The Effects of Time Preferences on Cooperation: Experimental Evidence from Infinitely Repeated Games – Online Appendix

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July 2021

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Appendices

A The Evolution of Behavior After Round 1

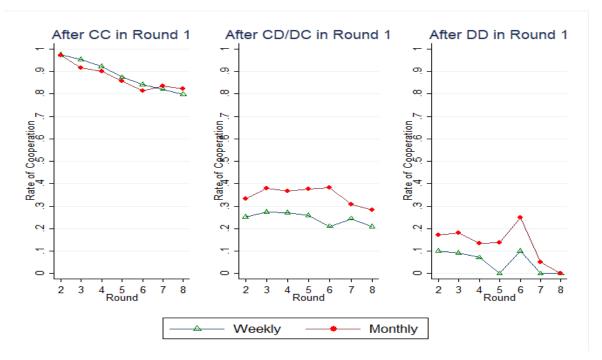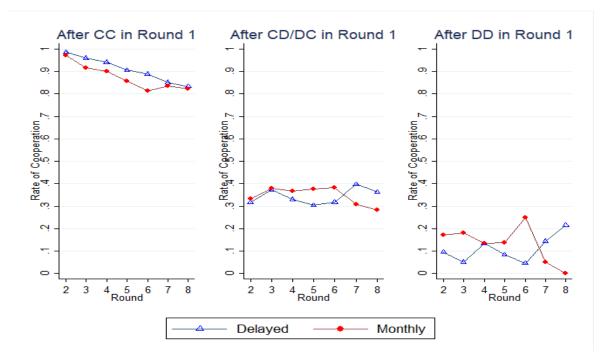### A.1 Average Cooperation in Round 2 and After: Weekly and Monthly
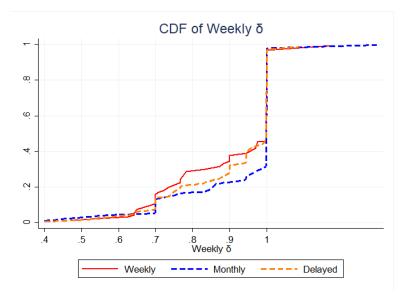

Figure A.1: Average Cooperation in Round 2 and After: Weekly and Monthly
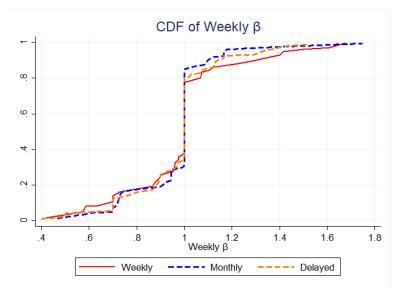
A.2 Average Cooperation in Round 2 and After: Delayed and Monthly

Figure A.2: Average Cooperation in Round 2 and After: Delayed and Monthly

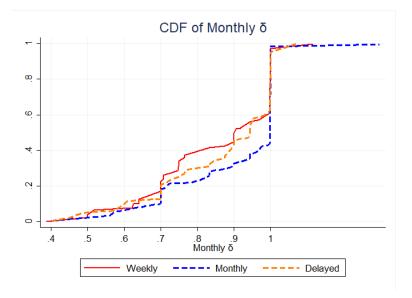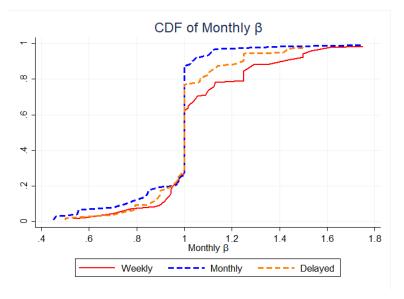# B Distribution of Elicited Time Preferences

(a) Weekly δ

(b) Weekly β

Figure B.1: Distribution of Weekly Parameters

(a) Monthly δ

(b) Monthly β

Figure B.2: Distribution of Monthly Parameters

C Additional Analysis for Section 4.3

Table C.1: β, δ, and Round 1 of Match 1 Cooperation (Probit – Marginal Effects)

	Weekly		Monthly		Delayed Monthly
	(1)	(2)	(3)	(4)	(5)
β	-0.026	-1.646	0.698	12.128*	
	(0.407)	(2.311)	(0.641)	(7.227)	
δ	0.031	-2.071	-0.323	11.660	0.259
	(0.233)	(3.100)	(0.656)	(7.135)	(0.251)
$\beta \times \delta$		2.017		-11.833*	
		(2.801)		(7.152)	
Obs.	59	59	64	64	71

Notes: Dependent variable: cooperation=1, defection=0. Frequency of opponent's cooperation indicates the fraction of times the other player has cooperated in the previous matches. Clustered standard errors in parentheses. Marginal effects are taken at the mean.
***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

Table C.2: β, δ, and Round 1 Cooperation by Cooperative Types - Last 10 Matches (Probit – Marginal Effects)

Type	Weekly		Monthly		Delayed Monthly	
	Coop (1)	Non-coop (2)	Coop (3)	Non-coop (4)	Coop (5)	Non-coop (6)
β	0.144	-0.503***	-0.133	23.554		
	(0.139)	(0.120)	(2.817)	(16.521)		
δ	0.193	-0.402	0.267	23.559	0.042	-0.218
	(0.164)	(0.266)	(3.389)	(17.042)	(0.055)	(0.157)
$\beta \times \delta$	-0.104	0.451*	0.266	-23.419		
	(0.189)	(0.234)	(3.338)	(17.156)		
Frequency of Opponents' Coop.	0.112**	0.328**	0.992***	1.124***	0.175**	1.239
	(0.053)	(0.133)	(0.215)	(0.435)	(0.079)	(0.872)
Obs.	420	170	460	180	550	160

Notes: Dependent variable: cooperation=1, defection=0. The cooperative (Coop) and non-cooperative (Non-coop) types refer to subjects who cooperated and defected in Round 1 of Match 1, respectively. Frequency of opponent's cooperation indicates the fraction of times the other player has cooperated in the previous matches. Clustered standard errors in parentheses. Marginal effects are taken at the mean.

***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

D The Four Sequences of the Realized Rounds

Table D.1: The Four Sequences of the Realized Rounds in Matches

Sequence	Match																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	2	1	1	8	6	3	4	5	5	5	1	2	7	17	2	2	12	6	4	4
2	6	8	5	3	2	3	1	2	1	4	2	6	5	9	3	1	3	1	5	11
3	2	3	5	3	4	2	3	8	15	1	3	6	5	2	5	2	1	1	8	2
4	6	1	4	8	1	3	3	9	4	1	7	2	2	1	2	1	5	3	9	4

E Instructions for the experiment

E.1 Phase 1 instructions

<div align="center">**Instructions (phase 1)**</div>

Welcome

You are about to participate in a session on decision-making, and you will be paid for your participation. What you earn depends partly on your decisions and partly on chance. The payment you earn will be paid to you through VENMO.

The entire session will take place through computer terminals. Please do not talk or try to communicate in any way with other participants during the session.

The entire session consists of two phases. The instructions for phase 1 are given below. After phase 1 ends, you will be given the instructions for phase 2.

We will start with a brief instruction period for phase 1. During this instruction period, you will be given a description of the main features of phase 1. If you have any questions during this period, raise your hand. Your question will then be answered publicly so everyone can hear.

General Instructions

1. In phase 1, you will be asked to make decisions for 8 blocks of questions. In each block, there are 2,000 questions. For each question, you can choose either: Option A, which pays you sooner, or Option B, which pays you later.

2. After you answer all questions, I will randomly pick one question and pay you the option you chose on that question. Each question is equally likely to be chosen for payment. Obviously, you have no incentive to lie on any question, because if that question gets chosen for payment, then you would end up with the option you like less.

3. For example, the questions in one block are as follows (note that each row corresponds to a question, and so you will have to choose an option in each row):

Questions	Payment Option A (Pays the Amount Below Today)	Payment Option B (Pays the Amount Below in 1 month)
1	$8.00	$0.01
2	$8.00	$0.02
3	$8.00	$0.03
⋮	⋮	⋮
1,999	$8.00	$19.99
2,000	$8.00	$20.00

I assume you will choose Option A for at least the first few questions, but at some point switch to choosing Option B. In order to save time, you can answer at which dollar value you'd switch. I can then 'fill out' your answers to all 2,000 questions based on your switch point (choosing Option A for all questions before your switch point, and Option B for all questions at or after your switch point). I will still draw one question randomly for payment. Again, if you lie about your preferred switch point, you might end up with an option that you like less.

4. The 8 blocks will differ in two ways: (1) the timings of sooner and later payments:
   - Between payment **today** and payment in **1 week**.
   - Between payment **today** and payment in **1 month**.
   - Between payment in **1 month** and payment in **1 month and 1 week**.
   - Between payment in **1 month** and payment in **2 months**.
and (2) whether you are asked to switch from <u>A to B</u> or <u>B to A</u>.

Payment

1. At the end of the experiment, one question in one of the blocks will be randomly selected for payment and will be displayed on your screen. Depending on your decision for that question, you will be paid on the designated date through VENMO. If in the question that is randomly selected, your decision was to receive a payment today, then you will be paid through VENMO within a few hours of the end of the experiment. If, on the other hand, your decision was to receive a payment in the future, you will be paid on the designated date through VENMO.

2. In addition, you will receive a $5 show-up fee through VENMO after the experiment.

- Are there any questions?

Before we start, let me remind you that:
- There are 8 blocks of questions in each of which you will be asked to state your switch point.
- Only one question in one of the blocks will be randomly selected for payment.
- Depending on your decision, you will be paid on the designated date through VENMO.
- A $5 show-up fee will be paid to you through VENMO after the experiment.

E.2 Phase 2 instructions

Instructions (phase 2) - Weekly treatment

We will start with a brief instruction period for phase 2. During this instruction period you will be given a description of the main features of phase 2. If you have any questions during this period, raise your hand. Your question will then be answered publicly so that everyone can hear.

General Instructions

1. In phase 2 you will be asked to make decisions in several rounds. Each sequence of rounds is referred to as a match. You will be randomly paired with another person for a match.

2. The length of a match is determined randomly. After each round, there is a 75% probability that the match will continue for at least another round. This is as if we were to randomly choose an integer between 1 and 100 and continue if the number chosen is less than or equal to 75 and end if the number chosen is larger than 75. So, for instance, if you are in round 2, the probability that there will be a third round is 75%, and if you are in round 9, the probability that there will be another round is also 75%.

3. Once a match ends, you will be randomly paired with another person for a new match. You will have 20 matches in phase 2.

4. In each round, you will be asked to choose between action 1 and 2. The payoffs are determined by your action and the action chosen by the person paired with you. The payoffs are described in the table below:

	The other's choice	
Your choice	1	2
1	$4.00, $4.00	$1.00, $5.00
2	$5.00, $1.00	$2.00, $2.00

- The first entry in each cell represents your payoff, while the second entry represents the payoff of the person you are paired with. That is, if:

    You select 1 and the other selects 1, you each make $4.00.
    You select 1 and the other selects 2, you make $1.00 while the other makes $5.00.
    You select 2 and the other selects 1, you make $5.00 while the other makes $1.00.
    You select 2 and the other selects 2, you each make $2.00.
- Once you and the person you are paired with have made your choices, those choices will be highlighted and your payoff for the round will appear.

Payment

1. At the end of the experiment, one of the matches will be randomly selected for payment.

2. For the selected match, you will receive payment for the first round today. After that, you will receive payment for the following rounds once a week. That is, you will receive payment for the second round in 1 week, payment for the third round in 2 weeks, and so on. The schedule of payment is summarized in the table below.

Payoffs (round)	Payment schedule (from today)
1st round payoff	Today
2nd round payoff	in 1 week
3rd round payoff	in 2 weeks
⋮	⋮

3. In the same way that payments are made for phase 1, you will be paid on the designated dates through VENMO.

- Are there any questions?

Before we start, let me remind you that:

- The length of a match is randomly determined. After each round, there is a 75% probability that the match will continue for at least another round. You will play with the same person for the entire match.

- After a match is finished, you will be randomly paired with another person for a new match. You will have 20 such matches.

- One match will be randomly selected for payment.
You will receive your payment for the first round today. After that, you will receive payment for the following rounds once a week. That is, you will receive payment for the second round in 1 week, payment for the third round in 2 weeks, and so on.

Instructions (phase 2) - Monthly treatment

We will start with a brief instruction period for phase 2. During this instruction period you will be given a description of the main features of phase 2. If you have any questions during this period, raise your hand. Your question will then be answered publicly so that everyone can hear.

General Instructions

1. In phase 2 you will be asked to make decisions in several rounds. Each sequence of rounds is referred to as a match. You will be randomly paired with another person for a match.

2. The length of a match is determined randomly. After each round, there is a 75% probability that the match will continue for at least another round. This is as if we were to randomly choose an integer between 1 and 100 and continue if the number chosen is less than or equal to 75 and end if the number chosen is larger than 75. So, for instance, if you are in round 2, the probability that there will be a third round is 75%, and if you are in round 9, the probability that there will be another round is also 75%.

3. Once a match ends, you will be randomly paired with another person for a new match. You will have 20 matches in phase 2.

4. In each round, you will be asked to choose between action 1 and 2. The payoffs are determined by your action and the action chosen by the person paired with you. The payoffs are described in the table below:

	The other's choice	
Your choice	1	2
1	$4.00, $4.00	$1.00, $5.00
2	$5.00, $1.00	$2.00, $2.00

- The first entry in each cell represents your payoff, while the second entry represents the payoff of the person you are paired with. That is, if:

    You select 1 and the other selects 1, you each make $4.00.
    You select 1 and the other selects 2, you make $1.00 while the other makes $5.00.
    You select 2 and the other selects 1, you make $5.00 while the other makes $1.00.
    You select 2 and the other selects 2, you each make $2.00.
- Once you and the person you are paired with have made your choices, those choices will be highlighted and your payoff for the round will appear.

Payment

1. At the end of the experiment, one of the matches will be randomly selected for payment.

2. For the selected match, you will receive payment for the first round today. After that, you will receive payment for the following rounds once a month. That is, you will receive payment for the second round in 1 month, payment for the third round in 2 months, and so on. The schedule of payment is summarized in the table below.

Payoffs (round)	Payment schedule (from today)
1st round payoff	Today
2nd round payoff	in 1 month
3rd round payoff	in 2 months
⋮	⋮

3. In the same way that payments are made for phase 1, you will be paid on the designated dates through VENMO.

- Are there any questions?

Before we start, let me remind you that:

- The length of a match is randomly determined. After each round, there is a 75% probability that the match will continue for at least another round. You will play with the same person for the entire match.

- After a match is finished, you will be randomly paired with another person for a new match. You will have 20 such matches.

- One match will be randomly selected for payment.
You will receive your payment for the first round today. After that, you will receive payment for the following rounds once a month. That is, you will receive payment for the second round in 1 month, payment for the third round in 2 months, and so on.

We will start with a brief instruction period for phase 2. During this instruction period you will be given a description of the main features of phase 2. If you have any questions during this period, raise your hand. Your question will then be answered publicly so that everyone can hear.

General Instructions

1. In phase 2 you will be asked to make decisions in several rounds. Each sequence of rounds is referred to as a match. You will be randomly paired with another person for a match.

2. The length of a match is determined randomly. After each round, there is a 75% probability that the match will continue for at least another round. This is as if we were to randomly choose an integer between 1 and 100 and continue if the number chosen is less than or equal to 75 and end if the number chosen is larger than 75. So, for instance, if you are in round 2, the probability that there will be a third round is 75%, and if you are in round 9, the probability that there will be another round is also 75%.

3. Once a match ends, you will be randomly paired with another person for a new match. You will have 20 matches in phase 2.

4. In each round, you will be asked to choose between action 1 and 2. The payoffs are determined by your action and the action chosen by the person paired with you. The payoffs are described in the table below:

	The other's choice	
Your choice	1	2
1	$4.00, $4.00	$1.00, $5.00
2	$5.00, $1.00	$2.00, $2.00

- The first entry in each cell represents your payoff, while the second entry represents the payoff of the person you are paired with. That is, if:

    You select 1 and the other selects 1, you each make $4.00.
    You select 1 and the other selects 2, you make $1.00 while the other makes $5.00.
    You select 2 and the other selects 1, you make $5.00 while the other makes $1.00.
    You select 2 and the other selects 2, you each make $2.00.
- Once you and the person you are paired with have made your choices, those choices will be highlighted and your payoff for the round will appear.

Payment

1. At the end of the experiment, one of the matches will be randomly selected for payment.

2. For the selected match, you will receive payment for the first round in 1 month from today. After that, you will receive payment for the following rounds once a month. That is, you will receive payment for the second round in 2 months, payment for the third round in 3 months, and so on. The schedule of payment is summarized in the table below.

Payoffs (round)	Payment schedule (from today)
1st round payoff	in 1 month
2nd round payoff	in 2 months
3rd round payoff	in 3 months
⋮	⋮

3. In the same way that payments are made for phase 1, you will be paid on the designated dates through VENMO.

- Are there any questions?

Before we start, let me remind you that:

- The length of a match is randomly determined. After each round, there is a 75% probability that the match will continue for at least another round. You will play with the same person for the entire match.

- After a match is finished, you will be randomly paired with another person for a new match. You will have 20 such matches.

- One match will be randomly selected for payment.
You will receive your payment for the first round in 1 month from today. After that, you will receive payment for the following rounds once a month. That is, you will receive payment for the second round in 2 months, payment for the third round in 3 months, and so on.

F Screen shots for the experiment
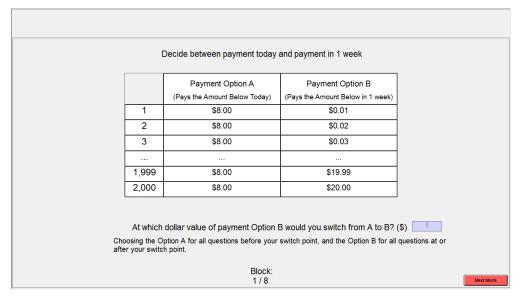
F.1 Phase 1 screen shots

Decide between payment today and payment in 1 week

	Payment Option A (Pays the Amount Below Today)	Payment Option B (Pays the Amount Below in 1 week)
1	$8.00	$0.01
2	$8.00	$0.02
3	$8.00	$0.03
...	...	...
1,999	$8.00	$19.99
2,000	$8.00	$20.00

At which dollar value of payment Option B would you switch from A to B? ($)

Choosing the Option A for all questions before your switch point, and the Option B for all questions at or after your switch point.

Block:
1 / 8

Next block

Figure F.1: The screen shot of phase 1 (block 1)

Decide between payment in 1 month and payment in 2 months

	Payment Option A (Pays the Amount Below in 1 month)	Payment Option B (Pays the Amount Below in 2 months)
1	$0.01	$20.00
2	$0.02	$20.00
3	$0.03	$20.00
...	...	...
1,999	$19.99	$20.00
2,000	$20.00	$20.00

At which dollar value of payment Option A would you switch from B to A? ($)

Choosing the Option B for all questions before your switch point, and the Option A for all questions at or after your switch point.

Block:
8 / 8

Next block

Figure F.2: The screen shot of phase 1 (block 8)

F.2 Phase 2 screen shots (Delay-Monthly treatment)

Match: 1   **Round: 1**

The oucome of this round will be paid in 1 month(s)

Please select a row

The Other's Choice

Your Choice		1	2
	1	$4.00, $4.00	$1.00, $5.00
	2	$5.00, $1.00	$2.00, $2.00

Submit

Figure F.3: The screen shot of the round 1 decision stage

Match: 1   **Round: 1**

The oucome of this round will be paid in 1 month(s)

Outcome in This Round

The Other's Choice

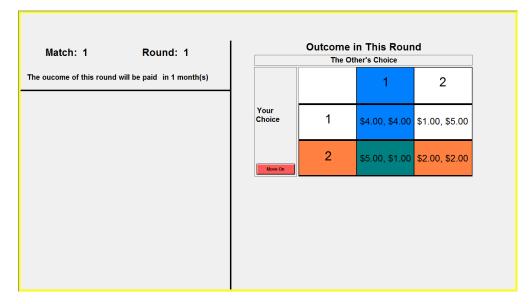| Your Choice		1	2
	1	$4.00, $4.00	$1.00, $5.00
	2	$5.00, $1.00	$2.00, $2.00

Move On

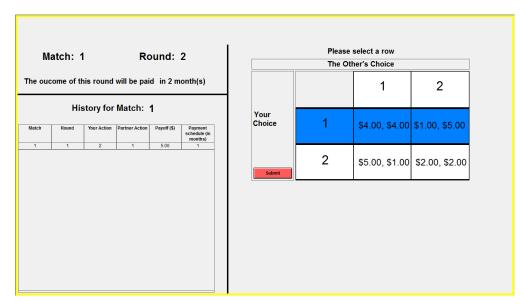Figure F.4: The screen shot of the round 1 feedback stage
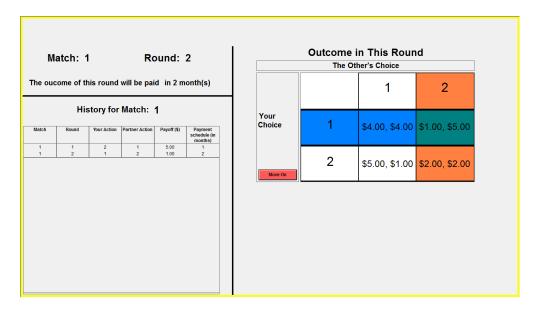
Figure F.5: The screen shot of the round 2 decision stage

Figure F.6: The screen shot of the round 2 feedback stage