Alcohol and Self-Control: A Field Experiment in India
Online Appendix

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Table A.1—: Eligibility and Selection of Study Participants

STAGE	**FRACTION (percent)**
Field Screening Survey (N= 794)	
Eligible and willing to participate in next stage	**60**
Not willing to conduct survey	15
Ineligle due to too low alcohol consumption	11
Ineligle due to too high alcohol consumption	1
Ineligible for other reasons	5
Eligible, but not interested in next stage	12
Office Screening Survey (N= 474)	
Eligible and willing to participate in next stage	**73**
Ineligible for medical reasons	11
Ineligible for other reasons	18
Eligible, but not interested in further participation	1
Lead-In Period (N= 348)	
Proceeded to fully enroll in the study	**66**
Did not proceed and BAC = 0 on day 1	19
Did not proceed and BAC > 0 on day 1	15
Fully Enrolled (N= 229)	

Notes: This table gives an overview of the three-stage screening process of the study. For each stage, the table shows the fraction of individuals who were eligible and willing to proceed to the next stage of the study, the reasons for individuals not to proceed, and the relative frequencies of these reasons (each conditional on reaching the respective stage). The tiers of the selection process are (i) the field screening survey (top panel), (ii) the office screening survey (center panel), and (iii) the lead-in period (Phase 1; bottom panel). Some individuals were ineligible to proceed to the next stage for several reasons, i.e. not all ineligibility criteria were mutually exclusive.

Table A.2—: Balance of Demographics (by Sobriety Incentive Group)

	Treatment groups			p value for test of:		
	Control (N=83)	Incentives (N=71)	Choice (N=75)	1=2	1=3	1 = (2 ∪ 3)
	(1)	(2)	(3)	(4)	(5)	(6)
Age	36.54	35.27	35.08	0.43	0.29	0.30
	(9.96)	(9.92)	(7.40)			
Married	0.82	0.80	0.81	0.80	0.92	0.84
	(0.39)	(0.40)	(0.39)			
Number of children	1.80	1.77	1.80	0.93	0.98	0.97
	(1.19)	(1.55)	(1.19)			
Lives with wife in Chennai	0.73	0.70	0.73	0.67	0.98	0.80
	(0.44)	(0.46)	(0.45)			
Wife earned income during past month	0.24	0.17	0.28	0.27	0.58	0.80
	(0.43)	(0.38)	(0.45)			
Years of education	4.89	5.45	5.49	0.38	0.34	0.28
	(3.93)	(3.95)	(3.92)			
Able to read the newspaper	0.63	0.62	0.63	0.93	1.00	0.96
	(0.49)	(0.49)	(0.49)			
Added 7 plus 9 correctly	0.86	0.77	0.77	0.20	0.19	0.12
	(0.35)	(0.42)	(0.42)			
Multiplied 5 times 7 correctly	0.48	0.41	0.47	0.36	0.85	0.53
	(0.50)	(0.50)	(0.50)			
Distance of home from office (km)	2.64	2.30	2.65	0.20	0.99	0.54
	(2.15)	(1.06)	(1.72)			
Years lived in Chennai	31.52	27.77	28.97	0.05	0.14	0.05
	(12.19)	(11.10)	(9.49)			
Reports having ration card	0.65	0.52	0.61	0.11	0.63	0.22
	(0.48)	(0.50)	(0.49)			
Has electricity	0.81	0.68	0.75	0.07	0.37	0.10
	(0.40)	(0.47)	(0.44)			
Owns TV	0.76	0.59	0.68	0.03	0.27	0.05
	(0.43)	(0.50)	(0.47)			
Happiness ladder score (0 to 10)	5.73	5.46	5.76	0.43	0.94	0.68
	(2.14)	(2.08)	(2.11)			

Notes: This table shows balance checks for main demographics across sobriety incentive treatment groups.

- Columns 1 through 3 show sample means for individuals in the Control Group (1), Incentive Group (2), and the Choice Group (3), respectively. Standard deviations are in parentheses. Columns 4 through 6 show p-values of OLS regressions of each variable on dummies for each treatment group.
- Columns 4 and 5 show p-values of tests for equality of means between the Incentive and Choice Groups compared to the Control Group, respectively. Column 6 shows the corresponding p-values for comparisons between the Control Group and the Incentive and Choice Groups combined.

Table A.3—: Balance of Alcohol Consumption (by Sobriety Incentive Group)

	Treatment groups			**p value for test of:**		
	Control (N=83)	Incentives (N=71)	Choice (N=75)	1=2	1=3	$1 = (2 \cup 3)$
	(1)	(2)	(3)	(4)	(5)	(6)
Years drinking alcohol	12.89	11.68	12.86	0.42	0.99	0.65
	(10.02)	(8.42)	(9.03)			
Alcohol expenditures in Phase 1 (Rs./day)	92.45	87.68	82.68	0.40	0.08	0.14
	(37.28)	(32.46)	(33.38)			
# of standard drinks per day in Phase 1	6.24	5.75	5.81	0.18	0.24	0.15
	(2.37)	(2.14)	(2.17)			
# of standard drinks during day in Phase 1	2.13	2.45	2.40	0.38	0.41	0.31
	(2.01)	(2.48)	(2.10)			
Baseline fraction sober	0.49	0.45	0.43	0.48	0.30	0.30
	(0.40)	(0.43)	(0.41)			
Alcohol Use Disorders Identification Test score	14.61	13.94	14.69	0.44	0.92	0.67
	(4.32)	(6.16)	(4.98)			
Drinks usually alone	0.87	0.82	0.85	0.40	0.80	0.51
	(0.34)	(0.39)	(0.36)			
Reports life would be better if liquor stores closed	0.84	0.80	0.77	0.52	0.27	0.29
	(0.37)	(0.40)	(0.42)			
In favor of prohibition	0.81	0.77	0.84	0.62	0.59	0.99
	(0.40)	(0.42)	(0.37)			
Would increase liquor prices	0.07	0.14	0.12	0.18	0.32	0.15
	(0.26)	(0.35)	(0.33)			

Notes: This table shows balance checks for alcohol-related variables across sobriety incentive treatment groups.

- Columns 1 through 3 show sample means for individuals in the Control Group (1), Incentive Group (2), and the Choice Group (3), respectively. Standard deviations are in parentheses. Columns 4 through 6 show p-values of OLS regressions of each variable on dummies for each treatment group.
- Columns 4 and 5 show p-values of tests for equality of means between the Incentive and Choice Groups compared to the Control Group, respectively. Column 6 shows the corresponding p-values for comparisons between the Control Group and the Incentive and Choice Groups combined.

Table A.4—: Balance of Work and Savings (by Sobriety Incentive Group)

	Treatment groups			p value for test of:		
	Control (N=83) (1)	Incentives (N=71) (2)	Choice (N=75) (3)	1=2 (4)	1=3 (5)	1 = (2 ∪ 3) (6)
Years worked as a rickshaw puller	14.06	12.49	12.81	0.29	0.34	0.25
	(9.53)	(8.78)	(6.73)			
Number of days worked last week	5.41	5.18	5.43	0.36	0.94	0.60
	(1.35)	(1.65)	(1.39)			
Has regular employment arrangement	0.47	0.54	0.47	0.42	0.97	0.66
	(0.50)	(0.50)	(0.50)			
Owns rickshaw	0.17	0.25	0.28	0.20	0.10	0.08
	(0.38)	(0.44)	(0.45)			
Says 'no money' reason for not owning rickshaw	0.61	0.65	0.59	0.67	0.72	0.98
	(0.49)	(0.48)	(0.50)			
Reported labor income in Phase 1 (Rs./day)	288.34	292.44	273.62	0.85	0.49	0.76
	(122.08)	(150.58)	(142.60)			
Total savings (Rs.)	12948	24119	38013	0.20	0.13	0.06
	(29749)	(68465)	(139191)			
Total borrowings (Rs.)	11711	5648	7913	0.11	0.36	0.18
	(29606)	(15762)	(22253)			
Savings at study office in Phase 1 (Rs./day)	40.98	44.67	41.04	0.62	0.99	0.77
	(41.93)	(49.28)	(48.25)			

Notes: This table shows balance checks for work- and savings-related variables across sobriety incentive treatment groups.

- Columns 1 through 3 show sample means for individuals in the Control Group (1), Incentive Group (2), and the Choice Group (3), respectively. Standard deviations are in parentheses. Columns 4 through 6 show p-values of OLS regressions of each variable on dummies for each treatment group.
- Columns 4 and 5 show p-values of tests for equality of means between the Incentive and Choice Groups compared to the Control Group, respectively. Column 6 shows the corresponding p-values for comparisons between the Control Group and the Incentive and Choice Groups combined.
- Baseline savings are calculated as the sum of amounts saved in a number of different options including savings at home in cash or in gold or silver, with relatives and friends, with self-help groups, or with shopkeepers, as reported in the baseline survey.

Table A.5—: Attrition and Inconsistencies of Choices

	Choice Group			**Incentive Group**	**Control Group**
	Week 1	Week 2	Week 3	Week 3	Week 3
Present & consistent (%)	88.0	89.3	88.0	90.1	86.7
Absent (%)	5.3	6.7	6.7	5.6	6.0
Inconsistent (%)	6.7	4.0	5.3	4.2	7.2

Notes: This table shows the fraction of individuals who were present and made consistent choices by treatment group and week of study. During a given choice session, an individual chose inconsistently if he chose Option B for the unconditional amount Y_1, but Option A for the unconditional amount Y_2 with $Y_2 > Y_1$. For instance, his choices are inconsistent if he preferred Option B in Choice 1, but not in Choice 3.

Table A.6—: Fraction Choosing Incentives in Choice Group and Over Time

	Choice Features	**Choice Group**			**Incentive Group**	**Control Group**
#	Unconditional amount	Week 1	Week 2	Week 3	Week 3	Week 3
(1)	Rs. 90	60.0	62.7	57.3	67.6	49.4
(2)	Rs. 120	46.7	52.0	44.0	54.9	37.3
(3)	Rs. 150	30.7	33.3	40.0	47.9	31.3

Notes: This table shows the fraction of individuals who preferred incentives over unconditional amounts for each of the choices by week of study. Individuals who were either absent or did not choose consistently are counted as *not* preferring incentives.

Table A.7—: Times of Study Office Visits and First Drinks

Dependent variable:	**Time of study office visit**		**Time of first drink**	
	(1)	(2)	(3)	(4)
Incentives	0.14		0.92	
	(0.11)		(0.42)	
Choice	0.02		1.20	
	(0.10)		(0.36)	
Pooled alcohol treatment		0.07		1.07
		(0.09)		(0.33)
Observations	2850	2850	2915	2915
R-squared	0.11	0.11	0.27	0.27
Control group mean	19.16	19.16	17.01	17.01

Notes: This table shows the impact of the two sobriety incentive treatments on (i) the time of study participants' study office visits (column 1 and 2) and (ii) the reported time of their first alcoholic drink of the day. Study visit and drinking times are measured in hours (24-hour military time). Standard errors are in parentheses, clustered by individual. All regressions control for Phase 1 and Baseline Survey Controls as described above.

Table A.8—: The Effect of Incentives on Attendance

	Dependent variable: present at study office						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Incentives	-0.07	-0.09	-0.06	-0.07	-0.08	-0.08	-0.06
	(0.04)	(0.04)	(0.04)	(0.04)	(0.05)	(0.04)	(0.07)
Choice	0.00	-0.00	0.02	0.00	-0.05	0.00	0.04
	(0.04)	(0.03)	(0.03)	(0.04)	(0.05)	(0.04)	(0.05)
Baseline fraction sober		-0.09	-0.00	-0.04	-0.08		
		(0.08)	(0.08)	(0.04)	(0.06)		
Incentives X Fraction sober in Phase 1					0.02		
					(0.10)		
Choice X Fraction sober in Phase 1					0.12		
					(0.08)		
Amount saved in Phase 1 (divided by 100)						0.02	0.04
						(0.01)	(0.01)
Incentives X Amount saved in Phase 1							-0.01
							(0.03)
Choice X Amount saved in Phase 1							-0.02
							(0.01)
Observations	3435	3435	3435	3435	3435	3435	3435
R-squared	0.01	0.04	0.14	0.01	0.01	0.03	0.03
Baseline survey controls	NO	NO	YES	NO	NO	NO	NO
Phase 1 controls	NO	YES	YES	NO	NO	NO	NO
Control group mean	0.87	0.87	0.87	0.87	0.87	0.87	0.87

Notes: This table shows regressions of daily attendance at the study office on indicators for the two sobriety incentive treatments.

- All regressions use data from day 5 (the first day of sobriety incentives) through day 19 (the last day of sobriety incentives) of the study.
- The outcome variable is an indicator variable for whether an individual visited the study office on a given study day when he was supposed to.
- Standard errors are in parentheses, clustered by individual. Phase 1 and Baseline Survey Controls are the same as in the above tables.

Table A.9—: Lee Bounds for Impacts on Sobriety and Savings

	Incentives		**Choice**		**Pooled**	
	Lower (1)	Upper (2)	Lower (3)	Upper (4)	Lower (5)	Upper (6)
Panel A: Sobriety						
Lee Bounds	0.138	0.228	0.106	0.110	0.123	0.162
Standard Error	(0.025)	(0.026)	(0.023)	(0.024)	(0.020)	(0.021)
Imbens-Manski 95% CI	[0.097, 0.270]		[0.063, 0.155]		[0.089, 0.197]	
Panel B: Savings						
Lee Bounds	1.553	28.827	14.371	18.566	3.825	21.433
Standard Error	(5.128)	(5.978)	(4.954)	(9.278)	(3.303)	(4.910)
Imbens-Manski 95% CI	[-6.881, 38.660]		[5.538, 35.107]		[-1.609, 29.510]	

Notes: This table shows Lee (2009) treatment effects for sobriety and savings.

- The first two rows of each panel show the estimated treatment effect upper and lower bounds including standard errors in parentheses. The third row shows the Imbens-Manski 95 percent confidence interval for the treatment effect.
- Columns 1 and 2 show estimates using the Incentive and Control Groups only. Columns 3 and 4 show estimates using the Choice and Control Groups only. Columns 5 and 6 show estimates of the pooled treatment effect using all three treatment groups.
- None of the regressions include Phase 1 or Baseline Survey Controls.

Table A.10—: The Effect of Sobriety Incentives on Savings (Winsorized Data)

	Dependent variable: Amount saved at study office (Rs./day)								
Fraction of winsorized data:	0%	1%	2%	0%	1%	2%	0%	1%	2%
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Incentives	11.28	13.43	12.08	10.69	12.79	11.41	23.61	24.00	20.79
	(6.22)	(5.42)	(5.13)	(6.02)	(5.15)	(4.83)	(9.05)	(7.91)	(7.42)
Choice	16.62	16.19	15.09	12.54	11.75	10.52	28.75	26.51	23.60
	(5.58)	(5.17)	(4.97)	(5.48)	(4.95)	(4.70)	(8.86)	(8.31)	(7.87)
High matching contribution	9.34	7.94	7.20	10.56	9.27	8.58	16.98	12.79	11.02
	(4.66)	(4.33)	(4.15)	(4.42)	(4.06)	(3.88)	(7.67)	(7.39)	(7.13)
Commitment savings	5.31	4.47	3.20	4.69	3.80	2.51	13.51	13.33	10.70
	(4.92)	(4.24)	(4.00)	(4.78)	(4.03)	(3.78)	(7.09)	(6.64)	(6.34)
Pooled alc treat X Commitment save							-13.72	-14.50	-12.24
							(10.36)	(9.16)	(8.70)
Pooled alc treat X High match							-11.84	-7.60	-6.00
							(10.96)	(9.92)	(9.49)
Daily study payment (Rs)				0.32	0.35	0.36			
				(0.05)	(0.05)	(0.05)			
Observations	3435	3435	3435	3435	3435	3435	3435	3435	3435
R-squared	0.13	0.27	0.34	0.14	0.30	0.37	0.13	0.27	0.34
Control group mean	20.42	20.42	20.42	20.42	20.42	20.42	20.42	20.42	20.42

Notes: This table shows the regressions from Table 5, using winsorized data.

- Columns (1), (4), and (7) show regressions using the original, non-winsorized data.
- Columns (2), (5), and (8) show regressions using data in which the lowest and highest 0.5 percent of values (i.e. 1 percent in total) are winsorized.
- Columns (3), (6), and (9) show regressions using data in which the lowest and highest 1 percent of values (i.e. 2 percent in total) are winsorized.
- All of the regressions include Phase 1 or Baseline Survey Controls as in the tables above.

Table A.11—: Effect of Sobriety Incentives on Family Resources and Other Expenses

	Money given to family (Rs./day)						**Other expenses (Rs./day)**					
	To wife		**To others**		**Total**		**Food**		**Coffee & tea**		**Tobacco & paan**	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Incentives	7.67		-2.92		4.76		1.65		0.52		3.51	
	(13.97)		(7.91)		(15.89)		(5.56)		(0.94)		(1.67)	
Choice	12.80		-10.85		1.95		1.03		0.67		-1.41	
	(13.75)		(7.52)		(14.97)		(5.14)		(0.88)		(1.56)	
Pooled alcohol treatment		10.47		-7.25		3.22		1.32		0.60		0.88
		(11.67)		(5.69)		(11.99)		(4.67)		(0.77)		(1.43)
Observations	2969	2969	2969	2969	2969	2969	1035	1035	1047	1047	1047	1047
R-squared	0.19	0.19	0.11	0.11	0.15	0.15	0.31	0.31	0.16	0.16	0.17	0.15
Control group mean	150.10	150.10	25.36	25.36	175.46	175.46	50.93	50.93	4.52	4.52	10.52	10.52

Notes: This table shows the impact of the two sobriety incentive treatments on family resources and other expenses

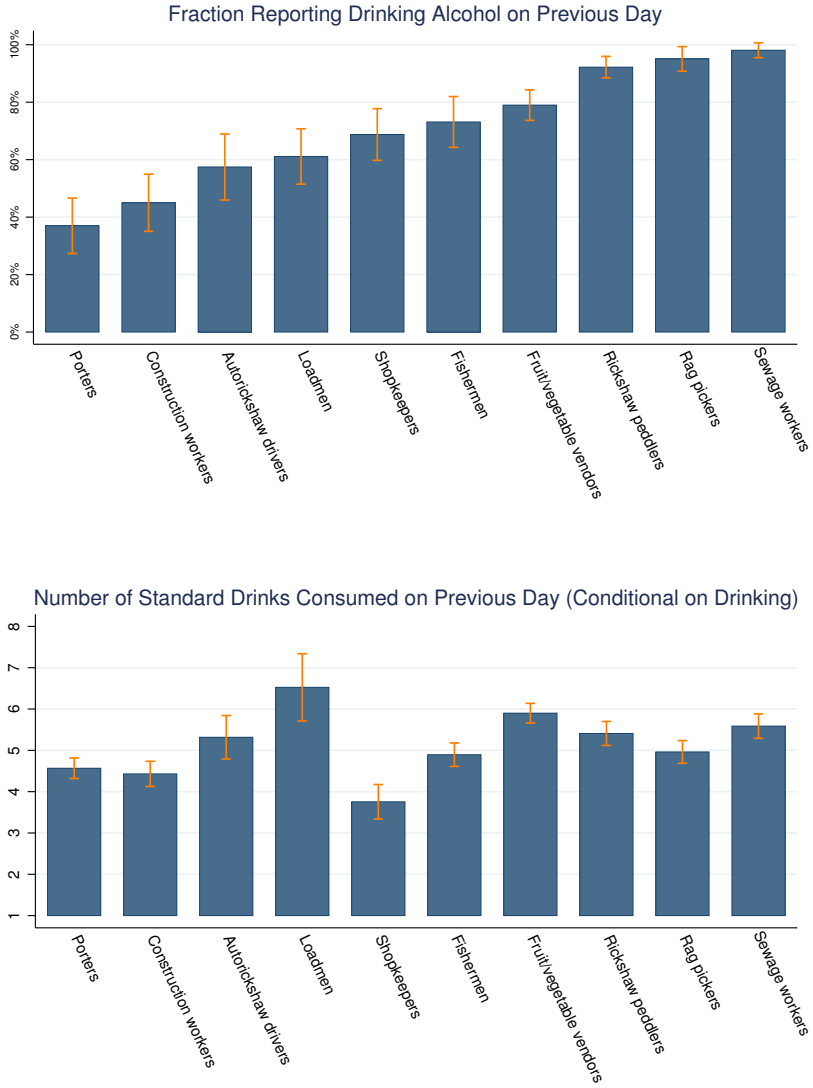
- All regressions use data from day 5 (the first day of sobriety incentives) through day 19 (the last day of sobriety incentives) of the study.
- The outcome variables in columns (1) through (6) are (i) money given to the wife (Rs./day; always zero for unmarried individuals) (ii) other family expenses (the sum of money given to other family members and direct household expenses), and (iii) total family resources (i.e. the sum of (i) and (ii)). The outcome variables in columns (7) through (12) are (i) expenditures on food outside the household, (ii) expenditures on coffee and tea, and (iii) expenditures on tobacco and paan.
- The data used in the regressions is from retrospective surveys on the consecutive study days, during which individuals were asked about each of the above variables on the previous day. In addition, if individuals missed a day or two (and on Mondays), they were asked about the same outcomes two or three days ago, respectively. Individuals were asked daily about the outcomes in columns (1) through (6) and about every third study day about the remaining outcomes.
- Standard errors are in parentheses, clustered by individual. Phase 1 and Baseline Survey Controls are the same as in the above tables.

Table A.12—: The Marginal Propensity to Save out of Lottery Earnings

Dependent variable	**Amount saved at study office (Rs./day)**					
	(1)	(2)	(3)	(4)	(5)	(6)
Pooled alcohol treatment	12.33	14.94	13.88	11.85	14.30	13.47
	(6.26)	(6.02)	(5.83)	(6.12)	(5.94)	(5.83)
Amount won in lottery on previous study day	0.27	0.33	0.26			
	(0.17)	(0.16)	(0.15)			
Pooled alcohol treatment X Lottery amount				0.32	0.40	0.30
				(0.20)	(0.19)	(0.16)
Control Group X Lottery amount				0.16	0.19	0.17
				(0.30)	(0.29)	(0.28)
Observations	3435	3435	3435	3435	3435	3435
R-squared	0.01	0.05	0.09	0.01	0.05	0.09
Baseline survey controls	NO	NO	YES	NO	NO	YES
Phase 1 controls	NO	YES	YES	NO	YES	YES
Control group mean	20.42	20.42	20.42	20.42	20.42	20.42

Notes: This table shows estimates of the impact of lottery winnings on the amounts saved at the study office.

- All regressions use data from day 5 (the first day of sobriety incentives) through day 19 (the last day of sobriety incentives) of the study. The outcome variable is the amount saved at the study office. If an individual did not visit the study office on any given day of the study, the amount saved is set to zero on this day. Similarly, the daily study payment is zero for those observations.
- The lottery was conducted on days 10 through 18 of the study. All regressions control for whether individuals participated in the lottery on any given day. Lottery winnings were Rs. 0 (no win), Rs. 30, or Rs. 60. If an individual won in the lottery, he was given a personalized voucher for the respective amount (Rs. 30 or Rs. 60) that was redeemable *only* by this individual *only* on the subsequent study day.
- Standard errors are in parentheses, clustered by individual. Phase 1 and Baseline Survey Controls are the same as in the above tables.



Notes: The figure shows summary statistics of drinking patterns for ten different low-income professions in Chennai, India. The underlying data from these figures are from short surveys conducted with a total sample size of 1,227 individuals. The number of individuals surveyed in each profession varies from 75 (auto rickshaw drivers) to 230 (fruit and vegetable vendors). Error bars measure 95 percent confidence intervals.

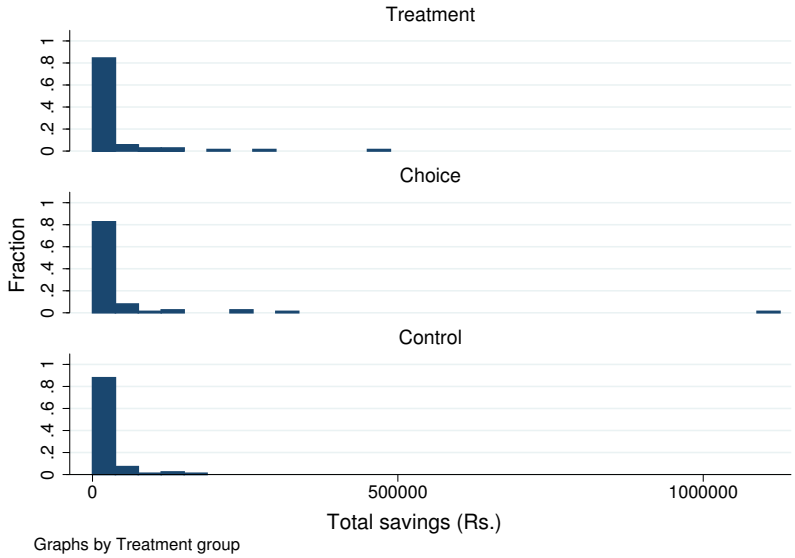
- The upper panel depicts the prevalence of alcohol consumption, as measured by the fraction of individuals who reported consuming alcohol on the previous day.
- The lower panel shows the number of standard drinks consumed on the previous day, conditional on reporting any alcohol consumption on the previous day.
- Reported consumption levels are converted into standard drinks according to WHO (2001). A small bottle of beer (330 ml at 5 percent alcohol), a glass of wine (140 ml at 12 percent alcohol), or a shot of hard liquor (40 ml at 40 percent alcohol) each contains about one standard drink.

Figure A.1. : Alcohol Consumption among Low-Income Males in Chennai

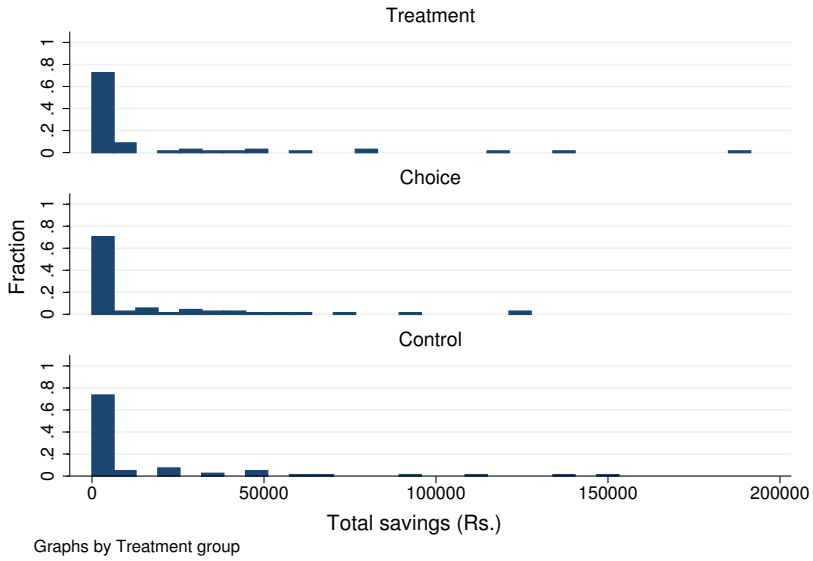
Notes: The figure is a continuation of Appendix Figure A.1.

- The upper panel of this figure shows the fraction of weekly income spent on alcohol for the sample described in Figure A.1. For each individual, the fraction spent on alcohol is calculated by dividing reported weekly alcohol expenditures by reported weekly earnings. Weekly alcohol expenditures are calculated by multiplying the number of days the individual reported consuming alcohol in the previous week times the amount spent on alcohol per drinking day. Weekly earnings are calculated by the number of days worked during the previous week times the amount earned per working day.
- The lower panel of this figure shows the fraction of individuals who were inebriated at the time of the survey, as measured by having a positive blood alcohol content in a breathalyzer test.
- All surveys were conducted during the day, i.e. between 8 am and 6 pm. Error bars measure 95 percent confidence intervals.

Figure A.2. : Alcohol Consumption among Low-Income Males in Chennai (cont'd)



(a) All individuals

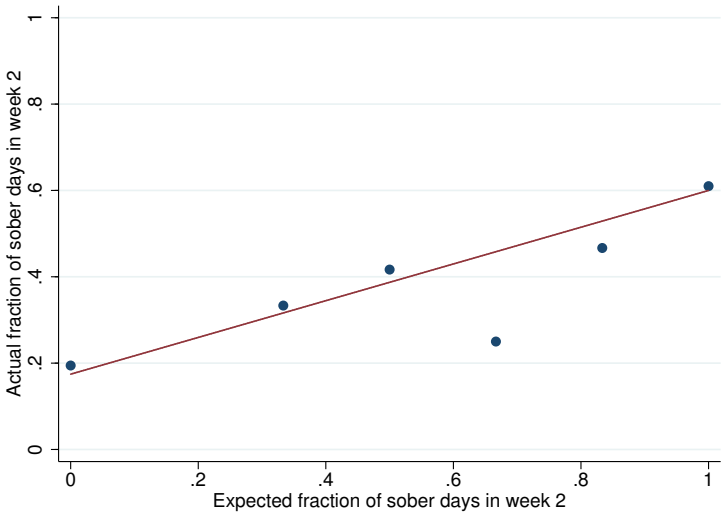


(b) Only individuals with savings below Rs. 200,000

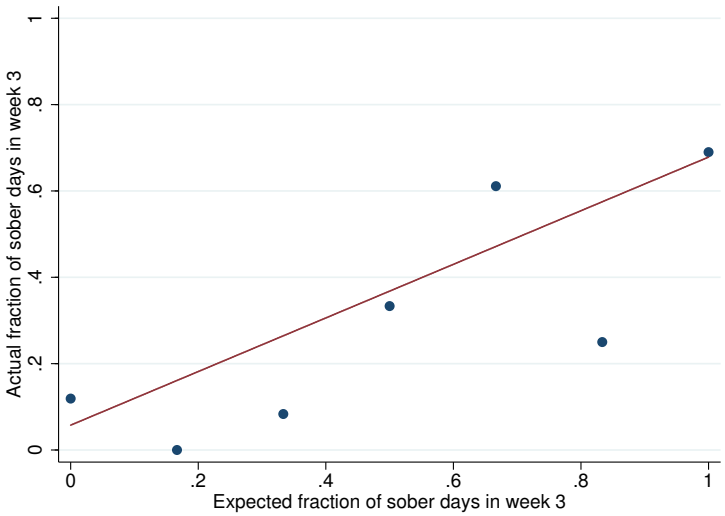
Notes: The figure shows the distribution of total savings in each of the sobriety incentive treatment groups.

- The upper panel of the figure shows the unconditional distribution.
- The lower panel of the figure shows the distribution for individuals with total savings below Rs. 200,000 (i.e. excluding six individuals).

Figure A.3. : Reported Total Savings by Incentive Treatment Group at Baseline



(a) Expected vs. actual sobriety in week 2

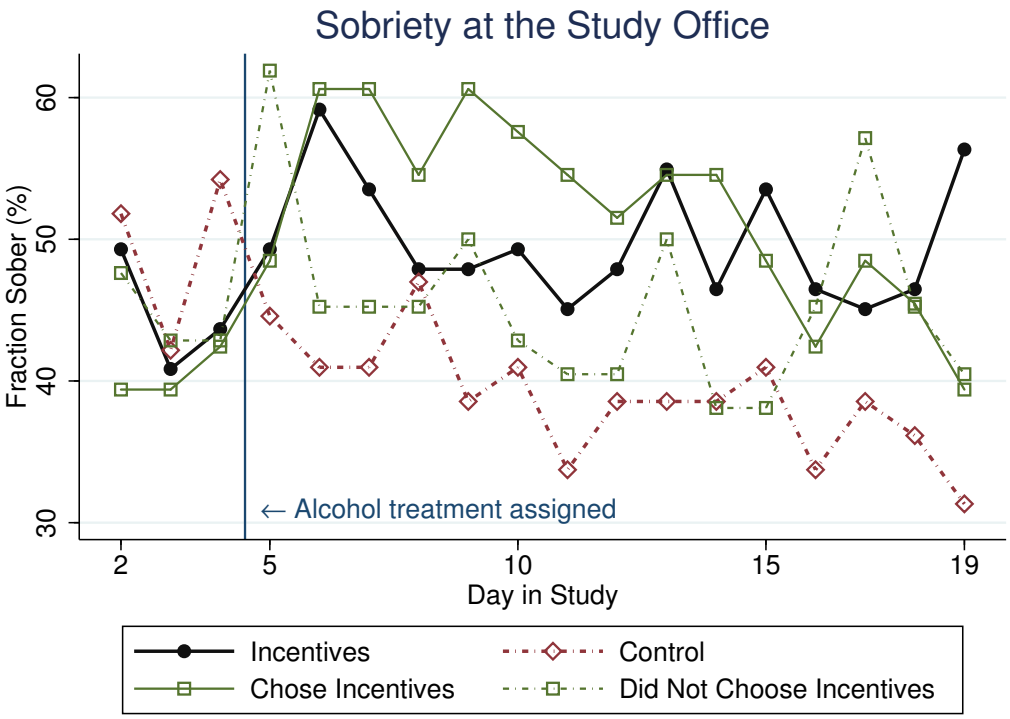


(b) Expected vs. actual sobriety in week 3

Notes: This figure shows individuals' beliefs regarding their future sobriety in the Incentive Group.

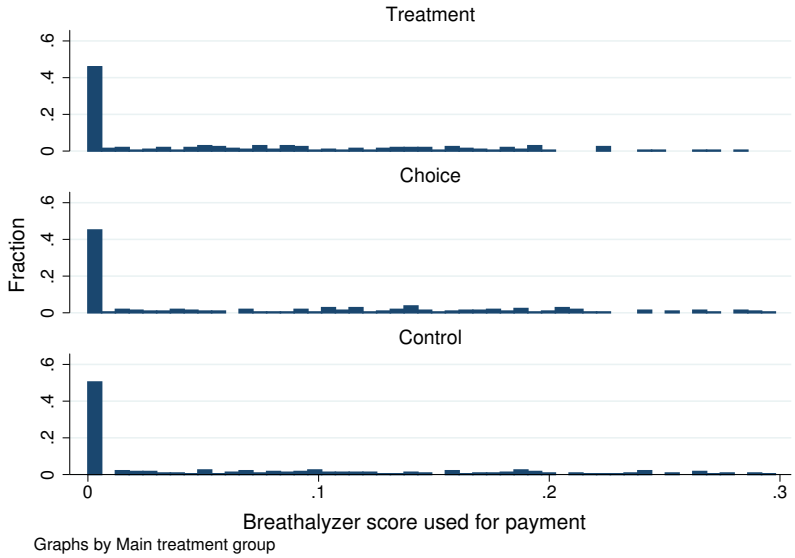
- As part of the comprehension questions during each of the choice sessions, individuals in the Incentive and Choice Groups were asked on how many of the subsequent days they expected to visit the study office sober.
- Both graphs show the relationship between individuals' (average) answers to these questions and the actually realized (mean) number of sober visits to the study office for each of the predicted number of subsequent sober visits.
- The upper panel shows predicted and actual sobriety for week 2, elicited during the first choice session (day 7 of the study). The lower panel shows predicted and actual sobriety for week 3, elicited during the second choice session (day 13 of the study).

Figure A.4. : Beliefs About Future Sobriety (under Incentives)

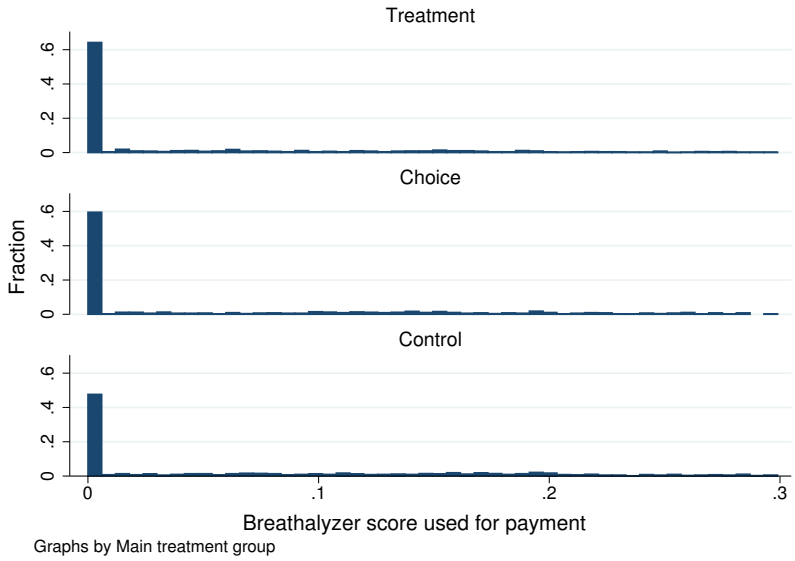


Notes: This figure shows the impact of incentives on sobriety at the study office. The figure is largely the same as Figure 3. However, the Choice Group is split up into individuals who in the first choice session (on day 7) chose incentives in Choice 2 (solid green line) and individuals who did not choose incentives on day 7 in Choice 2 (dotted green line).

Figure A.5. : The Impact of Incentives on Sobriety – Splitting up the Choice Group



(a) Before treatment assignment

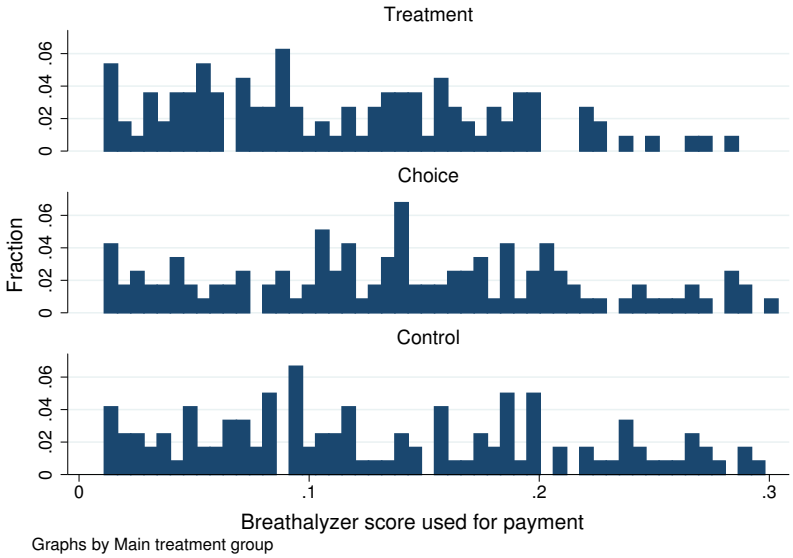


(b) After treatment assignment

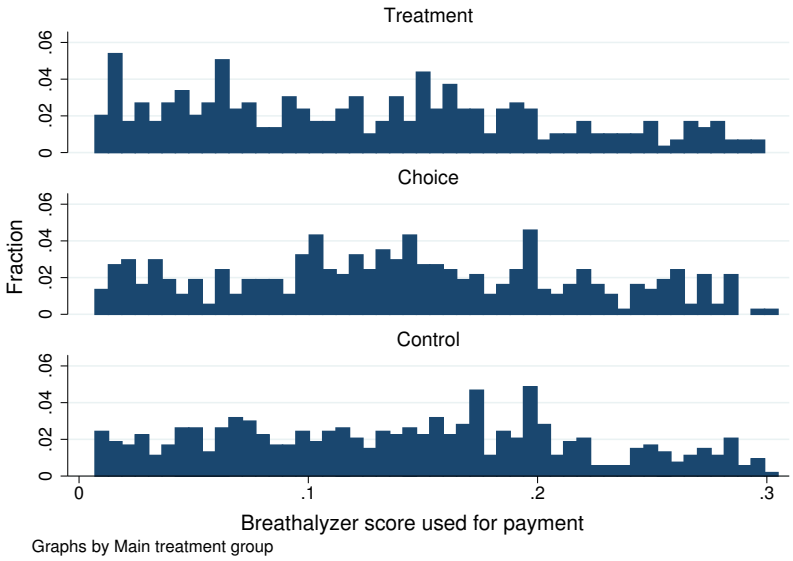
Notes: This figure shows histograms of measured breathalyzer scores during participants' study office visits by treatment group.

- The upper panel of the figure shows the BAC distribution for study office visits including day 4 (when the treatment was assigned).
- The lower panel of the figure shows the BAC distribution for study office visits after day 4.

Figure A.6. : Unconditional Distribution of Breathalyzer Scores by Treatment



(a) Before treatment assignment

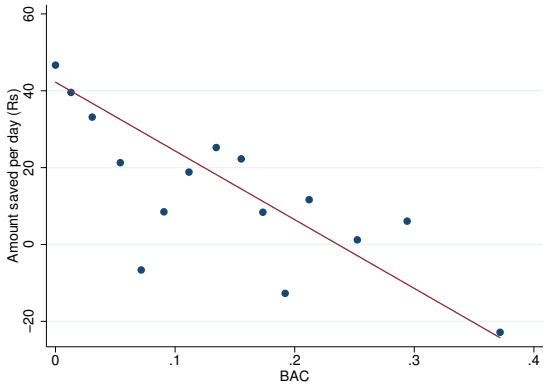


(b) After treatment assignment

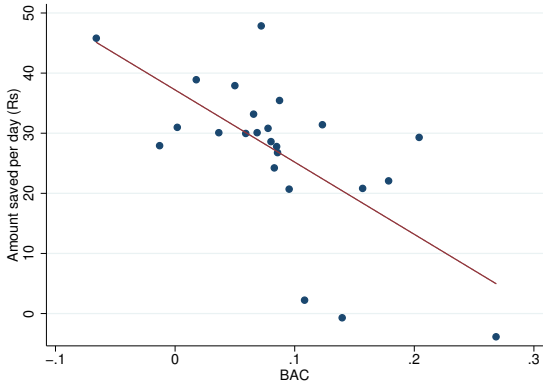
Notes: This figure shows histograms of measured breathalyzer scores during participants' study office visits for the three treatment groups, conditional on positive BAC.

- The upper panel of the figure shows the BAC distribution for study office visits including day 4 (when the treatment was assigned).
- The lower panel of the figure shows the BAC distribution for study office visits after day 4.

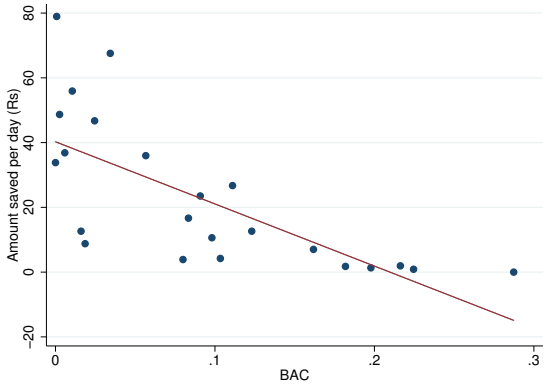
Figure A.7. : Distribution of Breathalyzer Scores by Treatment (Conditional on Positive BAC)



(a) Daily amount saved and BAC (no individual FE)



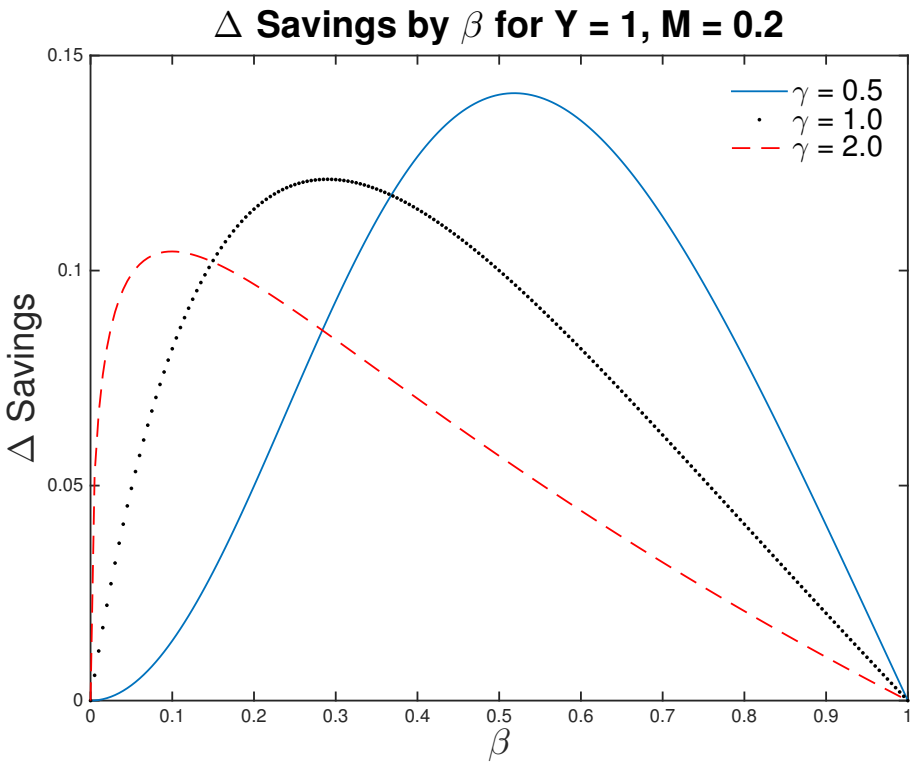
(b) Daily amount saved and BAC (individual FE)



(c) Mean amount saved and mean BAC

Notes: This figure shows the correlation between breathalyzer scores during study office visits and amounts saved at the study during the same visits for individuals in the Control Group. The top panel depicts a binned scatter plot (including regression line) for all observations in the Control Group. The center panel shows the same graph, controlling for individual fixed effects. The bottom panel depicts the correlation across study participants by collapsing observations by individual.

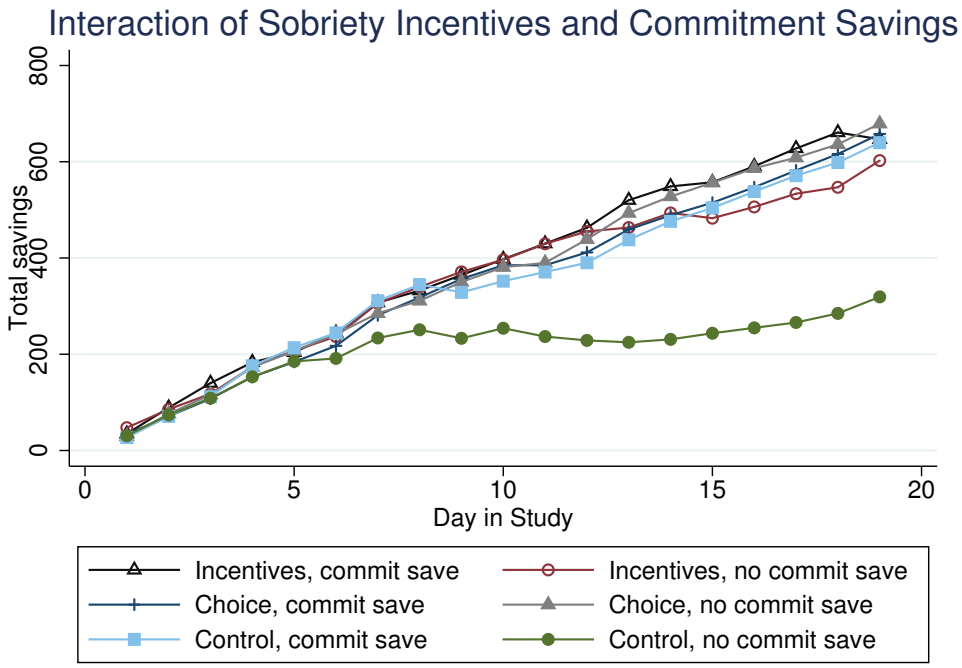
Figure A.8. : Cross-sectional Relationship between Daily Amounts Saved and BAC

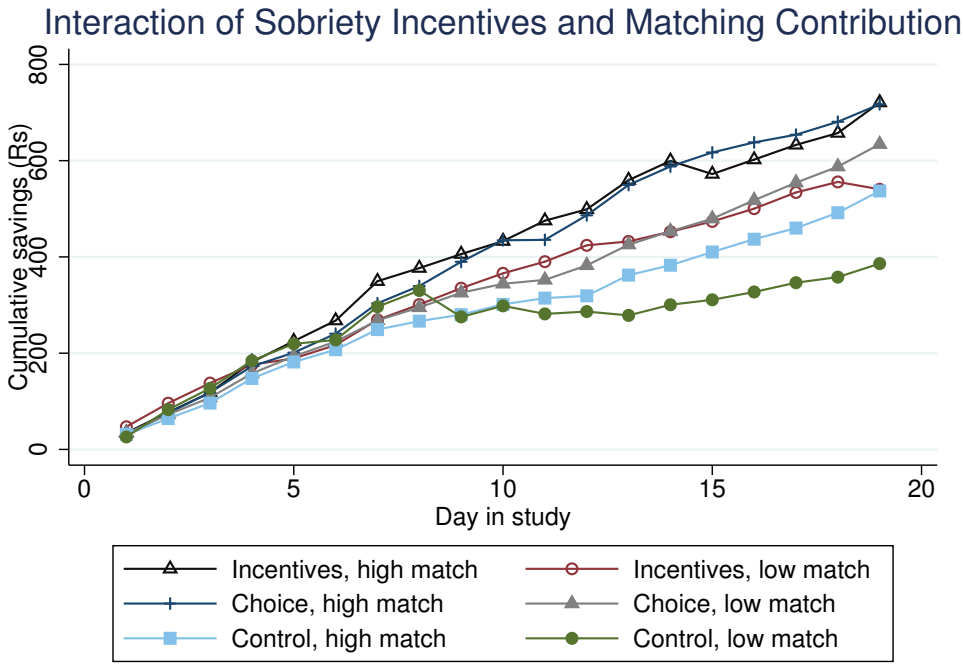


Notes: This figure shows the relationship between present bias and the effect of commitment savings in the model described in Sections A.A1 and A.A2.

- The figure shows the present bias (as measured by $\beta \in [0, 1]$) on the horizontal axis and the increase in savings due to offering a commitment savings option on the vertical axis for the iso-elastic utility case.
- This increase in savings is given by the difference in consumption in period 3 between the two cases described in my model, i.e. $\Delta = c_3^{\mathrm{C}} - c_3^{\mathrm{NC}}$ as shown in equation (A14).
- The figure depicts the relationship between Δ and β for $\gamma = 0.5$ (the solid line), $\gamma = 1$ (the dotted line), and $\gamma = 2$ (dashed line).
- In the specific figure shown here, $Y = 1$ and $M = 0.2$. The relationship is very similar, if not identical, for different parameter values. An explicit solution for Δ in the log case ($\gamma = 1$) is given in Online Appendix A.A1 below.

Figure A.9. : Effect of Commitment Savings as Function of β





Notes: This figure shows the interaction between the cross-randomized sobriety incentives and savings treatments. The figure is the same as Figure 6, except for the fact that the two sobriety incentive treatment groups are shown separately rather than pooled (as in Figure 6).

Figure A.10. : Interaction between Sobriety Incentives (not pooled) and Savings Treatments

A1. A Simple Model

Consider a simple consumption-saving problem. A consumer lives for three periods. In Period 1 he receives an endowment Y_1. There are no other income sources in Periods 2 and 3, but the consumer is paid a matching contribution of M times the amount saved by the start of Period 3. In Periods $t = 1, 2$, he has to decide how to allocate his available resources into instantaneous consumption c_t or savings. The instantaneous utility function $u(c_t)$ is increasing and concave: $u'(\cdot) > 0$ and $u''(\cdot) < 0$. The consumer has β-δ time preferences as in Laibson (1997), with $\delta = 1$ for simplicity and $\beta \in (0, 1]$. The individual is sophisticated in the O'Donoghue and Rabin (1999) sense. He understands the extent of future self-control problems, i.e. he knows his future β. There is no uncertainty. In Period 1, he maximizes $U_1(c_1, c_2, c_3) \equiv u(c_1) + \beta[u(c_2) + u(c_3)]$, and in Period 2 he maximizes $U_2(c_2, c_3) \equiv u(c_2) + \beta u(c_3)$.

No commitment savings. Consider first a situation without commitment savings. We solve the problem recursively. In Period 3, the individual will consume the entire amount saved plus the matching contribution: $c_3 = (Y_1 - c_1 - c_2)(1+M)$. In Period 2, the individual takes c_1 as given and maximizes

$$\max_{c_2} \; u(c_2) + \beta u((Y_1 - c_1 - c_2)(1 + M)). \tag{A1}$$

The associated FOC is $u'(c_2) = \beta(1 + M)u'(c_3)$. This choice is anticipated in Period 1 such that the individual chooses c_1 to solve the following problem:

$$\max_{c_1} \; u(c_1) + \beta[u(c_2) + u(c_3)] \tag{A2}$$

$$\text{s.t.} \quad c_3 = (Y_1 - c_1 - c_2)(1 + M) \tag{A3}$$

$$u'(c_2) = \beta(1 + M)u'(c_3) \tag{A4}$$

$$c_1, c_2, c_3 \geq 0 \tag{A5}$$

Defining $Y_2 \equiv Y_1 - c_1$, the solution is described by the following three equations.

$$u'(c_1) = \beta \left[u'(c_2) \frac{dc_2}{dY_2} + u'(c_3) \frac{dc_3}{dY_2} \right], \tag{A6}$$

$$u'(c_2) = \beta(1 + M)u'(c_3), \tag{A7}$$

$$c_3 = (Y_2 - c_2)(1 + M). \tag{A8}$$

Combining these equations yields a version of the familiar modified Euler equation

Harris and Laibson (2001):[33]

$$u'(c_1) = \left[\beta \frac{dc_2}{dY_2} + \left(1 - \frac{dc_2}{dY_2}\right)\right] u'(c_2). \tag{A9}$$

Commitment savings. Consider now the situation in which a commitment savings account is available. That is, any money that is saved in Period 1 cannot be withdrawn until Period 3. The Period 1 self would like to set $u'(c_2) = (1 + M)u'(c_3)$. However, in the absence of commitment savings, the Period 2 self deviates from this, i.e. chooses c_2 such that $u'(c_2) = \beta(1 + M)u'(c_3)$ and, hence, consumes more than the Period 1 self would like him to. This creates a demand for commitment for the Period 1 self. Since the Period 1 self is always (weakly) more patient than the Period 2 self, this implies that the solution to this problem is simply the case in which the Period 1 self determines consumption in all three periods. The individual will consume c_1 and deposit c_3 into the commitment savings account such that $u'(c_1) = \beta u'(c_2) = \beta(1+M)u'(c_3)$, subject to the above budget constraint. Hence, the solution is described by the following equations:

$$u'(c_1) = \beta u'(c_2), \tag{A10}$$

$$u'(c_2) = (1 + M)u'(c_3), \tag{A11}$$

$$c_3 = (Y_2 - c_2)(1 + M). \tag{A12}$$

Comparing the two solutions above clarifies the relationship between present bias and commitment savings. Introducing a commitment option increases savings iff $0 < \beta < 1$, since the commitment savings device makes both the Period 1 and 2 selves consume a smaller share of their available resources Y_1 and Y_2, respectively. If $\beta = 1$, commitment savings has no effect as there is no discrepancy between the Period 1 and Period 2 preferences. At the other extreme, if $\beta \to 0$, there are no savings even if commitment is available. Accordingly, there is no impact of the commitment device on savings choices either.[34] Taken together, this implies that the impact of commitment savings is non-monotonic in present bias.

For $\beta \in (0, 1)$, changing β has two opposing effects on the impact of commitment on savings. The first effect is that, in the absence of commitment, the Period 2 self will deviate more from the allocation that maximizes Period 1 self's utility (by increasing c_2 relative to c_3). This effect not only reduces the Period 2 self's savings for given resources, but it also reduces the Period 1 self's saving as he anticipates this effect. In contrast, in the presence of the commitment device, the Period 1 self can prevent this from happening by saving the desired amount using the commitment device. Hence, the impact of the commitment device on savings is larger for increased present bias due to this effect. However, there is a

[33] In contrast to Harris and Laibson (2001), there is no interest rate in this equation since M is a matching contribution rather than an interest rate.

[34] Subsistence levels in consumption could change this feature of the model.

second, opposing effect. Since the Period 1 self's β also decreases, the desire to allocate resources to Periods 2 and 3 falls even if a commitment savings option is available. This effect *lowers* the impact of offering the commitment savings option. In the extreme case for $\beta \to 0$, there is no impact at all.

Solving for the iso-elastic case. Consider the case of the commonly used iso-elastic utility function.

$$u(c_t) = \begin{cases} \frac{c_t^{1-\gamma}}{1-\gamma} & \text{if } \gamma \neq 1, \\ \log(c_t) & \text{if } \gamma = 1. \end{cases} \tag{A13}$$

The impact of commitment savings on savings is given by the difference in consumption levels in Period 3 with and without commitment (see Appendix Section A.A2 for details).

$$\Delta \equiv c_3^{\mathrm{C}} - c_3^{\mathrm{NC}} = \frac{Y_1(1+M)}{1+\theta+\theta\left[\frac{1+\beta\theta}{1+\theta}\right]^{\frac{-1}{\gamma}}} - \frac{Y_1(1+M)}{1+\theta+(1+M)^{1-\frac{1}{\gamma}}}, \tag{A14}$$

where $\theta \equiv (\beta(1+M))^{\frac{-1}{\gamma}}(1+M)$. Figure A.9 depicts Δ as a function of β for different values of γ. For the empirically relevant ranges of $\beta \in [0.5, 1]$ and $\gamma > 0.5$, a decrease in present bias, i.e. an increase in β, lowers the impact of commitment savings devices on savings.[35] This implies that an increase in sobriety (which lowers the use of commitment savings in my experiment) is effectively equivalent to an increase in β.

A2. Solution for the Case of Iso-elastic Utility

This section provides the solution of the model described in section 5.1 for the commonly used case of iso-elastic utility.

No commitment savings. Equations (A7) and (A9) become

$$c_2^{-\gamma} = \beta(1+M)c_3^{-\gamma} \tag{A15}$$

$$c_1^{-\gamma} = \left[\beta\frac{dc_2}{dY_2} + \left(1 - \frac{dc_2}{dY_2}\right)\right] c_2^{-\gamma} \tag{A16}$$

Using (A8) and (A15), we can solve for c_3 and c_2 as functions of Y_2:

$$c_3 = \left(\frac{1+M}{1+\theta}\right) Y_2 \quad \text{and} \quad c_2 = \left(\frac{\theta}{1+\theta}\right) Y_2. \tag{A17}$$

[35] See Frederick, Loewenstein and O'Donoghue (2002) for a review of estimates of present bias and Chetty (2006) for estimates of γ.

where $\theta \equiv (\beta(1+M))^{\frac{-1}{\gamma}}(1+M)$. This implies $\frac{dc_2}{dY_2} = \frac{\theta}{1+\theta}$ and, using (A16), we get

$$c_1 = \left(\frac{1+\beta\theta}{1+\theta}\right)^{\frac{-1}{\gamma}} c_2. \tag{A18}$$

Using the budget constraint and rewriting (A15) to $c_2 = \frac{\theta}{1+M}c_3$, this yields

$$c_3^{\mathrm{NC}} = \frac{Y(1+M)}{1+\theta+\theta\left[\frac{1+\beta\theta}{1+\theta}\right]^{\frac{-1}{\gamma}}}. \tag{A19}$$

Commitment savings. Equations (A10) and (A11) become

$$c_2 = (1+M)^{\frac{-1}{\gamma}} c_3, \tag{A20}$$

$$c_1 = \beta^{\frac{-1}{\gamma}} c_2 = \left(\frac{\theta}{1+M}\right) c_3. \tag{A21}$$

Using the budget constraint (A12), this implies

$$c_3^{\mathrm{C}} = \frac{Y(1+M)}{1+\theta+(1+M)^{1-\frac{1}{\gamma}}}. \tag{A22}$$

A3. A Special Case: Log Utility

This section considers a special case of log utility ($\gamma = 1$), i.e. $u(c_t) = \log(c_t)$.

No commitment savings. Equations (A7) and (A9) become

$$c_3 = \beta(1+M)c_2 \tag{A23}$$

$$c_2 = \left[\beta\frac{dc_2}{dY_2} + \left(1 - \frac{dc_2}{dY_2}\right)\right] c_1 \tag{A24}$$

Using $c_3 = (Y_2 - c_2)(1+M)$, we use (A23) to solve for c_3 and c_2 as functions of Y_2:

$$c_2 = \frac{1}{1+\beta}Y_2 \quad \text{and} \quad c_3 = \frac{\beta(1+M)}{1+\beta}Y_2 \tag{A25}$$

This implies $\frac{dc_2}{dY_2} = \frac{1}{1+\beta}$ and, hence $c_2 = \frac{2\beta}{1+\beta}c_1$ and $c_3 = (1+M)\frac{2\beta^2}{1+\beta}c_1$. Hence,

we get

$$c_1 = Y - c_2 - \frac{c_3}{1+M} = Y - \frac{2\beta}{1+\beta}c_1 - \frac{2\beta^2}{1+\beta}c_1 = \frac{Y}{1+\frac{2\beta}{1+\beta}+\frac{2\beta^2}{1+\beta}} \tag{A26}$$

This implies $c_3^{\mathrm{NC}} = \frac{2\beta^2}{1+3\beta+2\beta^2}Y(1+M)$.

Commitment savings. Consider now the solution for the commitment savings case. Equations (A10) and (A11) become

$$c_2 = \beta c_1 \qquad c_3 = (1+M)c_2 \tag{A27}$$

Using the budget constraint (A12), this yields

$$c_3^C = (Y - c_1 - c_2)(1+M) \tag{A28}$$

$$= Y(1+M) - \frac{c_3}{\beta} - c_3 \tag{A29}$$

$$= \frac{\beta}{1+2\beta}Y(1+M) \tag{A30}$$

Comparing the two solutions yields

$$\Delta \equiv c_3^{\mathrm{C}} - c_3^{\mathrm{NC}} = \left[\frac{\beta(1-\beta)}{(1+2\beta)(1+\beta)}\right] Y(1+M) \tag{A31}$$

Taking the derivative of the expression in brackets with respect to β yields

$$\frac{\partial[\cdot]}{\partial\beta} = \frac{1-2\beta-5\beta^2}{(1+3\beta+2\beta^2)^2} \tag{A32}$$

This expression is positive for $0 \leq \beta \approx 0.29$ and negative for $0.29 \approx \beta \leq 1$.