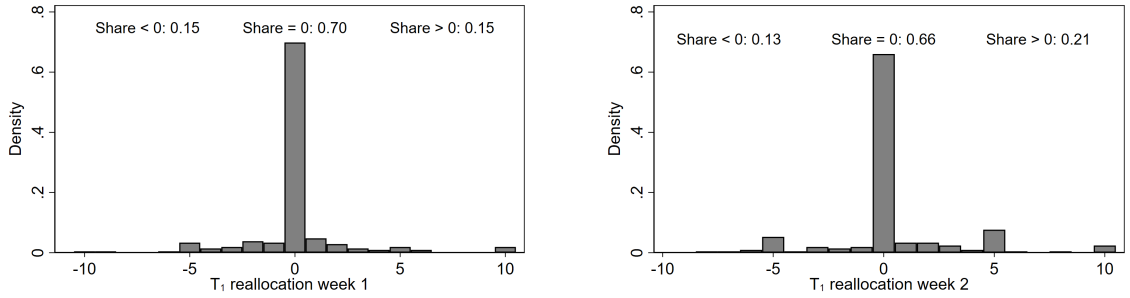
Appendix for Why Do We Procrastinate? Present Bias and Optimism

A Appendix figures and tables

A.1 Appendix figures

A.1.1 Lab experiment

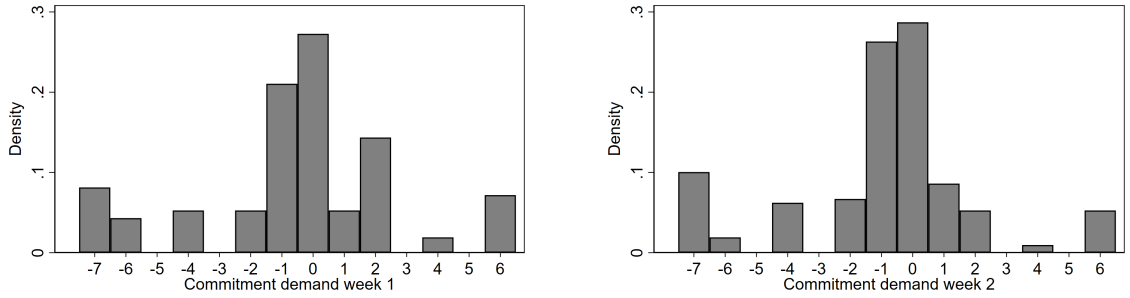
Figure A1: Lab experiment: Distribution of task reallocation



(a) Task reallocation in week 1 (b) Task reallocation in week 2

Notes: The figure shows the distribution of task reallocation in the lab experiment. Panel (a) shows week 1, before treatment. Panel (b) shows week 2, after treatment. The x-axis is the number of tasks put off (committed minus uncommitted).

Figure A2: Lab experiment: Distribution of commitment demand

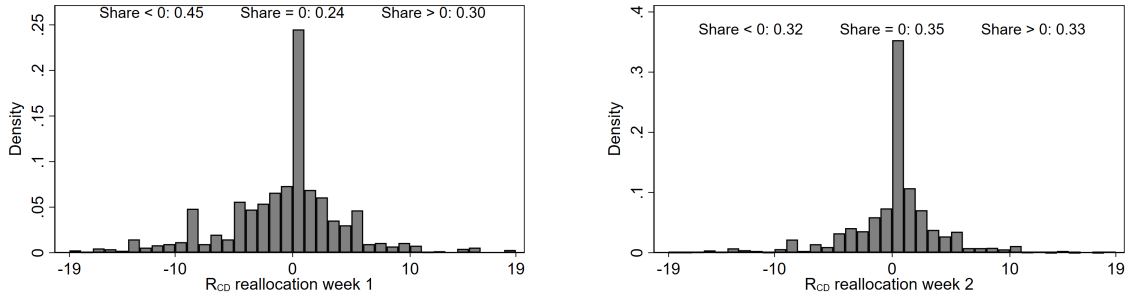


(a) Commitment demand in week 1 (b) Commitment demand in week 2

Notes: The figure shows the distribution of commitment demand in the lab experiment. Panel (a) shows week 1, before treatment. Panel (b) shows week 2, after treatment. The x-axis shows the *maximum* price the subject was willing to pay for commitment in terms of extra tasks. A commitment demand of one indicates that the subject was willing to do one extra task to be committed, but was unwilling to do two. The in-kind price could take on both positive and negative values. Subjects who were unwilling to commit even if it lowered the number of tasks they had to do by six were assigned a commitment demand of negative seven.

A.1.2 Online experiment

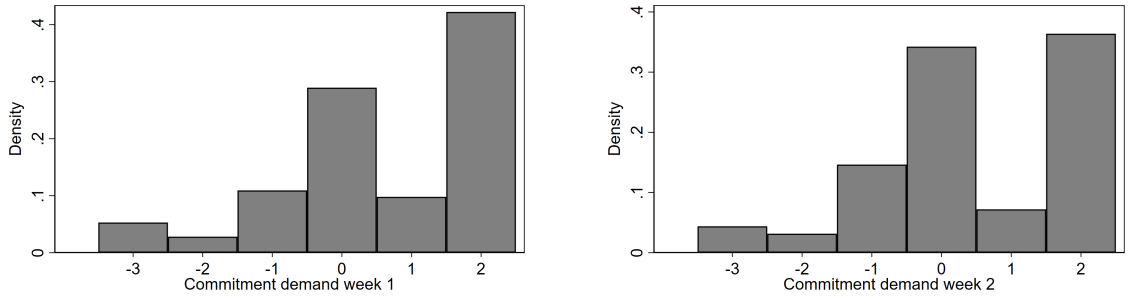
Figure A3: Online experiment: Distribution of task reallocation



(a) R_{CD} task reallocation in week 1 (b) R_{CD} task reallocation in week 2

Notes: The figure shows the distribution of task reallocation (R_{CD}) in the online experiment. Panel (a) shows week 1, before treatment. Panel (b) shows week 2, after treatment. The x-axis shows the number of committed unconditional tasks minus uncommitted realized (easy/hard) tasks.

Figure A4: Online experiment: Distribution of commitment demand



(a) Commitment demand in week 1 (b) Commitment demand in week 2

Notes: The figure shows the distribution of commitment demand in the online experiment. Panel (a) shows week 1, before treatment. Panel (b) shows week 2, after treatment. The x-axis shows the *maximum* price the subject was willing to pay for commitment in terms of extra tasks. A commitment demand of one indicates that the subject was willing to do one extra task to be committed, but was unwilling to do two. The in-kind price could take on both positive and negative values. Subjects who were unwilling to commit even if it lowered the number of tasks they had to do by two were assigned a commitment demand of negative three.

A.2 Appendix tables

A.2.1 Lab experiment

Table A1: Lab experiment: Test of attrition predictors

	Finished study
Treat	0.052
	(0.053)
Age	0.018
	(0.013)
GPA	0.070
	(0.055)
Female (indicator)	0.035
	(0.054)
Study wave	0.024
	(0.023)
F	1.21
p-value	0.30
Observations	273

Notes: The table shows an omnibus F-test on attrition. Sample includes all lab experiment subjects who completed our baseline survey instrument: 64 who did not complete the study and 209 who did. Estimates are from a regression of a study completion dummy on the listed variables. No other variables are included. In parentheses are heteroskedasticity-robust standard errors (White, 1980).

Table A2: Lab experiment: Summary statistics and covariate balance

	(1) Control Mean/(SD)	(2) Treated Mean/(SD)	(3) Diff./(SE)
Commitment demand week 1	-0.92	-0.13	-0.79
	(3.04)	(3.27)	(0.44)
Dyn. inconsistent week 1 (indicator)	0.35	0.26	0.093
	(0.48)	(0.44)	(0.064)
Bedtime difference from plan (minutes)	36.1	39.8	-3.68
	(68.7)	(53.9)	(8.50)
GPA (4 point scale)	3.22	3.31	-0.085
	(0.49)	(0.47)	(0.066)
Female (indicator)	0.54	0.70	-0.16
	(0.50)	(0.46)	(0.067)
Study wave	2.47	2.56	-0.090
	(1.13)	(1.09)	(0.15)
Observations	100	109	

Notes: The table shows pre-treatment summary statistics for the baseline sample from the lab experiment, broken down by treatment status. Columns 1 and 2 show average values with standard deviations in parentheses below for the control and treatment groups respectively. Column 3 shows the difference in means, with standard errors in parentheses below.

Table A3: Lab experiment: Effect of task information on contest-independent task reallocation and commitment demand, design controls only

	(1) R_{CI} reallocation	(2) ΔCommitment demand
Task message	0.32	-0.10
	(0.37)	(0.41)
Reported reallocation	0.33	0.0063
	(0.14)	(0.10)
Task message × reported reallocation	-0.41	0.43
	(0.20)	(0.19)
Two-tailed p value, interaction	0.045	0.027
Subjects	209	209
Observations	209	209

Notes: The table shows results from estimating a variant of equation (2) on the lab experiment sample. Column (1) shows the effect on task reallocation of being treated with messages about week 1 task reallocation. Column (2) shows the effect of the same treatment on the change in commitment demand. All baseline controls are excluded. In parentheses are standard errors clustered at the subject level.

A.2.2 Online experiment

Table A4: Online experiment: Test of attrition predictors

	(1) Finished study	(2) Finished study
Study wave	0.0023	-0.0084
	(0.021)	(0.0042)
Patience (11 point scale)	0.014	0.0018
	(0.0046)	(0.0011)
Risk tolerance (11 point scale)	-0.020	0.00041
	(0.0040)	(0.00052)
Manager (indicator)	-0.046	-0.0080
	(0.029)	(0.0055)
Employed (indicator)	-0.019	-0.0043
	(0.024)	(0.0028)
Dyn. inconsistent (R_{CD}) week 1		-0.0053
		(0.0027)
Subject win prob. week 1		0.000011
		(0.000013)
Sample	All subjects	Week 1 finishers
F	7.11	0.58
p-value	0.0000014	0.77
Observations	1479	1182

Notes: The table shows an omnibus F-test on attrition. Sample includes all online experiment subjects who completed the session 1 survey: 301 who did not complete the study and 1178 who did. Estimates are from a regression of a study completion dummy on the listed variables. No other variables are included. In parentheses are heteroskedasticity-robust standard errors (White, 1980).

Table A5: Online experiment: Descriptive statistics and covariate balance for contest information treatment

	(1) Control Mean/(SD)	(2) Treated Mean/(SD)	(3) Diff./(SE)
Task reallocation (R_{CD}) week 1	-0.90	-0.94	0.041
	(4.6)	(4.2)	(0.36)
Dyn. inconsistent (R_{CD}) wk 1 (indicator)	0.86	0.87	-0.018
	(0.35)	(0.33)	(0.028)
Commitment demand week 1	0.63	0.56	0.071
	(1.45)	(1.44)	(0.12)
Subject win prob. week 1	54.1	54.2	-0.077
	(25.2)	(25.4)	(2.10)
Female (indicator)	0.40	0.41	-0.012
	(0.49)	(0.49)	(0.041)
Study wave	1.40	1.38	0.014
	(0.49)	(0.49)	(0.040)
Born in US (indicator)	0.93	0.93	-0.00044
	(0.26)	(0.26)	(0.021)
English first lang. (indicator)	0.94	0.95	-0.013
	(0.24)	(0.22)	(0.019)
College degree (indicator)	0.54	0.50	0.042
	(0.50)	(0.50)	(0.041)
Age	39.4	38.9	0.54
	(11.5)	(10.9)	(0.93)
Observations	283	299	

Notes: The table shows summary statistics for the baseline sample from the lab experiment, broken down by treatment status for the contest information treatment. Observation counts do not sum to 888 because the task-information group is not included. Columns 1 and 2 show mean values with standard deviations in parentheses below for the control group and the contest treatment group respectively. Column 3 shows the difference between the means with standard errors below. The first variable ("Dyn. inconsistent (R_{CD})") is an indicator for whether the subject had at least 1 dynamically inconsistent allocation choice for the R_{CD} allocation (unconditional committed minus realized uncommitted).

Table A6: Online experiment: Descriptive statistics and covariate balance for task information treatment

	(1) Control Mean/(SD)	(2) Treated Mean/(SD)	(3) Diff./(SE)
Task reallocation (R_{CI}) week 1	-0.82	-1.20	0.39
	(3.5)	(3.5)	(0.29)
Dyn. inconsistent (R_{CI}) wk 1 (indicator)	0.90	0.91	-0.0077
	(0.30)	(0.29)	(0.025)
Commitment demand week 1	0.63	0.66	-0.028
	(1.45)	(1.47)	(0.12)
Subject win prob. week 1	54.1	54.2	-0.13
	(25.2)	(25.2)	(2.08)
Female (indicator)	0.40	0.48	-0.074
	(0.49)	(0.50)	(0.041)
Study wave	1.40	1.38	0.013
	(0.49)	(0.49)	(0.040)
Born in US (indicator)	0.93	0.91	0.018
	(0.26)	(0.28)	(0.022)
English first lang. (indicator)	0.94	0.92	0.012
	(0.24)	(0.26)	(0.021)
College degree (indicator)	0.54	0.52	0.021
	(0.50)	(0.50)	(0.041)
Age	39.4	38.8	0.60
	(11.5)	(11.4)	(0.95)
Observations	283	306	

Notes: The table shows summary statistics for the baseline sample from the lab experiment, broken down by treatment status for the task information treatment. Observation counts do not sum to 888 because the contest-information group is not included. Columns 1 and 2 show mean values with standard deviations in parentheses below for the control group and the task information treatment group respectively. Column 3 shows the difference between the means with standard errors below. The first variable ("Dyn. inconsistent (R_{CI})") is an indicator for whether the subject had at least 1 dynamically inconsistent allocation choice for the R_{CI} allocation (committed minus uncommitted within piece rate and information condition).

Table A7: Effect of contest information on contest-dependent task reallocation, full sample

	R_{CD} reallocation
0-win message ($\hat{\alpha}_0$)	-0.31
	(0.25)
1-win message ($\hat{\alpha}_1$)	0.52
	(0.28)
2-win message ($\hat{\alpha}_2$)	0.68
	(0.25)
$\hat{\alpha}_2 - \hat{\alpha}_0$	0.99
Right-tailed p value	.00097
Subjects	1178
Observations	3534

Notes: Results are from estimating equation (1) using the full online experiment sample, without the restriction based on week-1 censoring. The dependent variable is contest-dependent reallocation (committed unconditional minus uncommitted easy/hard). In parentheses are standard errors clustered at the subject level.

Table A8: Effect of contest information on contest-dependent task reallocation, design controls only

	R_{CD} reallocation
0-win message ($\hat{\alpha}_0$)	-0.16
	(0.41)
1-win message ($\hat{\alpha}_1$)	0.43
	(0.39)
2-win message ($\hat{\alpha}_2$)	0.88
	(0.42)
$\hat{\alpha}_2 - \hat{\alpha}_0$	1.04
Right-tailed p value	.025
Subjects	888
Observations	2322

Notes: Results are from estimating a variant of equation (1) using the online experiment sample. The dependent variable is contest-dependent reallocation (committed unconditional minus uncommitted easy/hard). All baseline controls are excluded. In parentheses are standard errors clustered at the subject level.

Table A9: Effect of contest information on win belief and contest-dependent task reallocation, PAP specification

	R_{CD} reallocation
0-win message ($\hat{\alpha}_0$)	-0.24
	(0.41)
1-win message ($\hat{\alpha}_1$)	0.41
	(0.43)
2-win message ($\hat{\alpha}_2$)	0.57
	(0.44)
$\hat{\alpha}_2 - \hat{\alpha}_0$	0.82
Right-tailed p value	.088
Subjects	888
Observations	2322

Notes: Results are from estimating a variant of equation (1), exactly as in the PAP, using the online experiment sample. The dependent variable is contest-dependent reallocation (committed unconditional minus uncommitted easy/hard). In parentheses are standard errors clustered at the subject level.

Table A10: Online experiment: Effect of task information on contest-independent task reallocation and commitment demand, full sample

	(1) R_{CI} reallocation	(2) ΔCommitment demand
Task message	0.33	0.093
	(0.12)	(0.098)
Reported reallocation	0.076	-0.0040
	(0.015)	(0.013)
Task message × reported reallocation	-0.032	0.017
	(0.031)	(0.023)
Left-tailed p value, interaction	0.15	0.23
Subjects	1178	1178
Observations	7068	1178

Notes: The table shows results from estimating equation (2) on the full online experiment sample, without the restriction based on week-1 censoring. Column (1) shows the effect on contest-independent task reallocation of being treated with messages about week 1 reported task reallocation. Column (2) shows the effect of the same treatment on the change in commitment demand. In parentheses are standard errors clustered at the subject level.

Table A11: Online experiment: Effect of task information on contest-independent task reallocation and commitment demand, design controls only

	(1) R_{CI} reallocation	(2) ΔCommitment demand
Task message	0.32	0.029
	(0.21)	(0.14)
Reported reallocation	0.10	-0.015
	(0.034)	(0.021)
Task message × reported reallocation	-0.059	0.0099
	(0.060)	(0.034)
Left-tailed p value, interaction	0.16	0.39
Subjects	888	888
Observations	4644	888

Notes: The table shows results from estimating a variant of equation (2) on the online experiment sample. Column (1) shows the effect on contest-independent task reallocation of being treated with messages about week 1 reported task reallocation. Column (2) shows the effect of the same treatment on the change in commitment demand. All baseline controls are excluded. In parentheses are standard errors clustered at the subject level.

Table A12: Online experiment: Effect of task information on contest-independent task reallocation and commitment demand, PAP specification

	(1) R_{CI} reallocation	(2) ΔCommitment demand
Reported reallocation	0.10	0.00020
	(0.033)	(0.015)
Task message × reported reallocation	-0.073	0.014
	(0.059)	(0.027)
Left-tailed p value, interaction	0.11	0.30
Subjects	888	888
Observations	4644	888

Notes: The table shows results from estimating a variant of equation (2), exactly as in the PAP, on the online experiment sample. Column (1) shows the effect on contest-independent task reallocation of being treated with messages about week 1 reported task reallocation. Column (2) shows the effect of the same treatment on the change in commitment demand. In parentheses are standard errors clustered at the subject level.

Table A13: Effect of contest information on alternative weights for easy allocation

	(1) $w_e/1-w_e$	(2) $(u-h)$
0-win message ($\hat{\alpha}_0$)	-0.32	-0.078
	(0.16)	(0.16)
1-win message ($\hat{\alpha}_1$)	-0.16	-0.095
	(0.13)	(0.15)
2-win message ($\hat{\alpha}_2$)	-0.054	0.13
	(0.16)	(0.19)
$\hat{\alpha}_2 - \hat{\alpha}_0$	0.27	0.21
Right-tailed p value	.1	.17
Subjects	460	888
Observations	934	2322

Notes: Results are from estimating versions of equation (1) on the online experiment sample. The dependent variable in Column (1) is relative (rather than absolute) weight on the committed easy allocation, which is not defined for all subjects. In Column (2) it is the numerator of $u-h$ of the weight w_e on the committed easy allocation, which is defined for all subjects. In parentheses are standard errors clustered at the subject level.

B Deviations from the pre-analysis plan, online experiment

No pre-analysis plan (PAP) was registered for the lab experiment. For the online experiment, this list describes deviations from the PAP (Breig et al., 2023). Below, we present evidence that these deviations do not meaningfully change point estimates.

- The PAP describes *ad hoc* control selection and mentions LASSO control selection as a robustness check. To maximize statistical power, we employ LASSO selection of baseline controls in the primary estimates. To demonstrate the harmlessness of this choice, Tables A8 and A11 present analogs of our primary results without any baseline controls. Point estimates are strongly similar; the LASSO procedure is not required to correct chance imbalances from the randomization. Precision is predictably reduced, but note that the complete exclusion of baseline controls is not required by the PAP.
- In equation (2), the first term is W_i, the indicator for task information treatment. The PAP erroneously omitted this term, the analog of which was previously included in Breig et al. (2020). Such omission assumes that the effect of a zero-reallocation treatment message on outcomes is zero, which may be empirically false.
- In the PAP, estimating equations included indicators for the number of wins that did not interact with treatment. Conditional on contest score the number of wins is exogenous, and these win-count (contest-information) indicators were not shown to subjects so they could not affect behavior. To simplify notation we omit these variables.

Tables A9 and A12 display results from regressions that follow the PAP exactly. Because LASSO control selection is not employed in these tables, the precision of pre-specified test statistics of interest is weakly less. Differences in point estimates are described below. In Table A9, our pre-specified test statistic of interest ($\hat{\alpha_2} - \hat{\alpha_0}$) is modestly smaller than our primary result (0.82 rather than 1.02). This difference is small relative to the associated standard errors. In Table A12, our pre-specified test statistic of interest (the coefficient on the interaction of the task message and the reported reallocation) for R_{CI} reallocation is slightly larger in magnitude than our primary result (-0.073 rather than -0.062). For the change in commitment demand, it is also slightly larger (0.014 rather than 0.0072). Both differences are small relative to the associated standard errors.

Appendix References

Breig, Z., M. Gibson, and J. Shrader (2020). Why do we procrastinate? Present bias and optimism. *IZA Working Paper No. 13060*.

Breig, Z., M. Gibson, and J. Shrader (2023). Why do people change their work plans? *AEA RCT Registry*.

White, H. (1980). A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity. *Econometrica 48*(4), 817–838.