking decision, for instance.
- Possible solution: Deaton (1985) suggest to divide the population into several characteristics that are constant in time for the individual to create a pseudo panel

- We use Year of Birth, Gender, Geographical Area as the characteristics to define each cell
- $\bar{Y}^*_{cqt} = \bar{\alpha} + \beta \bar{X}_{cqt} + \gamma \bar{EC}_{cqt} + \bar{\delta}_s + \bar{\delta}_q + \bar{\delta}_t + \bar{\eta}_c + \bar{e}_{cqt}$ for c=1,...,C
- Potential problem: $\bar{\eta}_c$
  1. Depends on time
  2. Is unobservable
  3. Might still be correlated with $\bar{X}_{cqt}$
- Solution: If n_{cmt} is large enough, then
  1. $\bar{\eta}_c$ is a good proxy for η_c
  2. We can replace $\bar{\eta}_c$ with cohort fixed effects
  3. And use the WG estimator
     $\hat{\beta}_{IG} = [n_{cqt}(\bar{X}_{cqt} - \bar{X}_c)(\bar{X}_{cqt} - \bar{X}_c)']^{-1}[n_{cqt}(\bar{X}_{cqt} - \bar{X}_c)(\bar{Y}_{cqt} - \bar{Y}_c)']$

Table: Drink Participation: Baseline specification

	OLS	**Fixed Effects**		
	Full Sample	Full Sample	Men	Women
Cell Unemployment	-0.0025***	-0.0002	0.0001	-0.0000
	0.0004	0.0003	0.0005	0.0004
State Income per capita	0.4964	0.6081	0.9669	0.8532
	1.1428	0.9931	1.1939	1.6625
Tax on beer	-0.0236	-0.0410*	-0.0358	-0.0337
	0.0333	0.0215	0.0293	0.0267
R^2	0.96	0.98	0.98	0.95
Obs	5,485	5,485	2,831	2,654

$*p < 0.10; **p < 0.05, ***p < 0.01$

Heteroscedastic-consistent standard errors, clustered by cohort. All regressions include quarterly dummies and yearly dummies, age, age squared, race/ethnicity, marital status, education, health status and BMI, and the proportion of individuals in each state. Cohort: Year of birth-region-gender. Sample: BRFSS 1985-2009

Table: Binge Drinking: Baseline specification

	OLS	**Fixed Effects**		
	Full Sample	Full Sample	Men	Women
Cell Unemployment	-0.0025***	-0.0006**	0.0001	-0.0001
	0.0005	0.0003	0.0003	0.0004
State Income per capita	-0.0636	0.4141	0.4561	0.4003
	1.6542	1.1215	0.9112	1.3994
Tax on beer	-0.0319	-0.0159	0.0039	-0.0464*
	0.0381	0.0189	0.0180	0.0262
R^2	0.94	0.98	0.96	0.97
Obs	5,485	5,485	2,831	2,654

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Table: log(# Drinks): Baseline specification

	OLS	**Fixed Effects**		
	Full Sample	Full Sample	Men	Women
Cel Unemployment	-0.0082***	-0.0012	0.0008	-0.0010
	0.0018	0.0010	0.0011	0.0018
State Income per capita	3.7289	3.7524	5.5465	2.4073
	4.0700	2.9565	3.3146	5.4232
Tax on beer	-0.1015	-0.1053	-0.0972	-0.1091
	0.1084	0.0684	0.0860	0.1152
R^2	0.96	0.98	0.96	0.93
Obs	5,485	5,485	2,831	2,654

$*\,p < 0.10; **\,p < 0.05, ***\,p < 0.01$

Heteroscedastic-consistent standard errors, clustered by cohort. All regressions include quarterly dummies and yearly dummies, age, age squared, race/ethnicity, marital status, education, health status and BMI, and the proportion of individuals in each state. Cohort: Year of birth-region-gender. Sample: BRFSS 1985-2009

Table: Drink Participation: Baseline specification + peer effects

	OLS	**Fixed Effects**		
	Full Sample	Full Sample	Women	Men
Cell Unemployment	-0.0028***	-0.0006*	-0.0003	-0.0003
	0.0004	0.0003	0.0005	0.0005
State unemployment rate	0.0083***	0.0069***	0.0070***	0.0056***
	0.0015	0.0012	0.0016	0.0020
State Income per capita	2.1770**	1.9935*	2.3905*	2.0563
	1.0896	1.0185	1.3232	1.5757
Tax on beer	-0.0660*	-0.0799***	-0.0784**	-0.0630**
	0.0343	0.0221	0.0318	0.0275
R^2	0.96	0.98	0.98	0.95
Obs	5,485	5,485	2,831	2,654

$*\, p < 0.10; **\, p < 0.05, \; ***\, p < 0.01$

Heteroscedastic-consistent standard errors, clustered by cohort between parenthesis. All regressions include the same variables as in Table 2. Cohort: Year of birth-region-gender. Sample: BRFSS 1985-2009

Table: Binge Drinking: Baseline specification + peer effects

	OLS	**Fixed Effects**		
	Full Sample	Full Sample	Women	Men
Cell Unemployment	-0.0028***	-0.0007**	-0.0000	-0.0003
	0.0005	0.0003	0.0003	0.0005
State unemployment rate	0.0068***	0.0034***	0.0030***	0.0036*
	0.0017	0.0012	0.0010	0.0020
State Income per capita	1.3150	1.0962	1.0601	1.1639
	1.5547	1.0645	0.8541	1.3631
Tax on beer	-0.0667	-0.0350	-0.0142	-0.0650**
	0.0404	0.0211	0.0197	0.0300
R^2	0.94	0.98	0.96	0.97
Obs	5,485	5,485	2,831	2,654

$*p < 0.10; **\ p < 0.05, \ ***p < 0.01$

Heteroscedastic-consistent standard errors, clustered by cohort between parenthesis. All regressions include the same variables as in Table 2. Cohort: Year of birth-region-gender. Sample: BRFSS 1985-2009

Table: Log (# drinks): Baseline specification + peer effects

	OLS	**Fixed Effects**		
	Full Sample	Full Sample	Women	Men
Cell Unemployment	-0.0091***	-0.0019*	0.0001	-0.0016
	0.0018	0.0011	0.0011	0.0019
State unemployment rate	0.0212***	0.0125***	0.0133***	0.0107
	0.0051	0.0040	0.0044	0.0076
State Income per capita	8.0410**	6.2688**	8.2425**	4.7075
	3.9263	2.9705	3.4610	5.4697
Tax on beer	-0.2103*	-0.1759**	-0.1779*	-0.1652
	0.1138	0.0755	0.0966	0.1283
R^2	0.96	0.98	0.96	0.93
Obs	5,485	5,485	2,831	2,654

$*p < 0.10; **p < 0.05, ***p < 0.01$

Heteroscedastic-consistent standard errors, clustered by cohort between parenthesis. All regressions include the same variables as in Table 2. Cohort: Year of birth-region-gender. Sample: BRFSS 1985-2009

Table: Drink Participation: short and long term unemployment

	OLS	**Fixed Effects**		
	Full Sample	Full Sample	Women	Men
Long term unemployed	-0.4666***	-0.1896***	-0.1645*	-0.1119
	0.0760	0.0590	0.0887	0.0759
Short term unemployed	-0.1738***	0.0217	0.0711	0.0071
	0.0625	0.0453	0.0712	0.0653
State unemployment rate	0.0083***	0.0070***	0.0071***	0.0056***
	0.0015	0.0012	0.0016	0.0020
State Income per capita	2.1194*	1.9446*	2.3754*	1.9962
	1.0848	1.0179	1.3187	1.5768
Tax on beer	-0.0659*	-0.0800***	-0.0791**	-0.0633**
	0.0340	0.0220	0.0318	0.0276
R^2	0.96	0.98	0.98	0.95

$*p < 0.10; **\ p < 0.05, \ ***p < 0.01$

Heteroscedastic-consistent standard errors, clustered by cohort. All regressions include the same variables as in Table 2.Cohort definition: Year of birth-region-gender. Sample: BFRSS 1985-2009

Table: Binge Drinking: short and long term unemployment

	OLS	**Fixed Effects**		
	Full Sample	Full Sample	Women	Men
Long term unemployed	-0.4536***	-0.1215***	-0.0640	-0.0905
	0.0860	0.0453	0.0487	0.0719
Short term unemployed	-0.1779***	-0.0458	0.0432	0.0062
	0.0645	0.0397	0.0383	0.0592
State unemployment rate	0.0068***	0.0034***	0.0030***	0.0035*
	0.0017	0.0012	0.0010	0.0020
State Income per capita	1.2607	1.0787	1.0532	1.1151
	1.5619	1.0645	0.8548	1.3683
Tax on beer	-0.0666	-0.0350	-0.0145	-0.0652**
	0.0403	0.0212	0.0195	0.0303
R^2	0.94	0.98	0.96	0.97

$*p < 0.10; **\ p < 0.05, \ ***p < 0.01$

Heteroscedastic-consistent standard errors, clustered by cohort. All regressions include the same variables as in Table 2. Cohort definition: Year of birth-region-gender. Sample: BFRSS 1985-2009

Table: Log (# drinks): short and long term unemployment

	OLS	**Fixed Effects**		
	Full Sample	Full Sample	Women	Men
Long term unemployed	-1.7275***	-0.7069***	-0.4721**	-0.7564**
	0.2715	0.1702	0.2093	0.2913
Short term unemployed	-0.4334*	0.1152	0.3775**	0.1385
	0.2301	0.1455	0.1819	0.2396
State unemployment rate	0.0215***	0.0128***	0.0137***	0.0104
	0.0051	0.0040	0.0044	0.0076
State Income per capita	7.7862**	6.0785**	8.1880**	4.2560
	3.9087	2.9531	3.4089	5.4848
Tax on beer	-0.2101*	-0.1761**	-0.1802*	-0.1671
	0.1125	0.0752	0.0956	0.1305
R^2	0.96	0.98	0.96	0.93
Obs	5,485	5,485	2,831	2,654

$*p < 0.10; **p < 0.05, ***p < 0.01$

Heteroscedastic-consistent standard errors, clustered by cohort. All regressions include the same variables as in Table 2.

- Another advantage of having longitudinal data is the possibility of introducing habit formation. Long T implies consistency of WG estimator in a dynamic context.
- $Y^*_{cqt} = \alpha + \rho_1 Y_{cq(t-1)} + \beta X_{cqt} + \gamma EC_{cqt} + \delta_s + \delta_q + \delta_t + \eta_c + e_{cqt}$

Table: Baseline model with Habit Formation.

	Drink Participation	Log(# drinks)	Log(Cond # drinks)	Binge	Chronic
Cell Long term Unemp	-0.1511**	-0.5412***	-0.4463**	-0.1009**	-0.0685*
	0.0593	0.1669	0.2037	0.0447	0.0376
Cell Short term Unemp	0.0552	0.1577	0.3354**	-0.0309	-0.0094
	0.0457	0.1399	0.1532	0.0380	0.0276
State Income per capita	0.4790	0.9776	-2.0027	0.3304	1.9618***
	0.9926	2.6594	3.4090	1.1201	0.6406
Tax on Beer	-0.0383*	-0.0424	-0.0010	-0.0141	0.0127
	0.0213	0.0629	0.0989	0.0189	0.0136
Lagged endogenous	0.0111***	0.1470***	0.0588***	0.0128***	0.0091***
	0.0038	0.0217	0.0197	0.0032	0.0025
R^2	0.98	0.98	0.95	0.98	0.71
Obs	5,466	5,466	5,466	5,466	5,466

$*p < 0.10; **p < 0.05, ***p < 0.01$

Heteroscedastic-consistent standard errors, clustered by cohort reported. All regressions include the same variables as in Table 2. Cohort: Year of birth-region-gender. Sample: BFRSS 1985-2009

- Zeros can arise from infrequent purchase, corner solution or abstention
- Pooling data for drinkers with non drinkers might not be a good idea
- We rewrite the equations for participation, per capita consumption of alcoholic drinks (C_C) and mean consumption (C_M)
- $$C_C = \frac{D}{N} = \frac{N_D}{N} * \frac{D}{N_D} = P * C_M$$
- $$\xi_{Unemp}(C_C) = \xi_{Unemp}(P) + \xi_{Unemp}(C_M)$$
- $$\begin{array}{rcl} P & = & \alpha_0 + \beta_0 X + \gamma_0 Unemployment + u_0 \\ log(C_C) & = & \alpha_1 + \beta_1 X + \gamma_1 Unemployment + u_1 \\ log(C_M) & = & \alpha_2 + \beta_2 X + \gamma_2 Unemployment + u_2 \end{array} \quad \Rightarrow \quad \begin{array}{rcl} \xi_{\text{Unemp}}(P) & = & \gamma_0 \frac{Unemp}{Participation} \\ \xi_{\text{Unemp}}(C_C) & = & \gamma_1 Unemp \\ \xi_{\text{Unemp}}(C_M) & = & \gamma_2 Unemp \end{array}$$

Table: Participation and consumption elasticities with respect to cell unemployment

	$\xi_{\text{U}}(P)$	$\xi_{\text{U}}(C_M)$	$\xi_{\text{U}}(C_C)$
Average Cohort Unemployment	-0.001433741	-0.004472125	0.00260874
Short Term Cohort Unemployment	0.062684822	0.173000448	0.252742842
Long Term Cohort Unemployment	-0.811488035	-1.572873707	-0.368242465

- Our results show the previous findings are driven by both the period choice and not clustering standard errors
- Once we account for unobservables, we do not find a counter-cyclical effect on drinking participation or consumption (though we do in binge drinking)
- Individuals that are unemployed for a period long enough seems to find a budget constraint problem to continue drinking
- Peer effects are pro cyclical.
- Finally the results confirm that the unemployment rate is not a significant determinant of the volume of alcohol consumed, conditional on being a drinker
- Since the budget allocated to alcohol problems does not depend on the phase of the business cycle, it is important to identify the behavior of different groups rather than universal policies