Supplement to "Measuring trust in institutions and its causal effect"

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Stefan P. Penczynski
School of Economics and Centre for Behavioural and Experimental Social Science (CBESS), University of East Anglia

Maria Isabel Santana
School of Global Development and Centre for Behavioural and Experimental Social Science (CBESS), University of East Anglia

Appendix A: Supplemental Appendix

A.1 *Payment guarantee: Check*

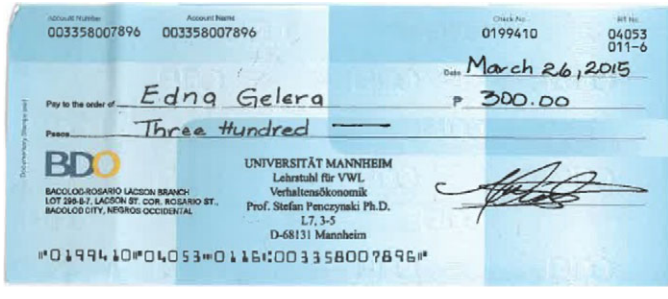

Figure 5. Sample check.

Stefan P. Penczynski: S.Penczynski@uea.ac.uk
Maria Isabel Santana: M.Santana@uea.ac.uk

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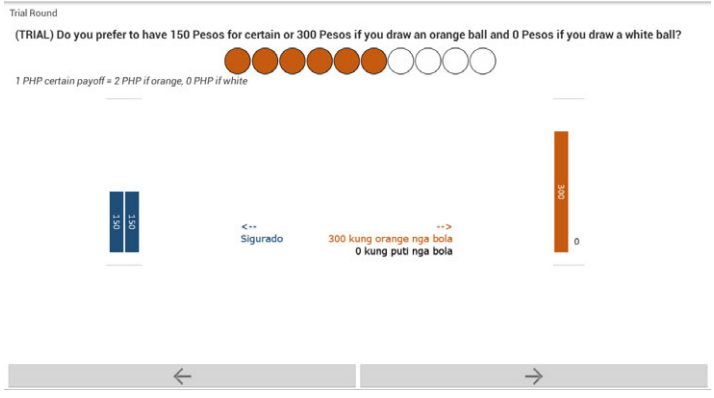
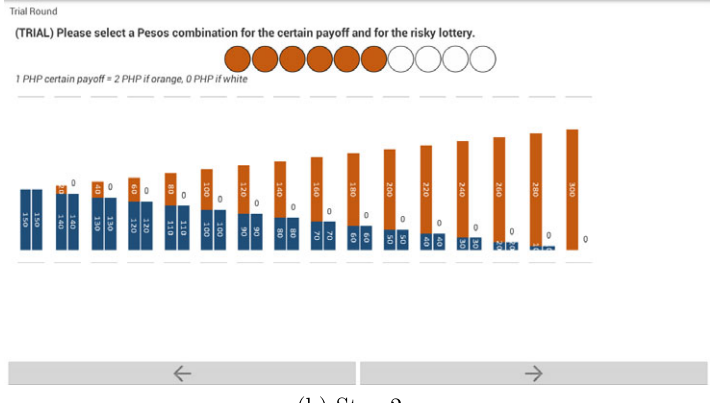
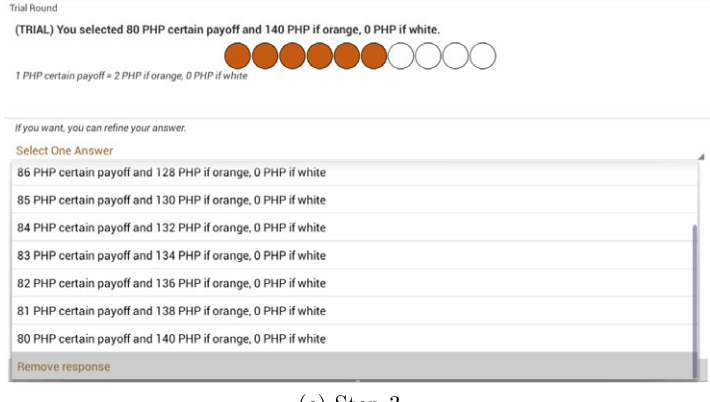
A.2 *Risk preference elicitation screen shots*



(a) Step 1.
"Sigurado" meaning certain and "300/0 kung orange/puti nga bola" meaning 300/0 if orange/white ball.



(b) Step 2.



(c) Step 3.

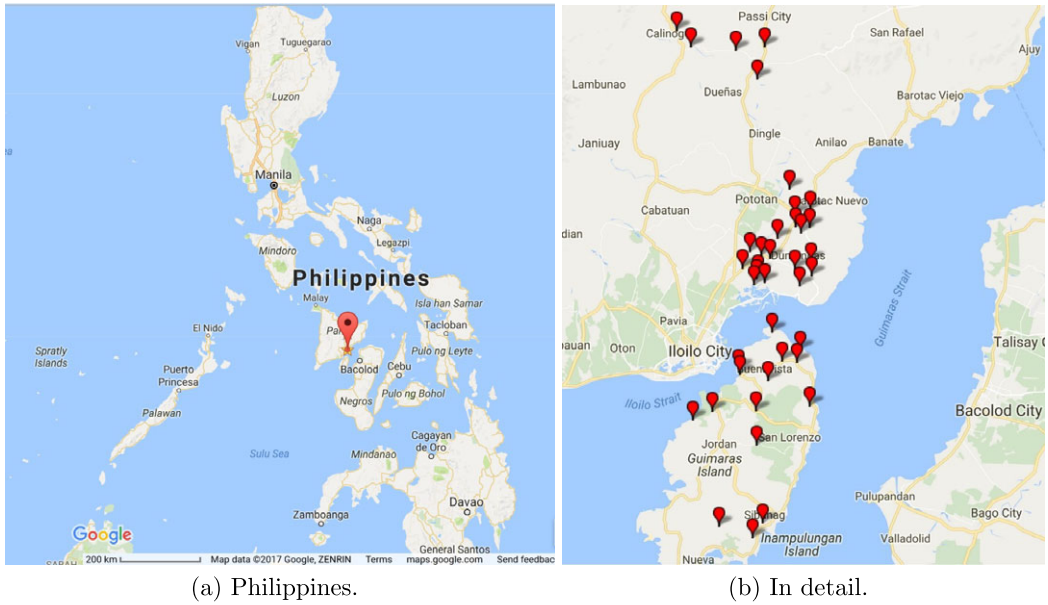
FIGURE 6. Screenshots of the risk elicitation task in trial round.

A.3 *Randomization*

Subjects participating in the study are mostly clients of NWTF (Negros Women for Tomorrow Foundation). NWTF is organized into branches according to the Philippine provinces. Our study recruited participants from the three branches in Capiz, Iloilo, and Guimaras. Figure 7 locates the experimental sessions within the Philippines (7a) and in detail around Iloilo City (7b). Clients in the three NWTF branches were distributed across 175 centers, located in 155 different villages, called "barangays."

The randomization procedure had two steps. In the first step, an average of three centers were grouped together in a bin, based on geographical proximity. The grouping made the recruitment and the logistics of the experimental sessions easier and more efficient. Safety concerns led us to exclude some barangays, particularly in the Capiz branch. Bins had on average 90 clients. Each of the 60 bins was then randomly allocated to one of four treatment arms, following the between-subject 2×2 design with two institutions and the two orders of the *C* and *NC* blocks. In a second step, 20–30 clients were randomly selected from each bin for the experimental session. Given this, we refer to the session as the randomization unit.

In order to have the information required for the randomization procedure, recruiters surveyed the barangays and collected data about the facilities and resources available. The survey, implemented with tablets, enabled the collection of geographical reference data of the barangays and municipalities as well as pictures of the facilities. Recruiters also gathered information about the barangay head and the possibility to acquire permission to hold the sessions in the barangay. The selection of the barangay in which the session was to be held depended on the meeting hall facilities, the proximity to the municipality, and the accessibility.



(a) Philippines. (b) In detail.

FIGURE 7. Location of experimental sessions.

In order to improve precision of our estimates, a rerandomization procedure based on a set of covariates was implemented, following Morgan and Rubin (2012). The procedure uses available data to check for covariate-balance across treatment groups. If a lack of balance is present, then rerandomization can help to ensure balance. This procedure used NWTF administrative data on loan size, savings, and other funds balances, as well as an urban area indicator, the population size of the bins' barangays, and the average distance from the bin to the municipality.

To establish the rerandomization criteria, the Mahalanobis distance M was utilized:

$$M = (\bar{X}_T - \bar{X}_C)\big[\mathrm{cov}(\bar{X}_T - \bar{X}_C)\big]^{-1}(\bar{X}_T - \bar{X}_C), \tag{15}$$

where $\bar{X}_T - \bar{X}_C$ is the k-dimensional vector of the difference in covariate means between the treatment groups and $\mathrm{cov}(x)$ is the sample covariate matrix of x. A randomization is acceptable whenever M is below a certain threshold.

The additional sample referenced in Section 5.3 results from a survey mapping of four villages to gather full network information on the inhabitants for another research project. In these villages, 77 participants were randomly selected from the village household list and 79 participants were randomly selected from the NWTF client pool. The entire mapping effort involved 156 participants, who were all allocated to the NWTF treatment.

A.4 *Clustering at the individual level*

When we estimate $\hat{P}_{NC}$ in Section 5, we cluster the standard errors at the randomization unit level. In field experiments, the clustering commonly is done on the level of the randomization unit, which in our case is the session level. Here, alternatively, we cluster standard errors at the individual level, following Andreoni and Sprenger (2012). Tables 11 and 12 report the results for these estimations. We find that the standard errors for $\hat{P}_{NC}$ are slightly lower and make the difference between $\hat{P}^{\mathrm{NWTF}}_{NC}$ and $\hat{P}^{\mathrm{ML}}_{NC}$ marginally significant.

A.5 *Specification 3*

As an extension to the probabilistic approach of specification 2, specification 3 uses CTB data in a way that has been outlined by Harrison, Lau, and Rutström (2013) as an appropriate analogue. This approach deals with corner choices and the constrained action space in a natural way and allows for the incorporation of the RPE data.

The main difference lies in the translation of choices into probabilities. Here, due to the choice sets $c, l \in [a, 150]$, the indices become[21]

$$\nabla\mathrm{DU} = \frac{\mathrm{DU}(c)^{\frac{1}{\nu}}}{\sum_{\tilde{c}}^{150}\mathrm{DU}(\tilde{c})^{\frac{1}{\nu}}}, \quad \text{and} \quad \nabla\mathrm{EU} = \frac{\mathrm{EU}(l)^{\frac{1}{\mu}}}{\sum_{\tilde{l}}^{150}\mathrm{EU}(\tilde{l})^{\frac{1}{\mu}}}. \tag{16}$$

[21] For convex utility ($\alpha > 1$)—a likely outcome of this specification with a high frequency of corner choices (see later results and Harrison, Lau, and Rutström (2013))—the parameters ν and μ are not separately identified from α. For us, robustness of the trust estimates for a given level of $\nu = \mu = 1$ is sufficient.

TABLE 11. CRRA and CARA parameters estimates, specification 1.

	(1) NWTF	(2) ML	(3) NWTF	(4) ML	(5) NWTF	(6) ML
Curvature $\hat{\alpha}$ (CRRA)	0.773	0.774	0.121	0.097		
	(0.0209)	(0.0225)	(0.0551)	(0.0628)		
Curvature $\hat{\rho}$ (CARA)					0.005	0.005
					(0.0003)	(0.0003)
Daily discount rate $\hat{\delta}$	1.005	1.000	1.003	0.998	1.002	0.9986
	(0.003)	(0.003)	(0.0019)	(0.0021)	(0.0014)	(0.0016)
$\hat{P}_{NC}$	0.393	0.324	0.500	0.442	0.573	0.524
	(0.0430)	(0.0416)	(0.0345)	(0.036)	(0.0302)	(0.0323)
$\hat{P}_{NC}^{\text{NWTF}} = \hat{P}_{NC}^{\text{ML}}$	$p = 0.1063$		$p = 0.1098$		$p = 0.1042$	
Other income ω	0.01	0.01	50.25	50.25		
Observations	13,440	12,792	13,440	12,792	13,440	12,792
LL	−33,960	−31,560	−21,480	−20,295	−56,232	−51,482
Uncensored	7077	6359	7077	6359	7077	6359
Clusters	560	533	560	533	560	533

Note: Two-limit Tobit maximum likelihood estimates. Clustered standard errors at the individual level in parenthesis calculated via the delta method. The reported p-values result from a simple linear hypothesis Wald test.

Table 13 presents the results from specification 3 that are based on both the TE and the RPE decisions. Due to many corner allocations, the estimates are indeed such that the curvature implies risk-lovingness with $\alpha > 1$ and $\rho < 0$, respectively, as hypothesized

TABLE 12. CRRA and CARA parameters estimates, specification 2.

	(1) NWTF	(2) ML	(3) NWTF	(4) ML	(5) NWTF	(6) ML
Curvature $\hat{\alpha}$ (CRRA)	0.313	0.266	0.646	0.572		
	(0.020)	(0.016)	(0.029)	(0.026)		
Curvature $\hat{\rho}$ (CARA)					0.012	0.014
					(0.0010)	(0.0007)
Daily discount rate $\hat{\delta}$	1.009	1.002	1.019	1.004	1.010	1.003
	(0.003)	(0.003)	(0.006)	(0.006)	(0.002)	(0.003)
$\hat{P}_{NC}$	0.452	0.437	0.166	0.103	0.507	0.517
	(0.035)	(0.041)	(0.057)	(0.074)	(0.031)	(0.034)
$\hat{P}_{NC}^{\text{NWTF}} = \hat{P}_{NC}^{\text{ML}}$	$p = 0.6664$		$p = 0.2657$		$p = 0.7528$	
Other income ω	0.01	0.01	50.25	50.25		
Observations	30,240	28,782	30,240	28,782	30,240	28,782
LL	−19,719	−18,935	−20,172	−19,381	−19,522	−18,699
Clusters	560	533	560	533	560	533

Note: Maximum likelihood estimates. Standard errors in parentheses are clustered at the subject level. The noise parameters μ and ν are set to 1 to allow for noise and to avoid their estimation. The reported p-values result from a simple linear hypothesis Wald test.

TABLE 13. CRRA and CARA parameters estimates, specification 3.

	(1) NWTF	(2) ML	(3) NWTF	(4) ML	(5) NWTF	(6) ML
Curvature $\hat{\alpha}$ (CRRA)	1.900	1.910	2.374	2.374		
	(0.052)	(0.052)	(0.075)	(0.075)		
Curvature $\hat{\rho}$ (CARA)					−0.006	−0.006
					(0.0004)	(0.0004)
Daily discount rate $\hat{\delta}$	0.983	0.974	0.983	0.974	0.988	0.980
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
$\hat{P}_{NC}$	0.275	0.271	0.264	0.258	0.284	0.282
	(0.021)	(0.022)	(0.023)	(0.024)	(0.022)	(0.023)
Other income ω	0.01	0.01	50.25	50.25		
Observations	30,240	28,782	30,240	28,782	30,240	28,782
LL	−137,858	−131,317	−138,170	−131,662	−138,313	−131,864
Clusters	560	533	560	533	560	533

Note: Maximum likelihood estimates. Standard errors in parenthesis are clustered at the subject level.

by Harrison, Lau, and Rutström (2013).[22] The daily discount rate is now lower at values around 0.97. This difference to the earlier estimates results from the compensation of the now risk-loving attitude toward the risky future payment.

Across utility and ω specifications, the estimates of $\hat{P}_{NC}$ are in the range between 0.25 and 0.34, lower than in specification 1. The difference between institutions is now smaller and only marginally significant for the CRRA specifications at the 0.2 significance level and insignificant for the CARA specification.

Overall, little can be taken away from these results as the curvature $\hat{\alpha}$ in the range of risk-lovingness cannot be meaningfully identified.[23]

A.6 *Choice histogram*

The CTB method by Andreoni and Sprenger (2012) sparked many responses (see Section 1), many of which deemed the econometric method inappropriate in the light of

TABLE 14. Proportion of corner and interior choices by interest rate.

	Interest rate $1+r$								
	1	1.3	1.7	2	2.3	2.7	4	8	40
Lower-bound corner	21.5	24.4	24.6	25.4	25.5	27.0	41.6	58.0	60.2
Upper-bound corner	33.8	25.6	23.7	21.4	20.5	19.4	18.6	17.4	15.9
Interior choices	44.7	50.1	51.7	53.2	54.1	53.6	39.8	24.6	23.9

[22]The raw choice data is suggestive of the existence of two types of players, those with predominant corner allocations ($\alpha > 1$) and those with mostly interior allocations ($\alpha < 1$).

[23]For columns 5 and 6, convergence fails for some versions of STATA. Please see the information in the replication package (Penczynski and Santana (2023)).

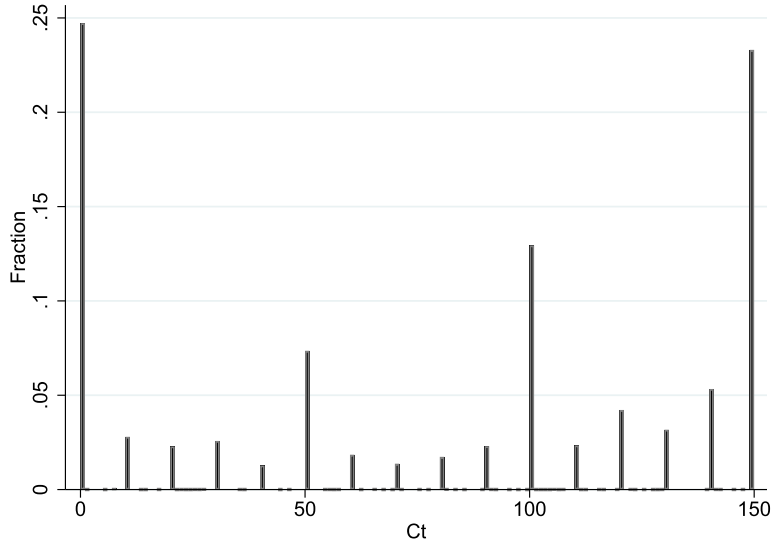


FIGURE 8. Choices for c_t in TE with $1 + r < 3$.

such a choice distribution. The consideration of specification 2 in Section 3.2 and the following specification 3 is motivated by our desire to explore whether our results are robust across methods.

A.7 *Current allocation details*

Figure 9 shows current allocations by interest rate and check order for interest rates $1 + r > 3$, where c_t was constrained from below. The regularities discussed in Section 5.1 and illustrated in Figure 4 hold for these interest rates as well.

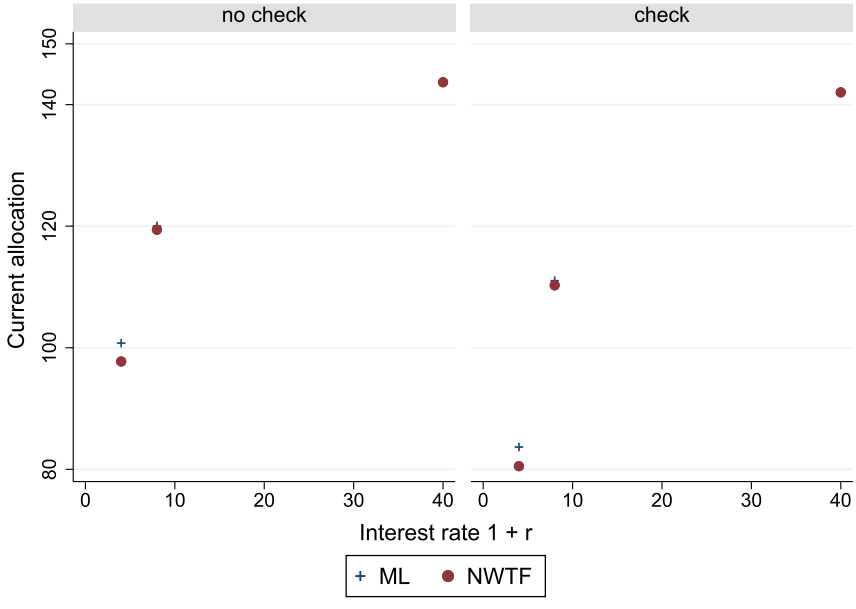
Figure 10 splits up current allocations by institution and check order. Irrespective of the order, it can be seen that current allocations in *C* is lower than in *NC*. Quite surprisingly, the difference in current allocations between institutions is higher in C/NC than in NC/C. While behavior in NC/C hardly distinguishes institutions, the difference in C/NC is much higher.

We find no overall effects of the check order on the full sample (column 1 in Table 16), but we do find an effect when we interact the check order with the institution (column 3). It is not clear to us what drives this interaction between check order and

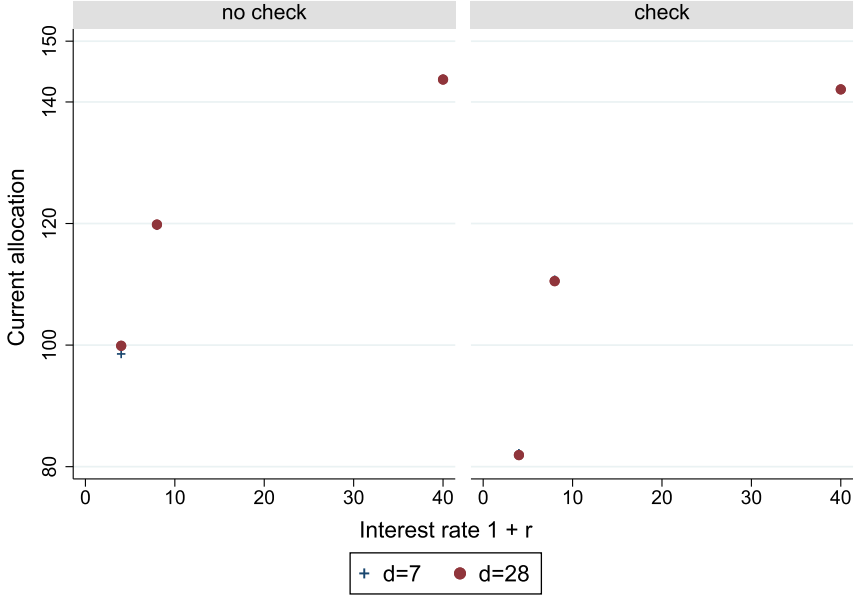
TABLE 15. Equality of means test for $c_t \in [0, 150]$.

	All	*NWTF*	*ML*
(1) $\bar{c}_t^{NC/C} - \bar{c}_t^{C/NC}$	−1.44	4.30	−7.68
	(0.558)	(0.782)	(0.794)
N	39,348	20,160	19,188

Note: Standard errors in parentheses.

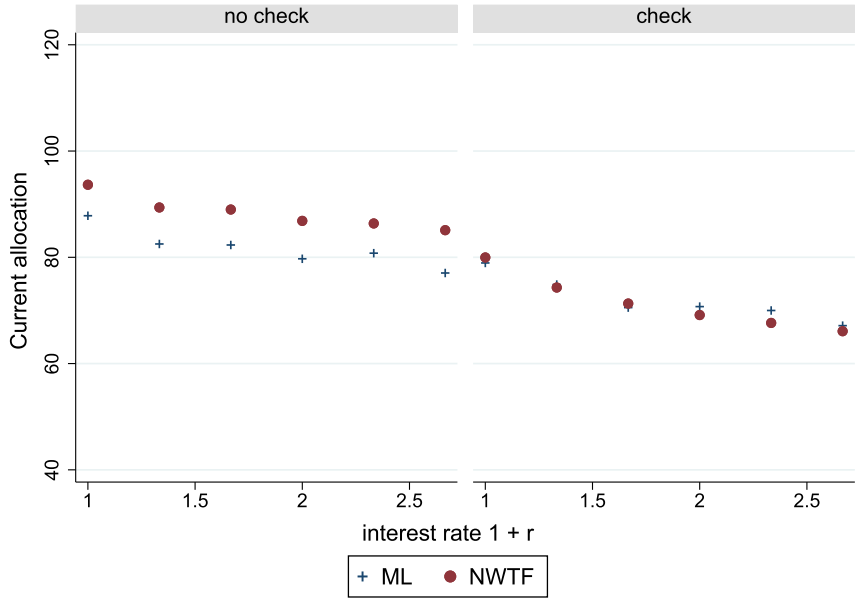


(a) By institution, pooled across delay lengths.

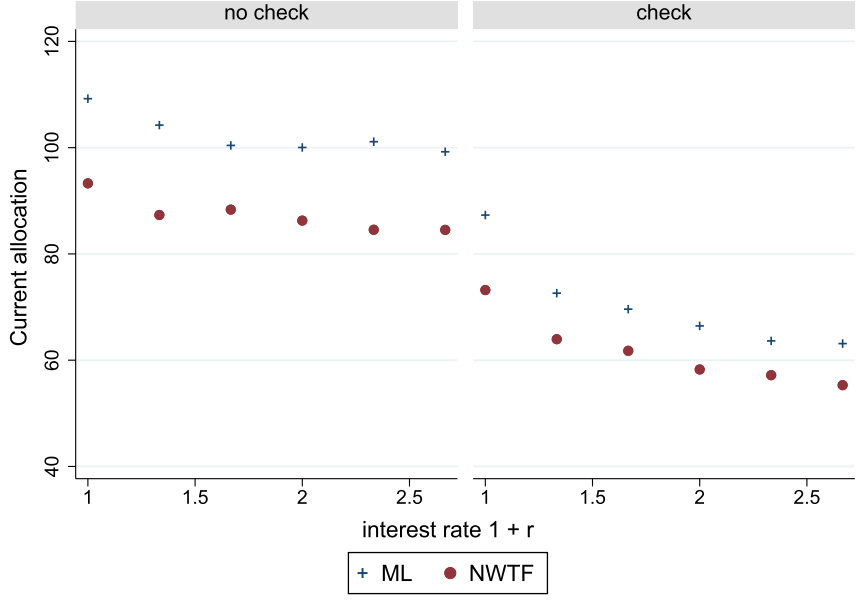


(b) By delay lengths, pooled across institutions.

FIGURE 9. Current allocations $c_t \in [0, 150]$ by interest rate and check order, *NC* vs. *C*, for $1 + r > 3$.



(a) NC/C treatment.



(b) C/NC treatment.

FIGURE 10. Current allocations c_t by interest rate and institution.

TABLE 16. Check order effects in current allocations c_t.

	(1)	(2)	(3)
C/NC	1.442	1.561	−4.304
	(2.810)	(2.823)	(3.411)
ML		3.668	−2.639
		(2.848)	(3.655)
C/NC × ML			11.98
			(5.449)
Constant	90.85	89.00	92.19
	(1.847)	(2.509)	(2.818)
N	39,348	39,348	39,348
Clusters	59	59	59
R^2	0.0002	0.0013	0.0042

Note: Clustered standard errors at the session level.

ML. One possibility is a certain loss aversion with respect to the check guarantee, so that the removal of the check guarantee midway through the TE task in the ML treatment highlights risks of *NC* stronger than starting right without such guarantee.

A.8 *Histogram of paid rounds*

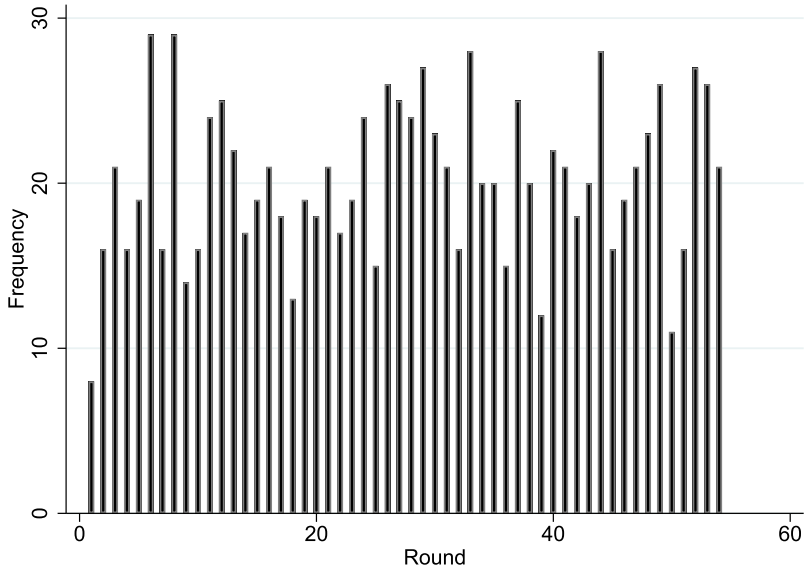


FIGURE 11. Distribution of decisions in rounds 1–54 randomly selected to be paid.

A.9 *Descriptive statistics*

TABLE 17. Descriptive statistics—savings analysis.

	Future payment eligibility					
	$T_i = 0$		$T_i = 1$			
	Mean	SD	Mean	SD	Diff.	SE
Age	42.5	10.9	41.8	11.4	0.7	(1.0)
Years of education	8.6	3.2	9.0	2.9	−0.4	(0.3)
Married	0.8	0.4	0.8	0.4	0.0	(0.0)
Household size	5.7	2.2	5.5	2.0	0.2	(0.2)
Employed	0.5	0.5	0.4	0.5	0.0	(0.0)
Regular income	0.6	0.5	0.5	0.5	0.0	(0.0)
Average consumption (ω)	331.1	418.1	331.2	307.0	−0.1	(32.3)
Average consumption HH	1000.4	727.5	946.4	645.3	54.1	(61.9)
Official position in village	0.1	0.2	0.1	0.3	−0.0	(0.0)
Rooms in HH for sleeping	1.7	0.7	1.8	0.8	−0.1	(0.1)
Flush toilet at dwelling	0.8	0.4	0.9	0.3	−0.0	(0.0)
Electricity at dwelling	0.8	0.4	0.9	0.3	−0.1	(0.0)
Own dwelling	0.9	0.3	0.9	0.3	−0.0	(0.0)
Am't borrowed MFI/Banks	5492.4	2794.1	5638.0	2888.2	−145.7	(277.0)
Savings in MFI/rural bank	1224.8	2106.2	1564.5	6696.3	−339.7	(699.2)
Trust level in NWTF[1]	6.5	1.0	6.4	0.9	0.1	(0.1)
Trust in ML[1]	3.8	2.0	3.7	2.1	0.1	(0.2)
Risk preference[2]	4.3	2.6	4.3	2.5	0.0	(0.2)
Betrayal aversion[3]	1.7	1.6	1.7	1.5	0.1	(0.1)
Avoid being taken advantage of[3]	2.0	1.8	2.0	1.8	0.0	(0.2)
Revenge if suffer serious wrong[4]	6.5	1.5	6.4	1.5	0.0	(0.1)
Reciprocity[5]	6.4	1.5	6.5	1.4	−0.1	(0.1)
Sociability[6]	4.3	1.2	4.2	1.3	0.1	(0.1)
Bank distance (minutes)	27.5	21.1	32.7	33.5	−5.2	(2.7)
NWTF information (PHP)						
Savings	265.9	423.7	245.1	337.7	20.7	(34.2)
Loan amount	5402.6	2652.2	5531.3	3008.6	−128.7	(262.5)
Loan balance	3233.1	2861.7	3008.4	2453.8	224.8	(238.8)
Repayment	248.7	217.3	246.6	169.6	2.2	(17.3)
Emergency fund balance	766.2	879.1	786.7	814.3	−20.4	(77.0)
Loan cycle	4.3	2.2	4.3	2.1	−0.0	(0.2)
Principal amortization	222.3	175.5	222.0	123.2	0.3	(13.3)
Observations	195		313			

Note: The last columns gives the standard errors of a t-test for a difference of 0.

[1] 1—no trust, 7—complete trust,

[2] Avoid/prepared to take risks: 1—avoid, 7—fully prepared,

[3] Avoid being betrayed/taken advantage of: 1—completely avoid, 7—do not avoid,

[4] If offended, offend back?: 1—offend, 7—not offend,

[5] Meet friends, relatives, neighbor: 1—never, 2—seldom, 3—monthly, 4—weekly, 5—daily,

[6] How certain is payment in 28 days?: 1—surely not reach me, 7—absolutely certain,

[7] Imagine 10 people that are promised a payment in 28 days. Out of 10 people, how many people do you think will get the payment delivered in 28 days?

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Co-editor Christopher Taber handled this manuscript.

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