A Appendix

To accompany, "On Measuring Time Preferences."
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Intended for online publication only.

In this Appendix, we provide a full description of the ICT identification, Luce stochastic error model identification, individual level parameter estimates and their cross-method correlations, estimates with different background consumption level specifications, data on the CTB predictions, an analysis of HL prediction, and the experimental forms.

I.A ICT Identification

Our data is notably different from AS in that we offer only six discrete options along a budget, whereas they offer 101. This means that the Euler and demand equations do not hold exactly at the points elicited from our experiment. If the differences between optima and choices depend systematically on the independent variables, this could bias our results. One way to think of this problem is as non-classical measurement error on the dependent variable.[36] As a check against this potential problem, we ignore the cardinal information associated with our observed responses and treat them as ordinal indicators of preference. We assume that optimality holds only for the underlying, unobserved optimal choices from fully-convex budgets, and that our observed data are related only probabilistically to the optimality conditions, but not subject to the same identification condition. The key feature that distinguishes this approach from techniques like the Luce stochastic error model or multinomial logit is that we maintain the assumption of optimality and thus the ordering of the choice options.

Our starting point for the ICT is a simplified version of (2), the OLS regression equation. Indexing the variables by i for individual and j for budget number, we have

$$z^*_{ij} = ln\left(\frac{x^*_{t(ij)}}{x^*_{t+k(ij)}}\right) = \gamma_1 t_{0ij} + \gamma_2 k_{ij} + \gamma_3 ln(P_{ij}) + e_{ij}, \tag{5}$$

[36] Which can also be expressed as an omitted variable bias.

where the starred variables indicate the underlying, unobserved optima. We can order all 6 choices along a budget in terms of their preference for sooner payment: call these $c = 1, 2, ...6$. We define the following correspondence between z^* and c:

$$c = \begin{cases} 1 & \text{if } z^* > K^1 \\ 2 & \text{if } K^1 > z^* > K^2 \\ \vdots & \vdots \\ 6 & \text{if } K^5 > z^* \end{cases}$$

The cut points, $K_1...K_5$, should not be interpreted as points of indifference between the adjacent choices, because conditional on parameter values, there is no indifference between adjacent choices. They are features of both the observed and unobserved parts of preferences. If they are known, it is straightforward to construct choice probabilities by making a distributional assumption on the error term. For $e_{ij} \sim N(0, \sigma^2)$, we have,

$$Pr(c_{ij} = n) = Pr(K_j^{n-1} < z_{ij}^* < K_j^n) =$$

$$Pr(K_j^{n-1} - \gamma_1 t_{0ij} - \gamma_2 k_{ij} - \gamma_3 ln(P_{ij}) < e_{ij} < K_j^n - \gamma_1 t_{0ij} - \gamma_2 k_{ij} - \gamma_3 ln(P_{ij}))$$

$$= \Phi\left(\frac{K_j^{n-1}}{\sigma} - \frac{\gamma_1}{\sigma} t_{0ij} - \frac{\gamma_2}{\sigma} k_{ij} - \frac{\gamma_3}{\sigma} ln(P_{ij})\right) - \Phi\left(\frac{K_j^n}{\sigma} - \frac{\gamma_1}{\sigma} t_{0ij} - \frac{\gamma_2}{\sigma} k_{ij} - \frac{\gamma_3}{\sigma} ln(P_{ij})\right), \quad (6)$$

where Φ represents the standard normal CDF. This holds exactly for the all interior choice options and the derivation for the corner solution probabilities follows the same logic. We estimate the cut points simultaneously with the other parameters using maximum likelihood.

Note that (6) demonstrates the γ parameters are only identified up to a constant of proportionality (σ) in this model, as are the cut points. Unfortunately, this prevents us from precisely estimating α because $\gamma_3 = \frac{1}{\alpha - 1}$. The estimate of $\alpha = \frac{\sigma}{\gamma_3} + 1$ is thus directly affected by this lack of identification. However $\gamma_1 = \frac{ln(\beta)}{\alpha - 1}$, implying $\beta = exp(\frac{\gamma_1}{\gamma_3})$ and $\gamma_2 = \frac{ln(\delta)}{\alpha - 1}$, implying $\delta = exp(\frac{\gamma_2}{\gamma_3})$. Because these two utility parameters are identified from ratios of the γ coefficients, the constant of proportionality does not affect the estimates. Examining whether these parameter estimates differ across methods serves as a robustness check on the OLS and NLS procedures against the potential non-standard measurement error bias introduced by ignoring the interval nature of the data in those approaches.

Note that in the expression above the cutoffs are indexed by decision, j. Ideally, we would want to identify all five cutoffs specific to all 24 budgets, but to maintain statistical feasibility we make an assumption that reduces the cut point estimation problem from 120 to 5 parameters. However, it is important that the assumption we make allows the cut points to vary across budgets to reflect price and income changes. Note that the error, e_{ij} is in units of the log consumption ratio. Using this fact, we assume that the cut point between choices n and $n-1$ is defined as the log of a linear combination of the consumption ratios at choices n and $n-1$ according to mixing parameter $\lambda^n \in [0,1]$. To state this formally, define K_j^n as the cut point that determines whether and individual selects option n or $n-1$ on choice j. Then

$$K_j^n = ln\left(\frac{x_{t(j)}(c_j = n)}{x_{t+k(j)}(c_j = n)}\lambda^n + \frac{x_{t(j)}(c_j = n-1)}{x_{t+k(j)}(c_j = n-1)}(1-\lambda^n)\right). \tag{7}$$

Assumption: $\lambda_j^n = \lambda_{j'}^n \quad \forall \quad (n, j, j') \in (\{j = 1...24\}, \{j' = 1...24\}, \{n = 1...5\})$.

While the mixing parameters for each interval are constant across budgets, the actual cut points associated with them adjust for the different properties of each budget.

There are other similar approaches to the ICT that one could take in our case. For example, an essentially identical exercise could be performed using the demand function rather than the tangency condition. However, the non-linearity of this function combined with the necessity of estimating cut-points makes the likelihood function very poorly behaved. More standard approaches would involve random utility models that do not take advantage of optimality conditions.

I.B Luce Stochastic Error Model Identification

AHLR use choice probabilities based on HL's adaptation of work by Luce (1959) to construct a likelihood function. Recall that according to this model, if an individual is presented with options X and Y, their probability of choosing option X is

$$Pr(c = X) = \frac{U(X)^{\frac{1}{\nu}}}{U(X)^{\frac{1}{\nu}} + U(Y)^{\frac{1}{\nu}}}.$$

ν represents deviations from deterministic choice. In the context of intertemporal choice, assume X represents sooner income and Y represents later income. Risk decisions from the HL are modeled similarly. For options L and R, the probability of choosing L is

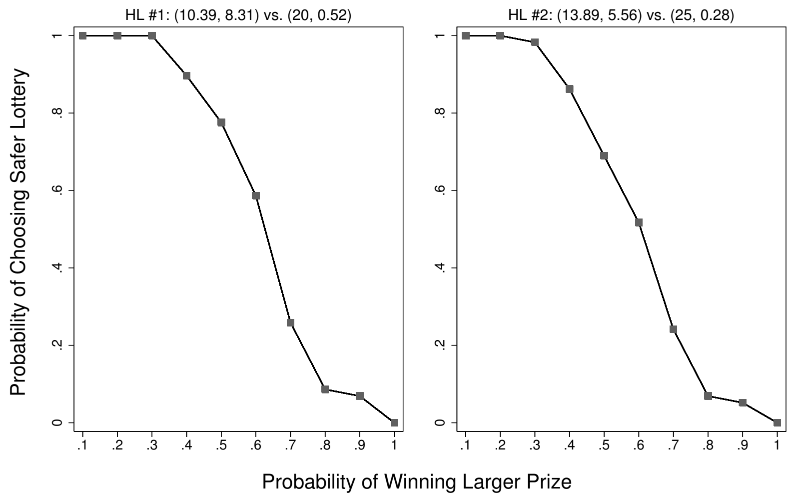
$$Pr(c = L) = \frac{U(L)^{\frac{1}{\mu}}}{U(L)^{\frac{1}{\mu}} + U(R)^{\frac{1}{\mu}}}.$$

Every individual decision on both the risk and time tasks generates one entry in the log-likelihood function. We use s to denote the risk decision index, j to denote the time decision index and i to denote individuals. The risk and time decisions enter the global DMPL likelihood function under an independence assumption that maintains complete linearity. This yields a log-likelihood function of

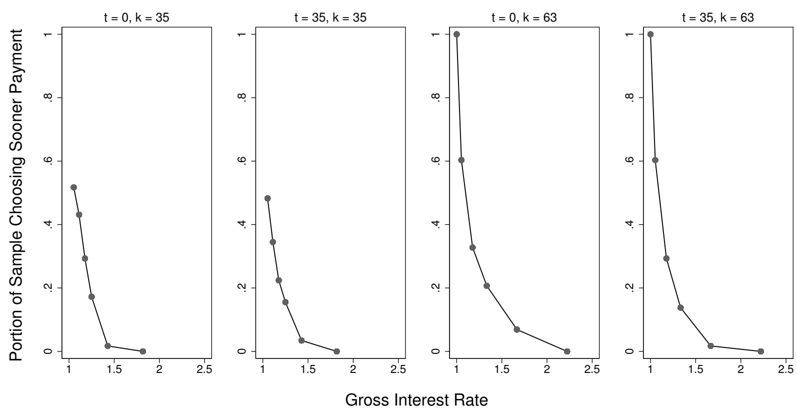
$$L = \sum_{ij} 1(c_{ij} = X_j) ln\left(\frac{U(X_j)^{\frac{1}{\nu}}}{U(X_j)^{\frac{1}{\nu}} + U(Y_j)^{\frac{1}{\nu}}}\right) + \sum_{ij} 1(c_{ij} = Y_j) ln\left(\frac{U(Y_j)^{\frac{1}{\nu}}}{U(X_j)^{\frac{1}{\nu}} + U(Y_j)^{\frac{1}{\nu}}}\right) +$$

$$\sum_{is} 1(c_{is} = R_s) ln\left(\frac{U(R_s)^{\frac{1}{\mu}}}{U(R_s)^{\frac{1}{\nu}} + U(L_s)^{\frac{1}{\nu}}}\right) + \sum_{is} 1(c_{is} = L_s) ln\left(\frac{U(L_s)^{\frac{1}{\mu}}}{U(R_s)^{\frac{1}{\nu}} + U(L_s)^{\frac{1}{\nu}}}\right). \quad (8)$$

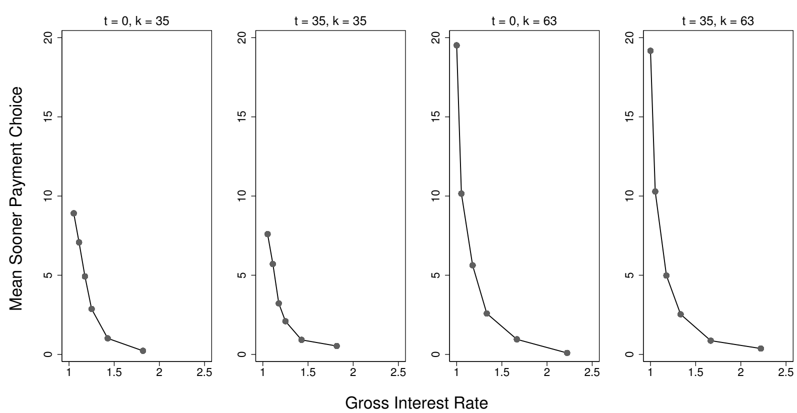
I.C Summary of Raw Data



A. HL Data



B. MPL Data



C. CTB Data

Figure A1

I.D Individual Parameter Estimates

Table A1: Individual-Specific Parameter Estimates

Parameter	N	Median	Mean	Standard Deviation	10th Pctile.	90th Pctile.
CTB						
α	58	0.937	0.936	0.030	0.915	0.966
β	58	1.084	1.060	0.160	0.839	1.174
r	58	0.692	33.553	197.117	-0.880	7.454
DMPL						
α	58	0.488	-0.178	3.426	0.231	0.958
β	58	0.995	2.320	9.947	0.948	1.027
r	58	0.282	0.994	2.649	-0.023	2.493

Note: Estimates are obtained using OLS for the CTB and the Luce stochastic error model for the DMPL.

Table A1 presents the individual-specific utility parameter estimates. The medians correspond closely to the aggregate estimates presented in Section 3.1. Using these measures, we can look at the between-method correlation for each parameter. Importantly, there are no significant pairwise correlation between measures of curvature, present-bias and discount rate across the two methods, ($\rho = 0.046,\ p = 0.773$), ($\rho = -0.073,\ p = 0.588$), ($\rho = 0.067,\ p = 0.619$), respectively.

I.E Background Parameter Specifications

For the main analysis we consider the experimental allocations in a vacuum. However, the degree to which laboratory sensitivity to stakes depends on extra-laboratory income and consumption is unresolved. Furthermore, all subjects were provided with a \$10 show-up fee that was divided into two payments of \$5 and split between the two payment dates. Shifting income levels in both periods will affect the levels of our estimates, but it is important to demonstrate that alternative specifications do not yield different qualitative results. Table A2 replicates our main Table of results in Section 3.1 with the \$5 payments added to each time period. We document substantial sensitivity in discounting and curvature estimates, particularly for the DMPL. Importantly, the difference in curvature across methods remains pronounced.

Table A2: Aggregate Utility Parameter Estimates with Show-up Fees

	Curvature	Discounting	Curvature and Discounting			
Elicitation Method:	MPL	HL	DMPL	mCTB		
Estimation Method:	ML	ML	ML	OLS	NLS	ICT
	(1)	(2)	(3)	(4)	(5)	(6)
Utility Parameters						
r	0.737	-	0.456	0.658	0.828	0.795
	(0.148)	-	(0.096)	(0.371)	(0.228)	(0.245)
β	0.989	-	0.992	1.017	0.998	0.999
	(0.008)	-	(0.006)	(0.021)	(0.014)	(0.018)
α	-	0.080	0.083	0.674	0.784	0.831†
	-	(0.092)	(0.091)	(0.018)	(0.011)	(0.023)
Error Parameters						
ν	0.065	-	0.003	-	-	-
	(0.007)	-	(0.003)	-	-	-
μ	-	0.009	0.009	-	-	-
	-	(0.010)	(0.010)	-	-	-
Clustered SE's	Yes	Yes	Yes	Yes	Yes	Yes
# Clusters	58	58	58	58	58	58
N	1392	1160	2552	1392	1392	1392
Log Likelihood	-545	-326	-871	-	-	-1514
R^2	-	-	-	0.420	0.536	-

†: The ICT estimate for α is only identified up to a constant. See Appendix A.1 for details.

Note: Standard errors clustered at the individual level in parentheses. Each individual made 20 decisions on the HL, 24 decisions on the MPL (and therefore 44 decisions on the DMPL) and 24 decisions on the CTB. Columns (1) through (3) HL, MPL and DMPL estimates are obtained via maximum likelihood using Luce's (1959) stochastic error probabilistic choice model. The CTB is estimated in three different ways: ordinary least squares (OLS) using the Euler equation (2), non-linear least squares (NLS) using the demand function (3) and interval-censored tobit (ICT) maximum likelihood using the Euler equation (2). All maximum likelihood models are estimated using the Broyden-Fletcher-Goldfarb-Shanno (BFGS) optimization algorithm.

I.F CTB Prediction Data

In Table A4, we present predicted optima and observed CTB choice based on CTB and DMPL estimates.

Table A4: Actual and Predicted Optima on CTB Data, in terms of Sooner Consumption

t	k	P	CTB Opt.	DMPL Opt.	Mean Choice	Median Choice
0	35	1.05	9.00	9.68	8.91	7.60
		1.11	4.60	8.87	7.08	0.00
		1.18	1.88	8.08	4.92	0.00
		1.25	0.65	7.31	2.87	0.00
		1.43	0.05	5.84	1.01	0.00
		1.82	0.00	3.83	0.23	0.00
0	63	1.00	16.66	10.83	19.52	20.00
		1.05	12.67	9.99	10.16	13.30
		1.18	3.68	8.36	5.63	0.00
		1.33	0.43	6.81	2.59	0.00
		1.67	0.01	4.65	0.95	0.00
		2.22	0.00	2.78	0.09	0.00
35	35	1.05	9.91	9.59	7.60	0.00
		1.11	5.29	8.79	5.71	0.00
		1.18	2.22	8.01	3.22	0.00
		1.25	0.78	7.24	2.10	0.00
		1.43	0.07	5.78	0.92	0.00
		1.82	0.00	3.78	0.53	0.00
35	63	1.00	17.17	10.74	19.17	20.00
		1.05	13.46	9.91	10.29	17.10
		1.18	4.26	8.29	4.98	0.00
		1.33	0.52	6.74	2.54	0.00
		1.67	0.01	4.60	0.87	0.00
		2.22	0.00	2.74	0.37	0.00

In each of the 24 rows, we use observed data from the 58 individuals who comprised our estimation sample. Optima are calculated using aggregate estimates.

I.G HL Predictions

A method of testing whether or the risky and riskless data generate conformable measures of concavity is to use the α parameters as estimated from the CTB to try and predict risky choices. Both aggregate and individual CTB estimates predict 82% of HL choices correctly. By comparison both aggregate and individual DMPL estimates predict with 90% accuracy.[37]

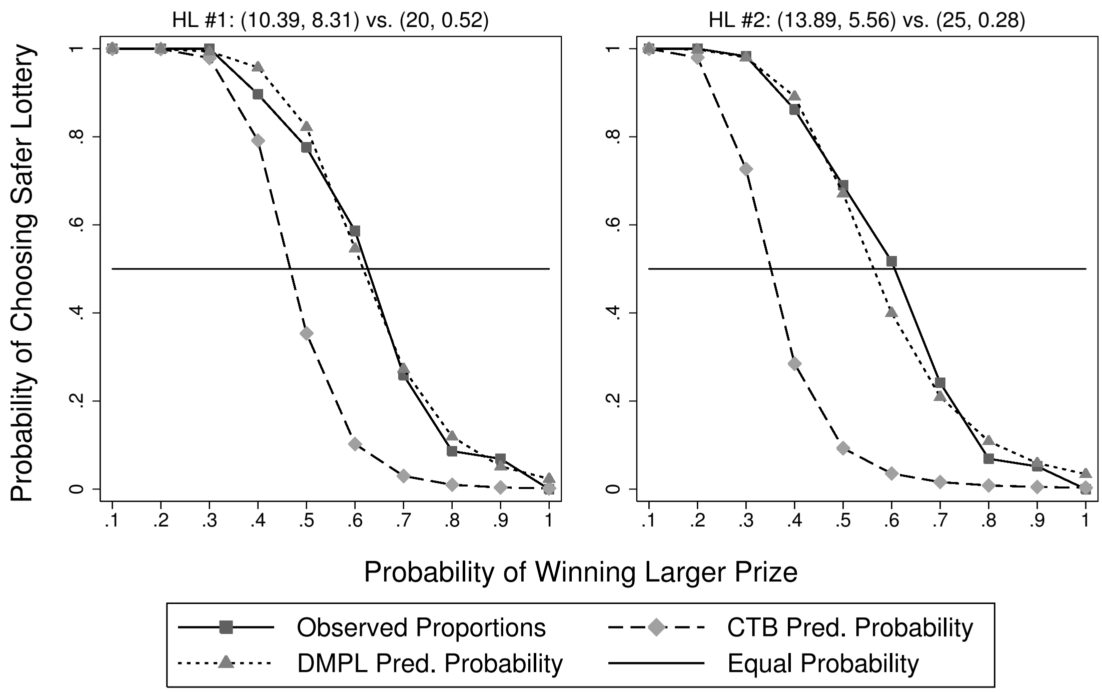


Figure A2: HL Prediction Exercise

Figure A2 plots the HL choice probabilities[38] for each measure of curvature and observed choices for each of our HL tasks. This illustrates that the CTB fails to predict enough risk-aversion to explain the data.[39]

[37]The difference is statistically significant with $p = 0.005$. Standard errors are clustered by individual.

[38]These are calculated using the Luce Stochastic Error model. In the case of the CTB estimates, we borrow the value fo μ from the DMPL estimation.

[39]Testing for equality of the predicted probabilities rejects with $p < 0.001$, standard errors clustered by individual.

I.H Experimental Stimuli

We provide the following stimuli (in this order): explanation of payment method, general instructions, CTB instructions, MPL instructions, HL instructions, BDM instructions.

Welcome

Welcome and thank you for participating

Eligibility for this study

To be in this study, you need to meet these criteria.

You must have a campus mailing address of the form:

```
YOUR NAME
9450 GILMAN DR 92(MAILBOX NUMBER)
LA JOLLA CA 92092-(MAILBOX NUMBER)
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Your mailbox must be a valid way for you to receive mail from now through the end of the Spring Quarter.

You must be willing to provide your name, campus mail box, email address, and student PID. This information will only be seen by Professor Andreoni and his assistants. After payment has been sent, this information will be destroyed. Your identity will not be a part of any subsequent data analysis.

You must be willing to receive your payment for this study by check, written to you by Professor James Andreoni, Director of the UCSD Economics Laboratory. The checks will be drawn on the USE Credit Union on campus. This means that, if you wish, you can cash your checks for free at the USE Credit Union any weekday from 9:00 am to 5:00 pm with valid identification (driver's license, passport, etc.).

The checks will be delivered to you at your campus mailbox at a date to be determined by your decisions in this study, and by chance. The latest you could receive payment is the last week of classes in the Spring Quarter.

If you do not meet <u>all of these criteria</u>, please inform us of this now.

Instructions

Earning Money

To begin, you will be given a $10 thank-you payment, just for participating in this study! You will receive this thank-you payment in two equally sized payments of $5 each. The two $5 payments will come to you at two different times. These times will be determined in the way described below.

In this study, you will make 49 choices over how to allocate money between two points in time, one time is "earlier" and one is "later." Both the earlier and later times will vary across decisions. This means you could be receiving payments as early as today, and as late as the last week of classes in the Spring Quarter, or possibly two other dates in between.

Once all 49 decisions have been made, we will **randomly select one of the 49 decisions as the decision-that-counts**. We will use the decision-that-counts to determine your actual earnings. Note, since all decisions are equally likely to be chosen, you should make each decision as if it will be the decision-that-counts.

When calculating your earnings from the decision-that-counts, we will add to your earnings the two $5 thank you payments. Thus, you will always get paid at least $5 at the chosen earlier time, and at least $5 at the chosen later time.

IMPORTANT: All payments you receive will arrive to your campus mailbox. That includes payments that you receive today as well as payments you may receive at later dates. On the scheduled day of payment, a check will be placed for delivery in campus mail services by Professor Andreoni and his assistants. *Campus mail services guarantees delivery of 100% of your payments by the following day.*

As a reminder to you, the day before you are scheduled to receive one of your payments, we will send you an e-mail notifying you that the payment is coming.

On your table is a business card for Professor Andreoni with his contact information. Please keep this in a safe place. If one of your payments is not received you should immediately contact Professor Andreoni, and we will hand-deliver payment to you.

Your Identity

In order to receive payment, we will need to collect the following pieces of information from you: name, campus mail box, email address, and student PID. This information will only be seen by Professor Andreoni and his assistants. After all payments have been sent, this information will be destroyed. Your identity will not be a part of subsequent data analysis.

You have been assigned a participant number. This will be linked to your personal information in order to complete payment. After all payments have been made, only the participant number will remain in the data set.

On your desk are two envelopes: one for the sooner payment and one for the later payment. Please take the time now to address them to yourself at your campus mail box.

1.

NAME: ______________________________________ PID:______________________

<u>How It Works:</u>

In the following four sheets you are asked to make 24 decisions involving payments over time. Each row on the sheets is a decision and is numbered from 1 to 24.

Each row will feature a series of options. Each option consists of a sooner payment AND a later payment. You are asked to pick your favorite option in each row by checking the box below it. You should pick the combination of sooner payment AND later payment that you like the most. For each row, mark only one box.

<u>Here is an example row:</u>

1.	payment TODAY …	$19.00	$15.20	$11.40	$7.60	$3.80	$0
	and payment in 5 WEEKS	$0	$4.00	$8.00	$12.00	$16.00	$20.00
		☐	☐	☐	☐	☐	☐

In this example, you are asked to choose your favorite combination of payment today AND payment in 5 weeks. As you can see, the sooner payment varies in value from $19 to $0 and the later payment varies in value from $0 to $20.

Note that there is a trade-off between the sooner payment and the later payment across the options. As the sooner payment goes down, the later payment goes up.

If someone's favorite option were $19.00 today AND $0 in five weeks, they would mark as follows:

1.	payment TODAY …	$19.00	$15.20	$11.40	$7.60	$3.80	$0
	and payment in 5 WEEKS	$0	$4.00	$8.00	$12.00	$16.00	$20.00
		☐	☐	☐	☐	☐	☐

If someone's favorite option were $0 today AND $20 in five weeks, they would mark as follows:

1.	payment TODAY …	$19.00	$15.20	$11.40	$7.60	$3.80	$0
	and payment in 5 WEEKS	$0	$4.00	$8.00	$12.00	$16.00	$20.00
		☐	☐	☐	☐	☐	☐

<u>How to proceed:</u>
There are 4 sheets, each with 6 decisions, making 24 decisions in total. Each decision has a number from 1 to 24.

NUMBERS 1 THROUGH 6: Each option has one payment <u>today</u> AND one payment <u>in 5 weeks</u>.
NUMBERS 7 THROUGH 12: Each option has one payment <u>today</u> AND one payment <u>in 9 weeks</u>.
NUMBERS 13 THROUGH 18: Each option has one payment <u>in 5 weeks</u> AND one payment <u>in 10 weeks</u>.
NUMBERS 19 THROUGH 24: Each option has one payment <u>in 5 weeks</u> AND one payment <u>in 14 weeks</u>.

Your decisions represent 24 of the 49 choices you make in the experiment. If, after all 49 choices are made, a number from 1 to 24 is drawn, these sheets will determine your payoffs. This number will determine which decision (from 1 to 24) will determine your payoffs. The sooner and later payments from the option you choose in the decision-that-counts will be added to your sooner and later $5 thank-you payments.

Remember that each decision could be the decision-that-counts! It is in your interest to treat each decision as if it could be the one that determines your payment.

NAME: ______________________________________ PID:______________________

How It Works:

In the following four sheets you are asked to make 24 decisions involving payments over time. Each row on the sheets is a decision and is numbered from 1 to 24.

Each row will feature a series of options. Each option consists of a sooner payment AND a later payment. You are asked to pick your favorite option in each row by checking the box below it. You should pick the combination of sooner payment AND later payment that you like the most. For each row, mark only one box.

Here is an example row:

1.	payment TODAY …	$19.00	$0
	and payment in 5 WEEKS	$0	$20.00
		☐	☐

In this example, you are asked to choose your favorite combination of payment today AND payment in 5 weeks. As you can see, the sooner payment varies in value from $19 to $0 and the later payment varies in value from $0 to $20.

Note that there is a trade-off between the sooner payment and the later payment across the options. As the sooner payment goes down, the later payment goes up.

If someone's favorite option were $19.00 today AND $0 in five weeks, they would mark as follows:

1.	payment TODAY …	$19.00	$0
	and payment in 5 WEEKS	$0	$20.00
		☐	☐

If someone's favorite option were $0 today AND $20 in five weeks, they would mark as follows:

1.	payment TODAY …	$19.00	$0
	and payment in 5 WEEKS	$0	$20.00
		☐	☐

How to proceed:
There are 4 sheets, each with 6 decisions, making 24 decisions in total. Each decision has a number from 1 to 24.

NUMBERS 1 THROUGH 6: Each option has one payment today AND one payment in 5 weeks.
NUMBERS 7 THROUGH 12: Each option has one payment today AND one payment in 9 weeks.
NUMBERS 13 THROUGH 18: Each option has one payment in 5 weeks AND one payment in 10 weeks.
NUMBERS 19 THROUGH 24: Each option has one payment in 5 weeks AND one payment in 14 weeks.

Your decisions represent 24 of the 49 choices you make in the experiment. If, after all 49 choices are made, a number from 1 to 24 is drawn, these sheets will determine your payoffs. This number will determine which decision (from 1 to 24) will determine your payoffs. The sooner and later payments from the option you choose in the decision-that-counts will be added to your sooner and later $5 thank-you payments.

Remember that each decision could be the decision-that-counts! It is in your interest to treat each decision as if it could be the one that determines your payment.

NAME: ______________________________________ PID:______________________

<u>How It Works:</u>

**In the following two sheets you are asked to choose between options: Option A or Option B.
On each sheet you will make ten choices, one on each row. For each decision row you will have to choose either Option A or Option B. You make your decision by checking the box next to the option you prefer more. You may choose A for some decision rows and B for other rows, and you may change your decisions and make them in any order.**

There are a total of 20 decisions on the following sheets. The sheets represent one of the 47 choices you make in the experiment. If the number 46 is drawn, these sheets will determine your payoffs. If the number 46 is drawn, a second number will also be drawn from 1 to 20. This will determine which decision (from 1 to 20) on the sheets is the decision-that-counts. The option you choose (either Option A or Option B) in the decision-that-counts will then be played. You will receive your payment from the decision–that-counts immediately. Your $5 sooner and later thank-you payments, however, will still be mailed as before. The sooner payment will be mailed today and the later payment will be mailed in 5 weeks.

Playing the Decision-That-Counts:

Your payment in the decision-that-counts will be determined by throwing a 10 sided die. Now, please look at Decision 1 on the following sheet. Option A pays $10.39 if the throw of the ten sided die is 1, and it pays $8.31 if the throw is 2-10. Option B yields $20 if the throw of the die is 1, and it pays $0.52 if the throw is 2-10. The other Decisions are similar, except that as you move down the table, the chances of the higher payoff for each option increase. In fact, for Decision 10 in the bottom row, the die will not be needed since each option pays the highest payoff for sure, so your choice here is between $10.39 or $20.

Remember that each decision could be the decision-that-counts! It is in your interest to treat each decision as if it could be the one that determines your payoff.

NAME: ________________________ PID:_____________________

Thank you for participating. Please write the dates that you are scheduled to receive your sooner and later payments:

sooner date __________ AND later date __________

As an additional thank-you, one person will be chosen to receive an additional $25 in their later check. This will be decided randomly and each of you has an equal chance of receiving the $25. If you are chosen to receive the $25 later, you will also have the possibility of taking a smaller amount in your earlier check. All you have to do is tell us the lowest amount you would accept in your sooner check to compensate you for not getting the $25 in your later check.

<u>How it works:</u> In the box below, write the smallest amount that you'd be willing to accept in your sooner check *in exchange for* the additional $25 in your later check. That is, you should state the amount of money paid to you at the sooner date that would be just as good to you as being paid $25 at the later date.

<u>Why should you tell the truth?</u> Once you write the amount in the box below we will collect all of the sheets. Then we will randomly pick a number between $15.00 and $24.99. All numbers from $15.00 to $24.99 are equally likely to be chosen. If the randomly chosen number is *greater than* the amount you write *you will be paid the <u>random number</u>* at the *sooner date*. If the randomly chosen number is *smaller than* the amount you write *you will be paid <u>$25</u>* at the *later date*.

<u>Example:</u> Let's say someone writes $21.80 in the box below. If the random number is $19.40, they receive the $25 later. If the random number is $22.49, they receive $22.49 sooner.

<u>What if I don't write my true value?</u> Consider the following stories.

Story 1: Suppose that, in truth, Person A is really indifferent between $22.85 paid sooner and $25 paid later. Instead of writing $22.85, Person A writes a lower number, say $20.00. Then, the random number is drawn and it winds up being $21.50. Person A receives $21.50 sooner and not $25 later. Person A is disappointed. $21.50 sooner is worse than $22.85 sooner; and $22.85 sooner is worth the same as $25 later. So the $21.50 is worse than the $25 Person A could have had by writing his true value. *By writing his true value instead of a lower number, Person A would be better off.*

Story 2: Suppose that, in truth, Person B is really indifferent between $19.65 paid sooner and $25 paid later. Instead of writing $19.65, Person B writes a higher number, say $23.25. Then, the random number is drawn and it winds up being $21.50. Person B receives the $25 later. Person B is disappointed. $25 later is worth the same as $19.65 sooner. $19.65 sooner is less than the $21.50 Person B could have had by writing her true value. *By writing her true value instead of a higher number, Person B would be better off.*

As you can see, the best idea is to write down your true value. Not a penny more and not a penny less!

Please write the smallest amount you'd truly be willing to accept in your sooner check in exchange for the additional $25 in your later check.

I am indifferent between $________ in my sooner check and $25 in my later check.