Economics Bulletin

Appendix and Supplemental material not intended for publication-Round 2

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Appendix A-C

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Appendix A

Table A.I: Empirical estimates of the fraction of present-biased individuals in recent studies

Study	Population	N	Elicitation method	Fraction
Ashraf, N., Karlan, D., & Yin, W. (2006). Tying Odysseus to the Mast: Evidence from a Commitment Savings Product in the Philippines. *The Quarterly Journal of Economics*, 21(2), 635-672.	Clients of a Philippine Bank	1,777	Hypothetical time preference questions	28%
Harrison, G. W., Lau, M. I., & Rutström, E. E. (2010). Individual Discount Rates and Smoking: Evidence from a Field Experiment in Denmark. *Journal of Health Economics*, 29(5), 708-717.	Danish Population	252	Experiment and structural estimation	37.9% of smokers and 27.3% of non-smokers
Meier, S., & Sprenger, C. (2010). Present-Biased Preferences and Credit Card Borrowing. *American Economic Journal: Applied Economics*, 2(1), 193-210.	Low income U.S. tax filers	541	Experiment	36%
Duflo, E., Kremer, M., & Robinson, J. (2011). Nudging Farmers to Use Fertilizer: Theory and Experimental Evidence from Kenya. *American Economic Review*, 101(6), 2350-90.	Farmers in Kenya	877	Model calibration for fertilizer use	69% stochastically, 17% always (31-41% of observed choices)
Epper, T., Fehr-Duda, H., & Bruhin, A. (2011). Viewing the Future through a Warped Lens: Why Uncertainty Generates Hyperbolic Discounting. *Journal of Risk and Uncertainty*, 43(3), 169-203.	University students	112	Experiment	45%
Andreoni, J., & Sprenger, C. (2012). Estimating Time Preferences from Convex Budgets. *The American Economic Review*, 102(7), 3333-3356.	University students	84	Experiment	No aggregate PB, β_{min}=0.76, β_{max}=1.32
Coller, M., Harrison, G. W., & Rutström, E. E. (2012). Latent Process Heterogeneity in Discounting Behavior. *Oxford Economic Papers*, 64(2), 375-391.	University students	87	Experiment and structural est.	41%
Read, D., Frederick, S., & Airoldi, M. (2012). Four Days Later in Cincinnati: Longitudinal Tests of Hyperbolic Discounting. *Acta Psychologica*, 140(2), 177-185.	University people and online database	128	Experiment	No aggregate present bias, 11.5% impatient switches (but as many patient switches)
Andersen, S., Harrison, G. W., Lau, M. I., & Rutström, E. E. (2014). Discounting Behavior: A Reconsideration. *European Economic Review*, 71, 15-33.	Danish population	413	Experiment and structural estimation	No aggregate present bias, individual estimation of β yields μ=1.00 and sd=0.04.
Augenblick, N., Niederle, M., & Sprenger, C. (2015). Working Over Time: Dynamic Inconsistency in Real Effort Tasks. *The Quarterly Journal of Economics*, 130(3), 1067-1115.	University students	89	Demand for commitment device	59%
Halevy, Y. (2015). Time Consistency: Stationarity and Time Invariance. *Econometrica*, 83(1), 335-352.	University students	117	Experiment	12% static present bias, 21% dynamic present bias
Kaur, S., Kremer, M., & Mullainathan, S. (2015). Self-control at Work. *Journal of Political Economy*, 123(6), pp.1227-1277.	Workers in Indian data-entry firm	8,423	Choice of a commitment contract	36%
Graziani, G., van der Klaauw, W. and Zafar, B. (2016). Workers' Spending Response to the 2011 Payroll Tax Cuts. *American Economic Journal: Economic Policy*, 8(4), pp.124-159.	Workers	206	Incentivized intertemporal choices	35.5%

Note: The table only contains a selection of recent studies. For further references, see the overview tables in Frederick *et al.* (2002) and Andersen *et al.* (2014).

Appendix B

Figure B.1: Set of potential payments in experiments 1 and 2

	Sie erhalten ... **heute** *Der Scheck ist sofort einlösbar* **A**	**oder**	Sie erhalten ... **in 1 Monat** *Der Scheck ist in 1 Monat einlösbar* **B**
1	200 €		200,80 €
2	200 €		201,60 €
3	200 €		202,40 €
4	200 €		203,20 €
5	200 €		203,90 €
6	200 €		204,70 €
7	200 €		205,40 €
8	200 €		206,10 €
9	200 €		206,80 €
10	200 €		207,50 €
11	200 €		208,20 €
12	200 €		208,90 €
13	200 €		209,60 €
14	200 €		210,20 €
15	200 €		210,80 €
16	200 €		211,50 €
17	200 €		212,10 €
18	200 €		212,70 €
19	200 €		213,30 €
20	200 €		213,90 €

Liste **Z5**

	Sie erhalten ... **in 12 Monaten** *Der Scheck ist in 12 Monaten einlösbar* **A**	**oder**	Sie erhalten ... **in 13 Monaten** *Der Scheck ist in 13 Monaten einlösbar* **B**
1	200 €		200,80 €
2	200 €		201,60 €
3	200 €		202,40 €
4	200 €		203,20 €
5	200 €		203,90 €
6	200 €		204,70 €
7	200 €		205,40 €
8	200 €		206,10 €
9	200 €		206,80 €
10	200 €		207,50 €
11	200 €		208,20 €
12	200 €		208,90 €
13	200 €		209,60 €
14	200 €		210,20 €
15	200 €		210,80 €
16	200 €		211,50 €
17	200 €		212,10 €
18	200 €		212,70 €
19	200 €		213,30 €
20	200 €		213,90 €

Liste **Z6**

Source: Richter and Schupp (2014, p.7).

Appendix C

Table C.I: Correlation between non-valid/corner choices in the experimental data and present-biasedness in the survey data

	(1)	(2)	(3)
	Never-switcher		
Present-bias (>4)	0.0022	0.0041	0.0036
s.e.	(0.051)	(0.051)	(0.051)
p-val	(0.965)	(0.935)	(0.943)
Observations	520	520	520
Age		X	X
Age squared		X	X
Sex			X
German			X
Log lik.	-347.3	-344.8	-343.4
R^2	0.000	0.009	0.015

Notes: 2006 SOEP data. The dependent variable is an indicator variable for being a never-switcher in the experimental data. Only 174 of the 177 excluded individuals have nonmissing information for the survey information of present bias. Standard errors and p-values in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table C.II: Validation results for the survey measure of present bias (using differences of switching amounts)

	(1)	(2)	(3)	(4)	(5)	(6)
Present-bias (scale 1-7)	-0.0013**	-0.0013**	-0.0021***			
	(0.001)	(0.001)	(0.001)			
Present-bias (>4)				-0.0069**	-0.0070***	-0.0097***
				(0.003)	(0.003)	(0.003)
Sex (male=1)		-0.0012	-0.0015		-0.0012	-0.0015
		(0.002)	(0.002)		(0.002)	(0.002)
German		-0.0029	-0.0013		-0.0028	-0.0011
		(0.005)	(0.005)		(0.005)	(0.005)
Father upper sec. edu.			-0.0073			-0.0076
			(0.005)			(0.005)
Mother upper sec. edu.			0.0050			0.0052
			(0.006)			(0.006)
Patience			-0.0013***			-0.0014***
			(0.000)			(0.000)
Observations	346	346	310	346	346	310
Age	X	X	X	X	X	X
Age squared	X	X	X	X	X	X
Log lik.	-770.4	-770.0	-679.0	-769.1	-768.8	-678.2
ML-R^2	.012	.014	.053	.02	.022	.059

Notes: 2006 SOEP data. The dependent variable is the difference in switching amounts ($x_{i,2} - x_{i,1}$). Standard errors in parentheses. * p < 0.1, ** p < 0.05, *** p < 0.01.

Table C.III: Validation results for the survey measure of present bias (using midpoint values of switching amounts)

	(1)	(2)	(3)	(4)	(5)	(6)
Present-bias (scale 1-7)	-0.0013**	-0.0013**	-0.0021***			
	(0.001)	(0.001)	(0.001)			
Present-bias (>4)				-0.0069**	-0.0070**	-0.0096***
				(0.003)	(0.003)	(0.003)
Sex (male=1)		-0.0012	-0.0015		-0.0012	-0.0015
		(0.002)	(0.002)		(0.002)	(0.002)
German		-0.0029	-0.0014		-0.0029	-0.0012
		(0.005)	(0.005)		(0.005)	(0.005)
Father upper sec. edu.			-0.0074			-0.0077
			(0.005)			(0.005)
Mother upper sec. edu.			0.0050			0.0052
			(0.006)			(0.006)
Patience			-0.0013***			-0.0013***
			(0.000)			(0.000)
Observations	346	346	310	346	346	310
Age	X	X	X	X	X	X
Age squared	X	X	X	X	X	X
Log lik.	854.1	854.5	774.8	855.4	855.7	775.7
R^2	0.012	0.014	0.053	0.020	0.022	0.058

Notes: 2006 SOEP data. The dependent variable is the ratio of switching amounts ($x_{i,2}/x_{i,1}$) using midpoint values. Standard errors in parentheses. * p < 0.1, ** p < 0.05, *** p < 0.01.

Table C.IV: *Experimental* measure of present bias (using the ratio of the two discount rates) and real-world outcomes

Variables	**Spending**				**Education and health**		
	Cash	**Save**	**Overspend**	**CDebt**	**College**	**Smoker**	**Unh. diet**
Present-biased (experiment)	-11.05**	-6.046	11.08**	-0.197	-0.0882	1.147	-0.388
	(4.379)	(5.581)	(4.832)	(1.017)	(1.130)	(1.281)	(1.485)
δ (experiment)	10.88**	-7.066	-7.213	0.684	-0.340	-0.154	-0.672
	(4.442)	(5.651)	(4.564)	(0.946)	(1.102)	(1.285)	(1.466)
Observations	345	344	346	326	346	310	310
Age	X	X	X	X	X	X	X
Age-squared	X	X	X	X	X	X	X
Male	X	X	X	X	X	X	X
Parental education	X	X	X	X	X	X	X
Log lik.	-630.3	-697.9	-655.7	-84.83	-161.0	-161.1	-207.7
R-squared	0.123	0.0774	0.0774	0.0645	0.0897	0.106	0.0974

Notes: SOEP data. The extent of *present-biased (experiment)* is measured by the ratio of the two discount rates ($d_{i,2}/d_{i,1}$). Dependent variables: *Cash* "I always try to have some money set aside for unexpected expenses"(1-7); *Save* "I consume less today to be able to afford more tomorrow"(1-7); *Overspend* "My monthly expenses are often higher than what I can actually afford."(1-7); *CDebt* indicates positive consumer debt; *College* indicates a college or university degree. *Smoker* indicates current smoking; *Unh. diet* indicates following an unhealthy diet. Robust standard errors in parentheses. * p < 0.1, ** p < 0.05, *** p < 0.01.

Table C.V: *Survey* measure of present bias and real-world outcomes (no control variables)

Variables	Spending				Education and health		
	Cash	**Save**	**Overspend**	**CDebt**	**College**	**Smoker**	**Unh. diet**
Present-biased (survey)	-0.494**	-0.768***	0.983***	0.0713	-0.173***	0.117*	0.228***
	(0.234)	(0.260)	(0.250)	(0.050)	(0.039)	(0.065)	(0.068)
δ (experiment)	6.540	-7.940	-2.535	0.759	-0.0270	0.839	-0.765
	(4.183)	(5.010)	(4.088)	(0.857)	(1.016)	(1.189)	(1.370)
Observations	345	344	346	326	346	310	310
Log lik.	-648.9	-705.8	-659.3	-94.00	-171.8	-176.2	-218.0
R-squared	0.0224	0.0342	0.0580	0.0104	0.0306	0.0141	0.0354

Notes: SOEP data. Dependent variables: *Cash* "I always try to have some money set aside for unexpected expenses."(1-7); *Save* "I consume less today to be able to afford more tomorrow"(1-7); *Overspend* "My monthly expenses are often higher than what I can actually afford."(1-7); *CDebt* indicates positive consumer debt; *College* indicates a college or university degree. *Smoker* indicates current smoking; *Unh. diet* indicates following an unhealthy diet. Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table C.VI: *Experimental* measure of present bias and real-world outcomes (no control variables)

Variables	Spending				Education and health		
	Cash	**Save**	**Overspend**	**CDebt**	**College**	**Smoker**	**Unh. diet**
present-biased (experiment)	-0.104	-0.163	0.540***	-0.0106	-0.0492	0.0296	-0.0177
	(0.180)	(0.218)	(0.193)	(0.038)	(0.045)	(0.053)	(0.060)
δ (experiment)	6.872	-7.401	-4.560	0.821	0.144	0.776	-0.569
	(4.283)	(5.240)	(4.247)	(0.874)	(1.067)	(1.215)	(1.398)
Observations	345	344	346	326	346	310	310
Log lik.	-651.5	-710.2	-665.4	-95.27	-176.7	-177.9	-223.4
R-squared	0.00757	0.00890	0.0242	0.00265	0.00334	0.00289	0.000985

Notes: SOEP data. *Present-biased (experiment)* is a variable which indicates whether the elicited β is smaller than one. β was dichotomized here to allow for a direct comparison between the estimated coefficients in this table with the ones from Table III. Dependent variables: *Cash* "I always try to have some money set aside for unexpected expenses"(1-7); *Save* "I consume less today to be able to afford more tomorrow"(1-7); *Overspend* "My monthly expenses are often higher than what I can actually afford."(1-7); *CDebt* indicates positive consumer debt; *College* indicates a college or university degree. *Smoker* indicates current smoking; *Unh. diet* indicates following an unhealthy diet. Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.