Intra-household Control and Intertemporal Choice: A Field Experiment In Guatemala

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Seminario Free Lunch

MOTIVATION

Motivation

- Conditional cash transfer (CCT) programs are aimed at breaking the cycles of poverty and extreme poverty, through the <u>INVESTMENT</u> in human capital.

- Ensuring that resources are allocated optimally involves challenges.

- Preferences of CCT recipients might not fit with features of human capital assets.

Motivation

- There are no studies about two of the <u>determinants of preferences</u> of CCT recipients: risk and time preference.

- Intra-household control.

- Increased understanding of the risk, time preferences and intra-household control of CCT recipients should inform efforts to improve program design.

Objective:

- <u>Estimate</u> risk and time preferences (α, β, δ).

- <u>Introduce</u> a financially motivated method of measuring willingness to forgo funds to control household finances.

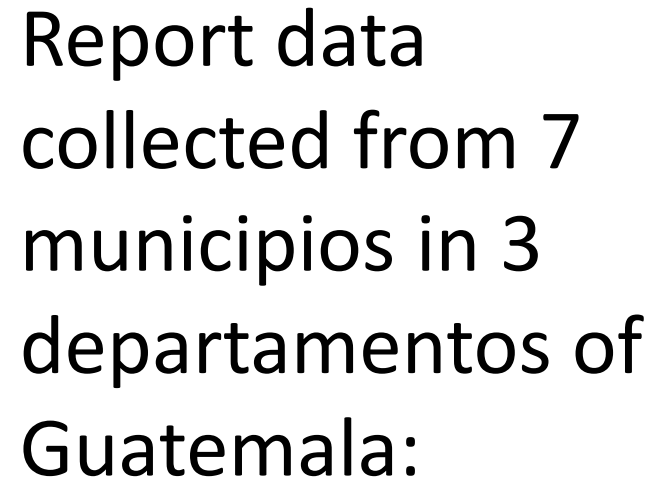Centro Vernon Smith de ECONOMÍA EXPERIMENTAL
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SAMPLE FEATURES

Sample: CCT beneficiaries

- 169 female participants in final sample
  - Mean age 35.85
- Median reported household monthly income Q500-Q1,000 (<PPP$180)
  - 87% below Q2,000
- HH size: 5.5 (2-18), 3.15 children (0-10)
- 69.8% married or with partner; 76% of those are not head of HH

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Sample: CCT beneficiaries

- Low level of formal education
  - 22% never went to school
  - 48% did not complete 6th grade
    - <15% secondary education
  - Literacy (self reported): 76.9%
  - Numeracy: only 34% could respond correctly to 3 sums (8+5; 20+50; 55+36)

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Location of Data Collection

Report data collected from 7 municipios in 3 departamentos of Guatemala:

1. El Progreso
2. Sacatepéquez
3. Escuintla

EXPERIMENTAL DESIGN

Experimental Design: Overview

1. Modified Convex Time Budget (mCTB)
   - Andreoni, Kuhn and Sprenger (2013)
   - Jointly estimate α, β and δ

2. **Demand for commitment devices.**

3. Demand for (intra-household) control.

- Socio-Demographic survey (non-incentivized).

Task 1: Modified Convex Time Budget

- 24 questions
  - Each presents six OPTIONS uniformly spread over an intertemporal budget constraint (x_t, x_{t+k})

Recibo <u>HOY</u> y dentro de <u>CINCO (5)</u> semanas

0 0 0 9 1

1. Sesión ○ 7 ○ 9 ○ 18   2. Participante # ○ 1 ○ 2 ○ 3 ○ 4 ○ 5 ○ 6 ○ 7 ○ 8 ○ 9 ○ 10 ○ 11 ○ 12 ○ 13 ○ 14 ○ 15 ○ 16 ○ 17 ○ 18
○ 19 ○ 20 ○ 21 ○ 22 ○ 23 ○ 24 ○ 25 ○ 26 ○ 27 ○ 28 ○ 29 ○ 30 ○ 31 ○ 32 ○ 33 ○ 34 ○ 35 ○ 36

3. Encuestador ○ 1 ○ 2 ○ 3 ○ 4 ○ 5 ○ 6 ○ 7 ○ 8 ○ 9 ○ 10   ○ d1px

Para las preguntas de la 1-6 usted deberá decidir las cantidades de dinero que le gustaría recibir HOY y dentro de CINCO semanas.
Para ello debe marcar la casilla correspondiente (una casilla por cada columna). Recuerde que solo debe marcar una casilla por pregunta.

Pregunta 1		Pregunta 2		Pregunta 3		Pregunta 4		Pregunta 5		Pregunta 6	
Recibe HOY…	Y *además* recibo dentro de 5 SEMANAS	Recibe HOY…	Y *además* recibo dentro de 5 SEMANAS	Recibe HOY…	Y *además* recibo dentro de 5 SEMANAS	Recibe HOY…	Y *además* recibo dentro de 5 SEMANAS	Recibe HOY…	Y *además* recibo dentro de 5 SEMANAS	Recibe HOY…	Y *además* recibo dentro de 5 SEMANAS
○ Q95.00	Q0.00	○ Q90.00	Q0.00	○ Q85.00	Q0.00	○ Q80.00	Q0.00	○ Q70.00	Q0.00	○ Q55.00	Q0.00
Opción 1		*Opción 1*		*Opción 1*		*Opción 1*		*Opción 1*		*Opción 1*	
○ Q76.00	Q20.00	○ Q72.00	Q20.00	○ Q68.00	Q20.00	○ Q64.00	Q20.00	○ Q56.00	Q20.00	○ Q44.00	Q20.00
Opción 2		*Opción 2*		*Opción 2*		*Opción 2*		*Opción 2*		*Opción 2*	
○ Q57.00	Q40.00	○ Q54.00	Q40.00	○ Q51.00	Q40.00	○ Q48.00	Q40.00	○ Q42.00	Q40.00	○ Q33.00	Q40.00
Opción 3		*Opción 3*		*Opción 3*		*Opción 3*		*Opción 3*		*Opción 3*	
○ Q38.00	Q60.00	○ Q36.00	Q60.00	○ Q34.00	Q60.00	○ Q32.00	Q60.00	○ Q28.00	Q60.00	○ Q22.00	Q60.00
Opción 4		*Opción 4*		*Opción 4*		*Opción 4*		*Opción 4*		*Opción 4*	
○ Q19.00	Q80.00	○ Q18.00	Q80.00	○ Q17.00	Q80.00	○ Q16.00	Q80.00	○ Q14.00	Q80.00	○ Q11.00	Q80.00
Opción 5		*Opción 5*		*Opción 5*		*Opción 5*		*Opción 5*		*Opción 5*	
○ Q0.00	Q100.00	○ Q0.00	Q100.00	○ Q0.00	Q100.00	○ Q0.00	Q100.00	○ Q0.00	Q100.00	○ Q0.00	Q100.00
Opción 6		*Opción 6*		*Opción 6*		*Opción 6*		*Opción 6*		*Opción 6*	

○ A. ○ N.A.

Task 1: Modified Convex Time Budget
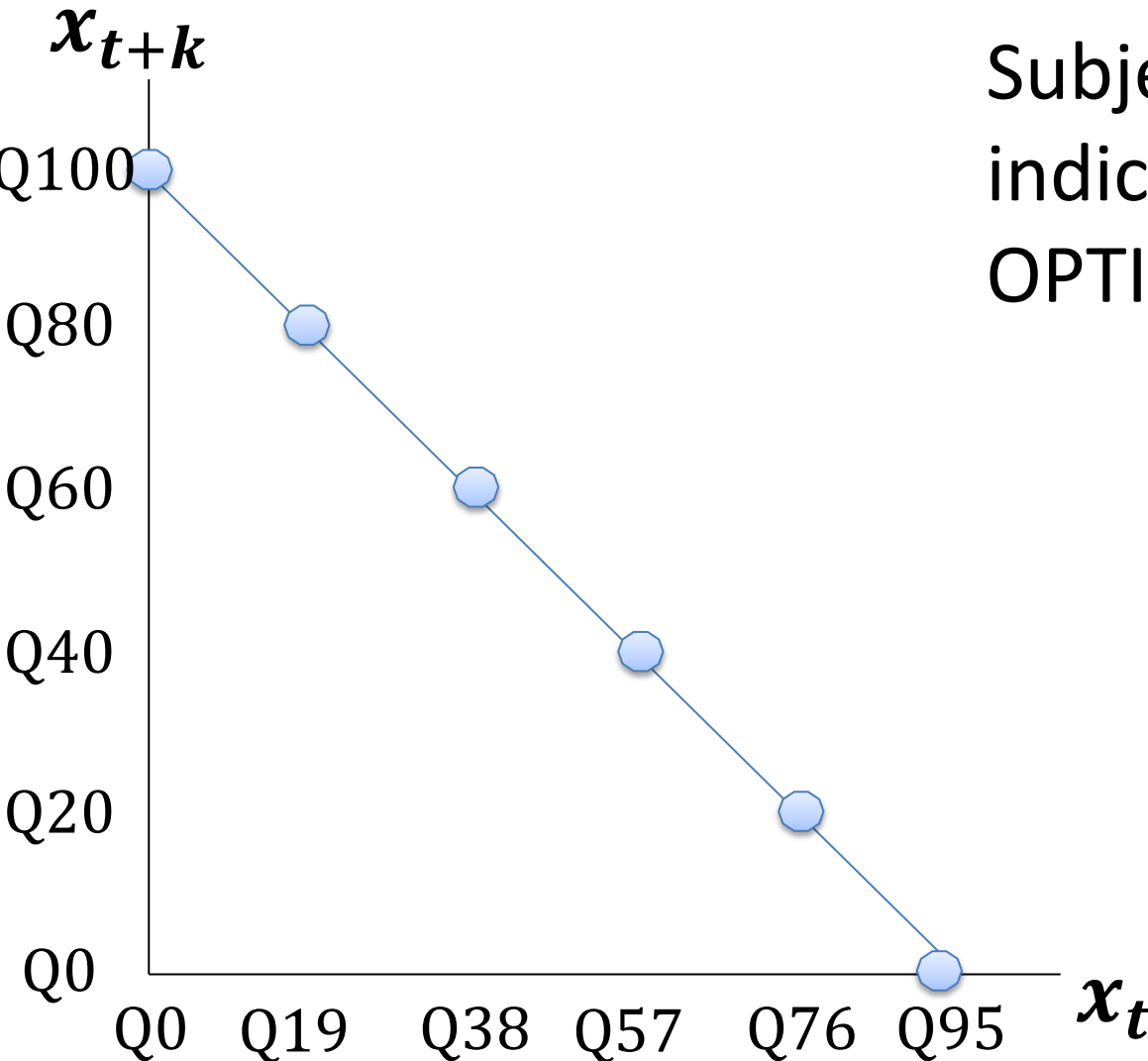
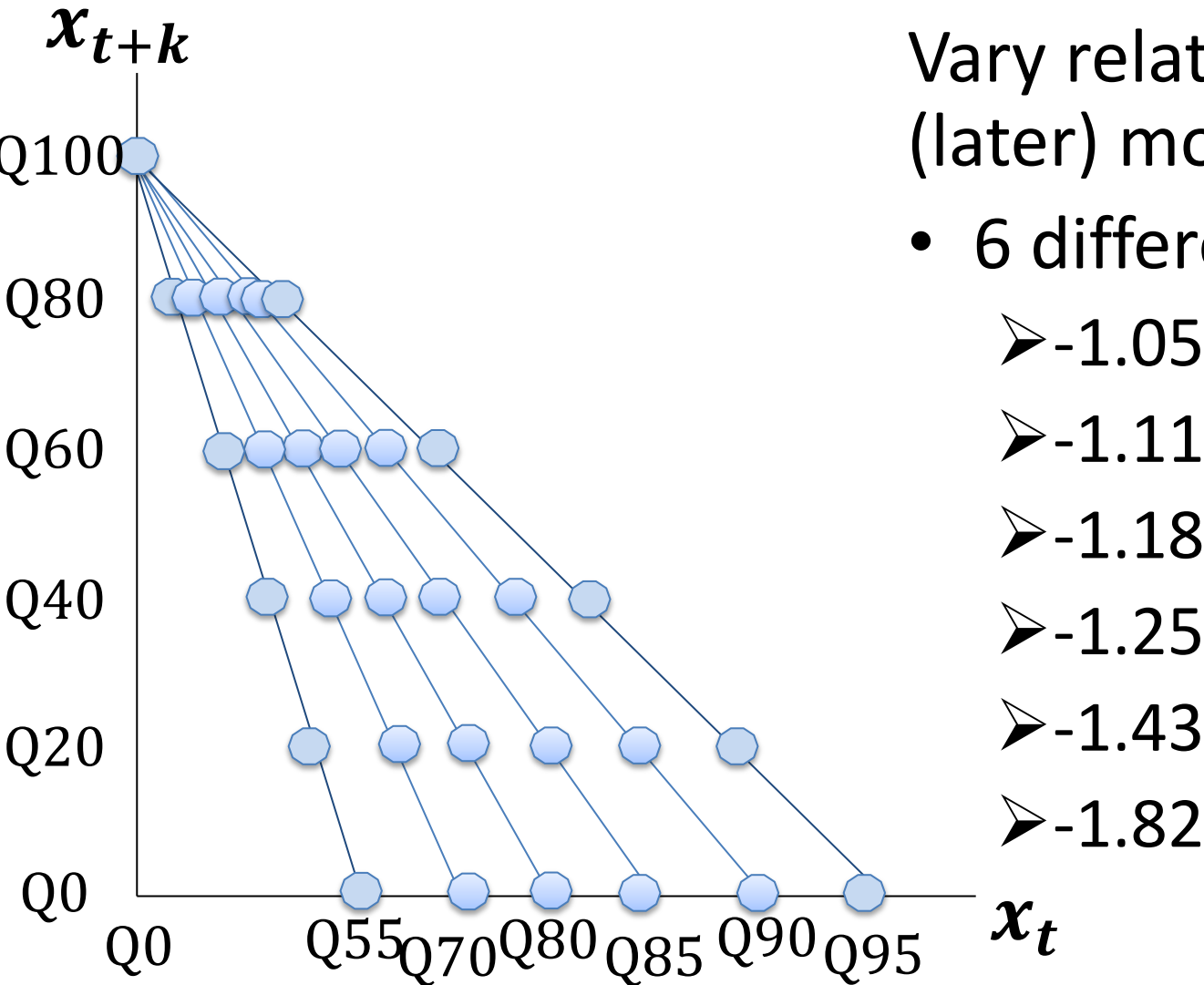Subjects are asked to indicate their preferred OPTION

Task 1: Modified Convex Time Budget

- 24 questions
  - – Each presents six OPTIONS uniformly spread over an intertemporal budget constraint (x_t, x_{t+k})

- 4 possible combinations of **t** and **k**
  - – Sooner payment (time **t**) is either today, or in 35 days
  - – Later payment is a delay (**k**) of either 35 or 63 days

  TODAY and 5 WEEKS from today

  TODAY and 9 WEEKS from today

  5 WEEKS from today and 10 WEEKS from today

  5 WEEKS from today and 14 WEEKS from today

Task 1: Modified Convex Time Budget

- 24 questions
  - Each presents six OPTIONS uniformly spread over an intertemporal budget constraint (x_t, x_{t+k})
- 4 possible combinations of **t** and **k**
  - Sooner payment (time **t**) is either today, or in 35 days
  - Later payment is a delay (**k**) of either 35 or 63 days
- 6 questions for each of the 4 combinations
  - Vary the relative price (MRT) of money across questions
    - Varying amounts available at time **t**

Task 1: Modified Convex Time Budget

Vary relative price of (later) money

- 6 different MRT
  - -1.05
  - -1.11
  - -1.18
  - -1.25
  - -1.43
  - -1.82

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Recibo hoy Q95   Dentro de 5 semanas: Q0

y además...   ∅

                          TOTAL: Q95

Recibo hoy Q76   Dentro de 5 semanas: Q20

y además...

Recibo hoy Q57

Dentro de 5 semanas: Q40

y además...

TOTAL: Q97

Recibo hoy Q19   Dentro de 5 semanas: Q80

y además...

                          TOTAL: Q99

Recibo hoy Q0   Dentro de 5 semanas: Q100

∅   y además...

                          TOTAL: Q100

Task 1: Modified Convex Time Budget

Table	1	2	3	4
t	0	0	35	35
k	35	35	63	63
Question	**MRT** (price ratios)			
#1	1.05	1.00	1.05	1.00
#2	1.11	1.05	1.11	1.05
#3	1.18	1.11	1.18	1.11
#4	1.25	1.33	1.25	1.33
#5	1.43	1.67	1.43	1.67
#6	1.82	2.22	1.82	2.22

Task 1: Modified Convex Time Budget

- Payment from one randomly selected question
  - Payment implemented via post-dated checks.
  - 10.7% cashed in advance.

- Show up fee (Q50) split in two payments:
  - Q25 *sooner* + Q25 *later*
    - *Sooner* & *later* determined randomly by selected question

- Vary (between sessions):
  - Order of options within a question
  - Order of questions for a given (t and k) table
  - Show-up fee shown explicitly in questions or not

Ordered probits on early check cashing

	Model#1	Model#2	Model#3	Model#4
Cashed in advance	0.227	0.121	0.121	0.135
	(0.146)	(0.146)	(0.146)	(0.139)
Relative price of money at t+k	-1.383***	-1.408***	-1.438***	-1.463***
	(0.149)	(0.153)	(0.156)	(0.158)
Show-up included		0.356**	0.357**	0.382***
		(0.109)	(0.109)	(0.111)
Decreasing soon amount (DSA)		-0.034	-0.035	-0.029
		(0.110)	(0.111)	(0.106)
Decreasing Opportunity Cost (DOC)		-0.283*	-0.282*	-0.286*
		(0.123)	(0.123)	(0.117)
Municipality		-0.073	-0.073	-0.057
		(0.044)	(0.044)	(0.045)
Later payment is a delay (k=35)			0.189***	0.192***
			(0.042)	(0.043)
Sooner payment (t=0)			0.086	0.085
			(0.050)	(0.050)
Surveyor Fixed effects?	NO	NO	NO	YES
Mean of dependent variable	4.2	4.2	4.2	4.2
Number of clusters	149	149	149	149

* $p<0.05$, ** $p<0.01$, *** $p<0.001$

Task 3:
Demand for (intra-household) Control

- 4 raffles of up to Q1,200 (≈PPP$297)
  - Only 1 of the 4 raffles would be paid to winner
  - 1/30 chance of winning, upon winning 1/6 chance for each raffle

- Identify "head of household"
  - Checks payable to "head of household"

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Task 3: Demand for Control

Si usted fuera el ganador de la rifa. ¿Cómo le gustaría a USTED recibir el dinero?

TABLA 3
SEGUNDA PARTE ③

	Marzo	Abril	Mayo	Junio	Julio	Agosto	Septiembre
Opción 1 TOTAL: Q1080	día 8 Q1080						
Opción 2 TOTAL: Q1080	día 8 Q540			día 8 Q540			
Opción 3 TOTAL: Q1080	día 8 Q360		día 8 Q360		día 8 Q360		
Opción 4 TOTAL: Q1080	día 8 Q180	día 8 Q180	día 8 Q180	día 8 Q180	día 8 Q180	día 8 Q180	
Opción 5 TOTAL: Q1080	día 8 Q90 / día 22 Q90	día 08 Q90 / día 22 Q90	día 08 Q90 / día 22 Q90	día 08 Q90 / día 22 Q90	día 08 Q90 / día 22 Q90	día 08 Q90 / día 22 Q90	
Opción 6 TOTAL: Q1080	día 8 ¿Cuánto?	día 8 ¿Cuánto?	día 8 ¿Cuánto?	día 8 ¿Cuánto?	día 8 ¿Cuánto?	día 8 ¿Cuánto?	día 8 ¿Cuánto?
Opción 7 TOTAL: Q1200	Q1200 para el jefe de hogar. Según los plazos y montos elegidos en la tabla 2.						
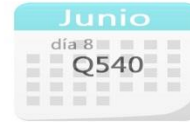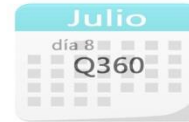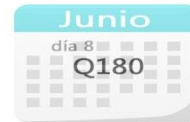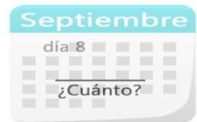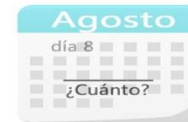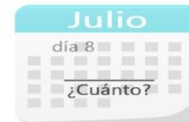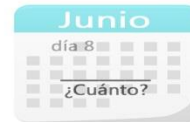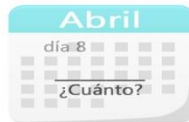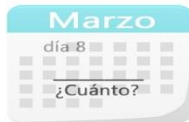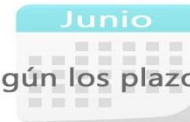
Demand for Control

- HH head receives full amount (Q1,200) as specified in raffle #2, or

- Participant receives a *fraction* of amount (price of intra-HH control):
90% (Q1,080) in raffle #3
75% (Q900) in raffle #4
55% (Q720) in raffle #5
40% (Q480) in raffle #6

Task 3: Demand for Control

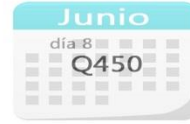Si usted fuera el ganador de la rifa. ¿Cómo le gustaría a USTED recibir el dinero?
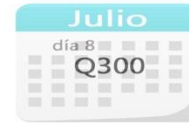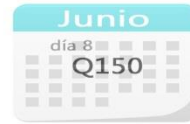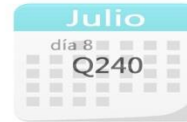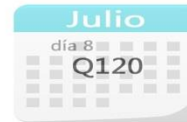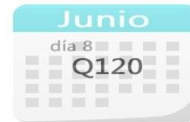
TABLA 4
SEGUNDA PARTE 4

	Marzo	Abril	Mayo	Junio	Julio	Agosto	Septiembre
Opción 1 TOTAL: Q900	Q900						
Opción 2 TOTAL: Q900	día 8 Q450			día 8 Q450			
Opción 3 TOTAL: Q900	día 8 Q300		día 8 Q300		día 8 Q300		
Opción 4 TOTAL: Q900	día 8 Q150	día 8 Q150	día 8 Q150	día 8 Q150	día 8 Q150	día 8 Q150	
Opción 5 TOTAL: Q900	día 8 Q75 / día 22 Q75	día 08 Q75 / día 22 Q75	día 08 Q75 / día 22 Q75	día 08 Q75 / día 22 Q75	día 08 Q75 / día 22 Q75	día 08 Q75 / día 22 Q75	
Opción 6 TOTAL: Q900	día 8 ¿Cuánto?	día 8 ¿Cuánto?	día 8 ¿Cuánto?	día 8 ¿Cuánto?	día 8 ¿Cuánto?	día 8 ¿Cuánto?	día 8 ¿Cuánto?
Opción 7 TOTAL: Q1200	Q1200 para el jefe de hogar. Según los plazos y montos elegidos en la tabla 2.						
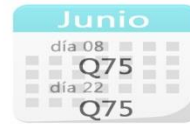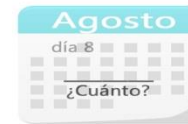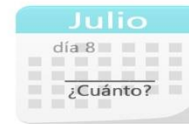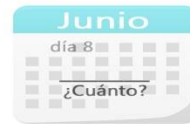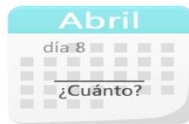
Task 3: Demand for Control

TABLA 5
SEGUNDA PARTE 5

Si usted fuera el ganador de la rifa. ¿Cómo le gustaría a USTED recibir el dinero?

	Marzo	Abril	Mayo	Junio	Julio	Agosto	Septiembre
Opción 1 TOTAL: Q720	día 8 Q720						
Opción 2 TOTAL: Q720	día 8 Q360			día 8 Q360			
Opción 3 TOTAL: Q720	día 8 Q240		día 8 Q240		día 8 Q240		
Opción 4 TOTAL: Q720	día 8 Q120	día 8 Q120	día 8 Q120	día 8 Q120	día 8 Q120	día 8 Q120	
Opción 5 TOTAL: Q720	día 8 Q60 / día 22 Q60	día 08 Q60 / día 22 Q60	día 08 Q60 / día 22 Q60	día 08 Q60 / día 22 Q60	día 08 Q60 / día 22 Q60	día 08 Q60 / día 22 Q60	
Opción 6 TOTAL: Q720	día 8 ¿Cuánto?	día 8 ¿Cuánto?	día 8 ¿Cuánto?	día 8 ¿Cuánto?	día 8 ¿Cuánto?	día 8 ¿Cuánto?	día 8 ¿Cuánto?
Opción 7 TOTAL: Q1200	Q1200 para el jefe de hogar. Según los plazos y montos elegidos en la tabla 2.						
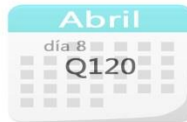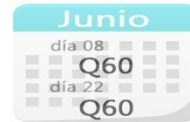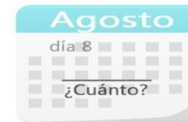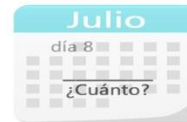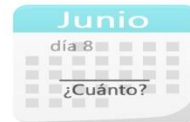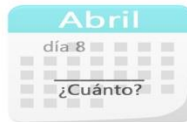
Task 3: Demand for Control

Si usted fuera el ganador de la rifa. ¿Cómo le gustaría a USTED recibir el dinero?
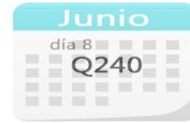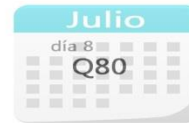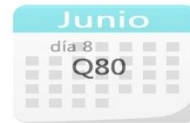
TABLA 6
SEGUNDA PARTE

6

	Marzo	Abril	Mayo	Junio	Julio	Agosto	Septiembre
Opción 1 TOTAL: Q480	día 8 Q480						
Opción 2 TOTAL: Q480	día 8 Q240			día 8 Q240			
Opción 3 TOTAL: Q480	día 8 Q160		día 8 Q160		día 8 Q160		
Opción 4 TOTAL: Q480	día 8 Q80	día 8 Q80	día 8 Q80	día 8 Q80	día 8 Q80	día 8 Q80	
Opción 5 TOTAL: Q480	día 8 Q40 día 22 Q40	día 08 Q40 día 22 Q40	día 08 Q40 día 22 Q40	día 08 Q40 día 22 Q40	día 08 Q40 día 22 Q40	día 08 Q40 día 22 Q40	
Opción 6 TOTAL: Q480	día 8 ¿Cuánto?	día 8 ¿Cuánto?	día 8 ¿Cuánto?	día 8 ¿Cuánto?	día 8 ¿Cuánto?	día 8 ¿Cuánto?	día 8 ¿Cuánto?
Opción 7 TOTAL: Q1200	Marzo	Abril	Mayo	Junio	Julio	Agosto	Septiembre
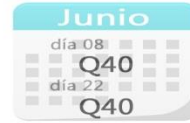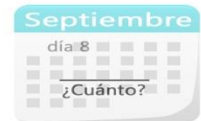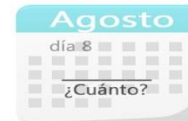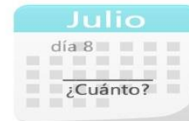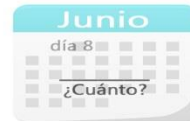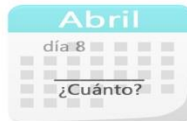
Q1200 para el jefe de hogar. Según los plazos y montos elegidos en la tabla 2.

Experimental Protocols

- 10 sessions, that lasted up to 4 hours
  - 16 to 24 subjects per session
- Session leader read instructions and projected slides for participants.
- Field workers assisted individuals during each session
  - Made sure they understood the instructions, answered questions, and assisted recording decisions

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RESULTS

mCTB Individual Choices

- 6% of participants show no variation in 24 questions (11).
  - Discarded individuals from analysis
- Between 9% al 17% show no variation within one of the tables.
- High proportion of corner choices : 51.6%.
    Lower than AKS (86.8%) and Andreoni and Sprenger 2012 (70%)
- Inconsistent individual choices: mean 16.88%
  - Violate transitivity
  - Imply upward sloping demand

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INDEX. Level of consistency on the expected value total (all tables)
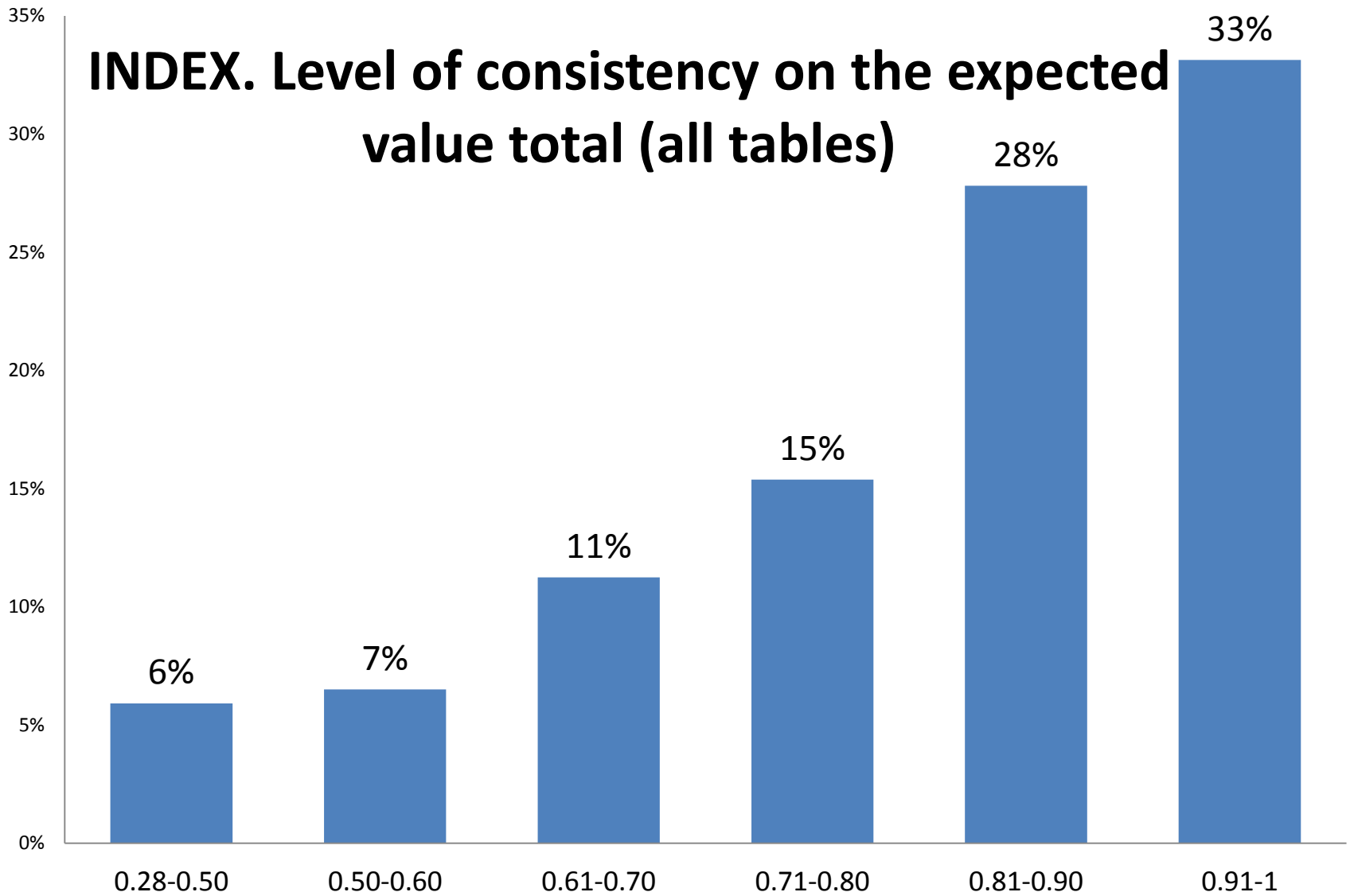
mCTB Aggregate Choice Consistency

- Are aggregate choices just random noise?

- Aggregate (average) demand for x_{t+k} as price changes
  - Use x_{t+k} as amounts are constant in all questions
  - Price of x_{t+k} in terms of x_t is 1/MRT

Demand for money at $t+k$
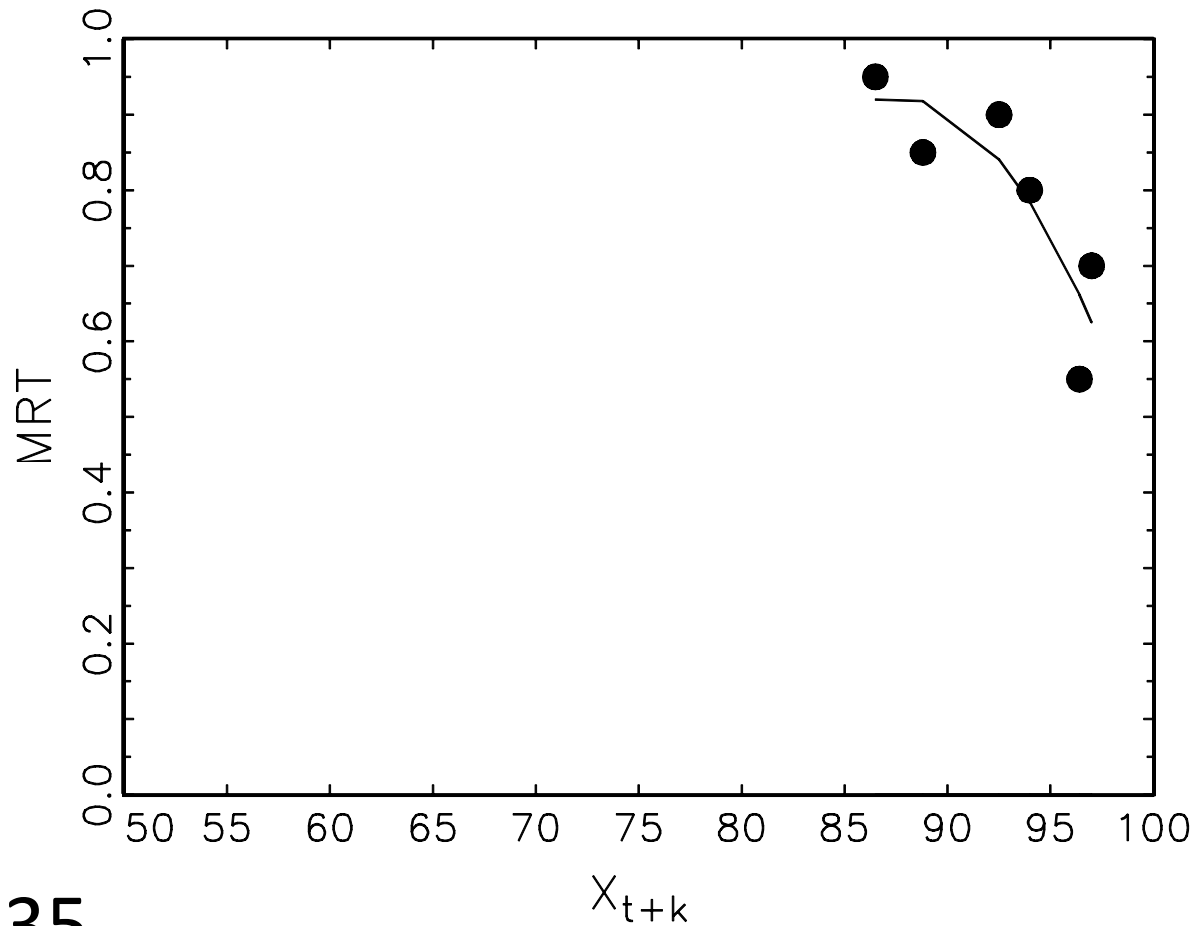
t=0, k=35

Demand for money at t+k
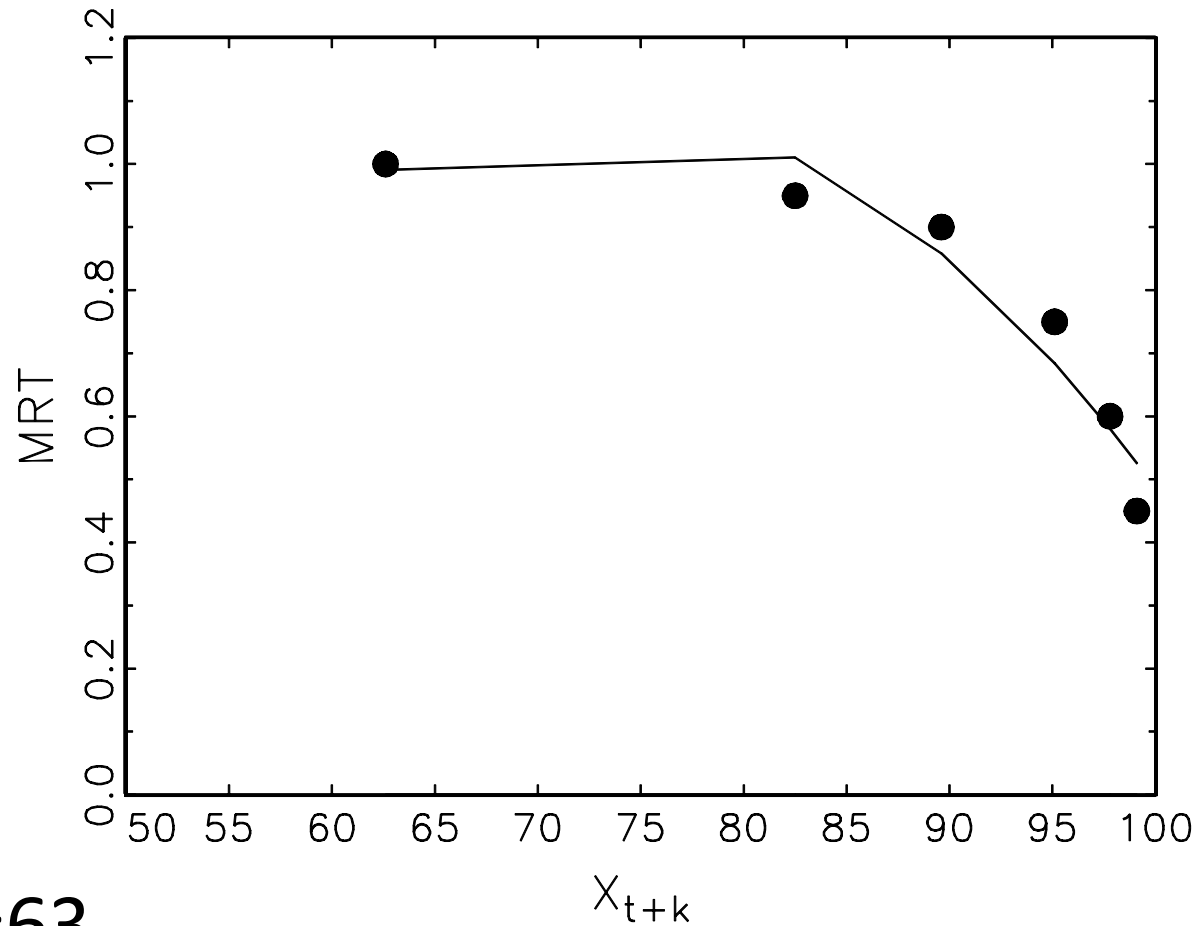
t=0, k=63

Demand for money at $t+k$
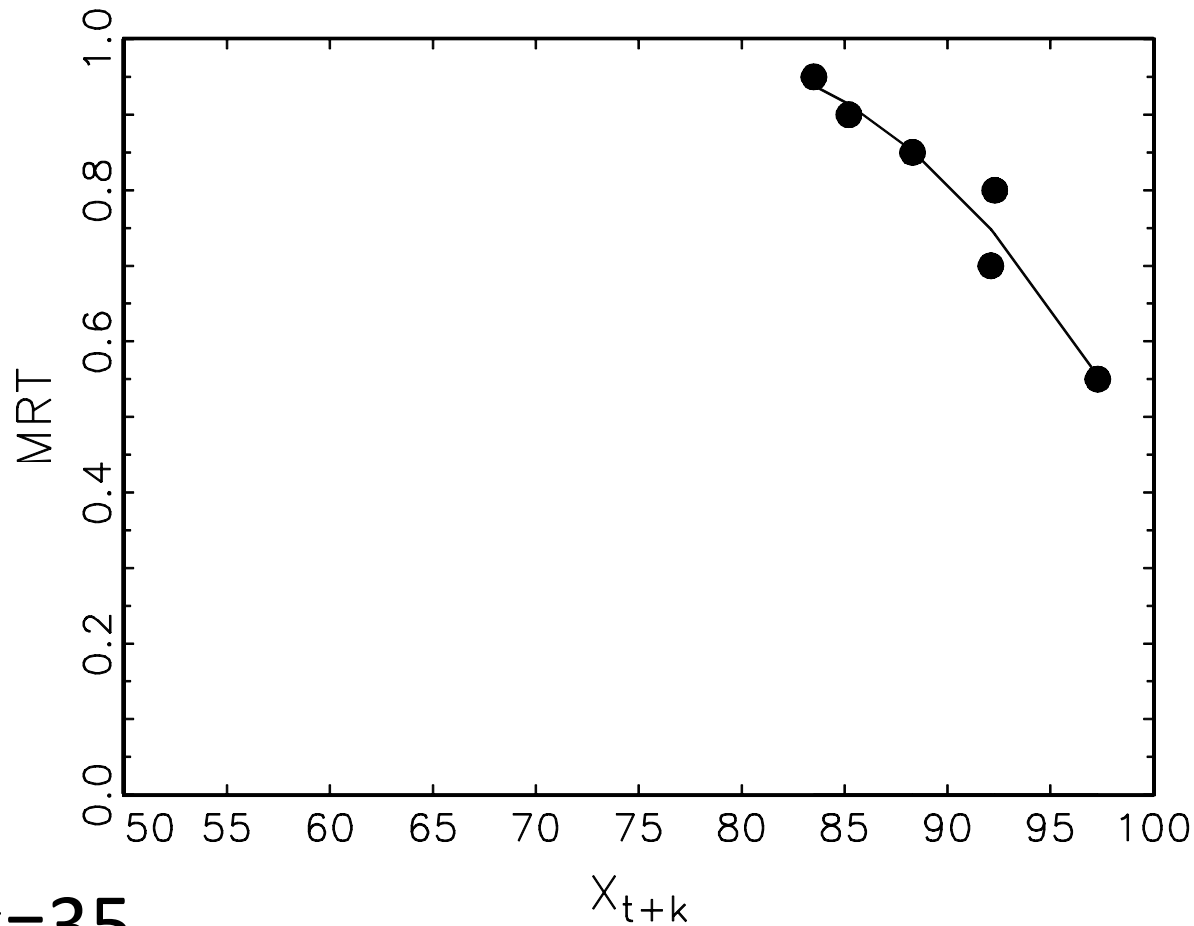
t=35, k=35

Demand for money at $t+k$
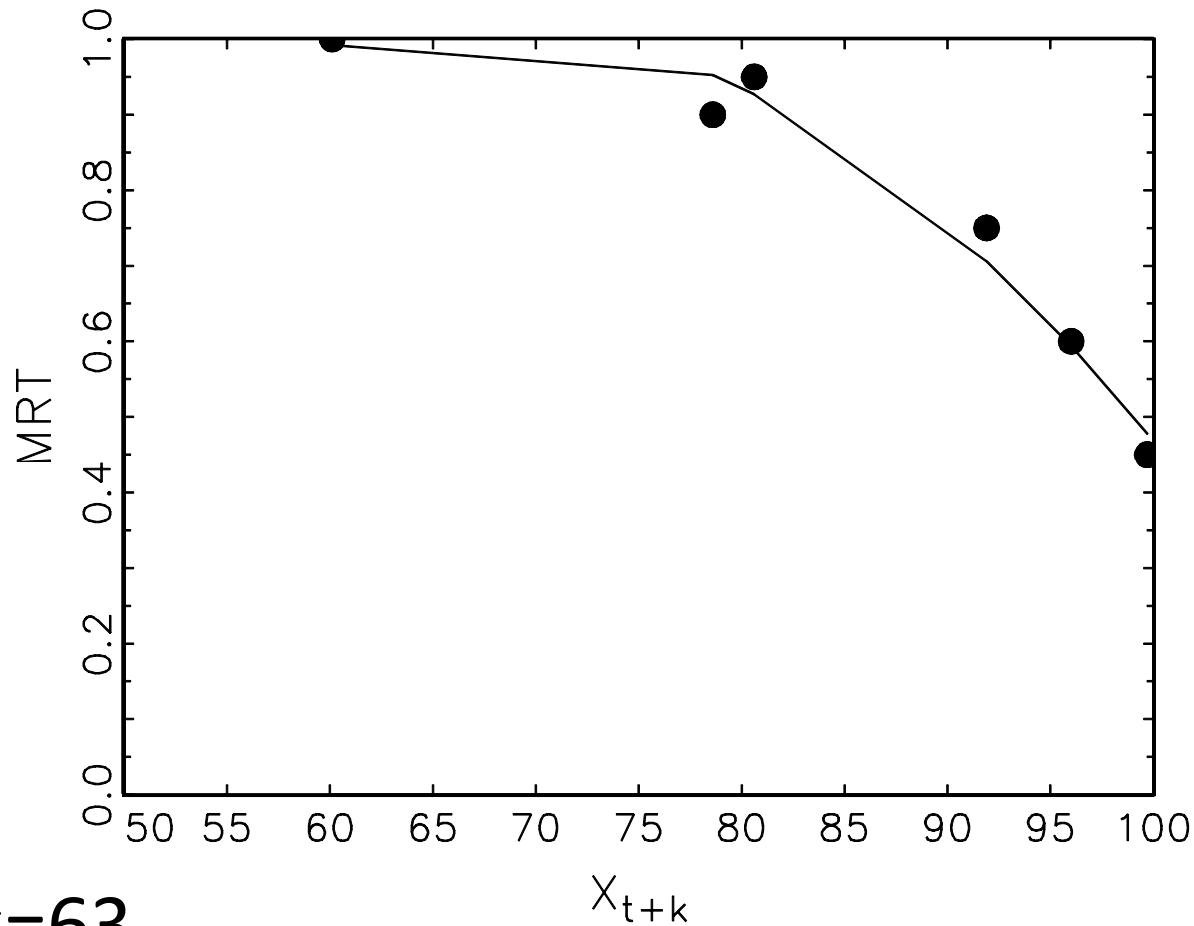
t=35, k=63

Demand for intra-HH control
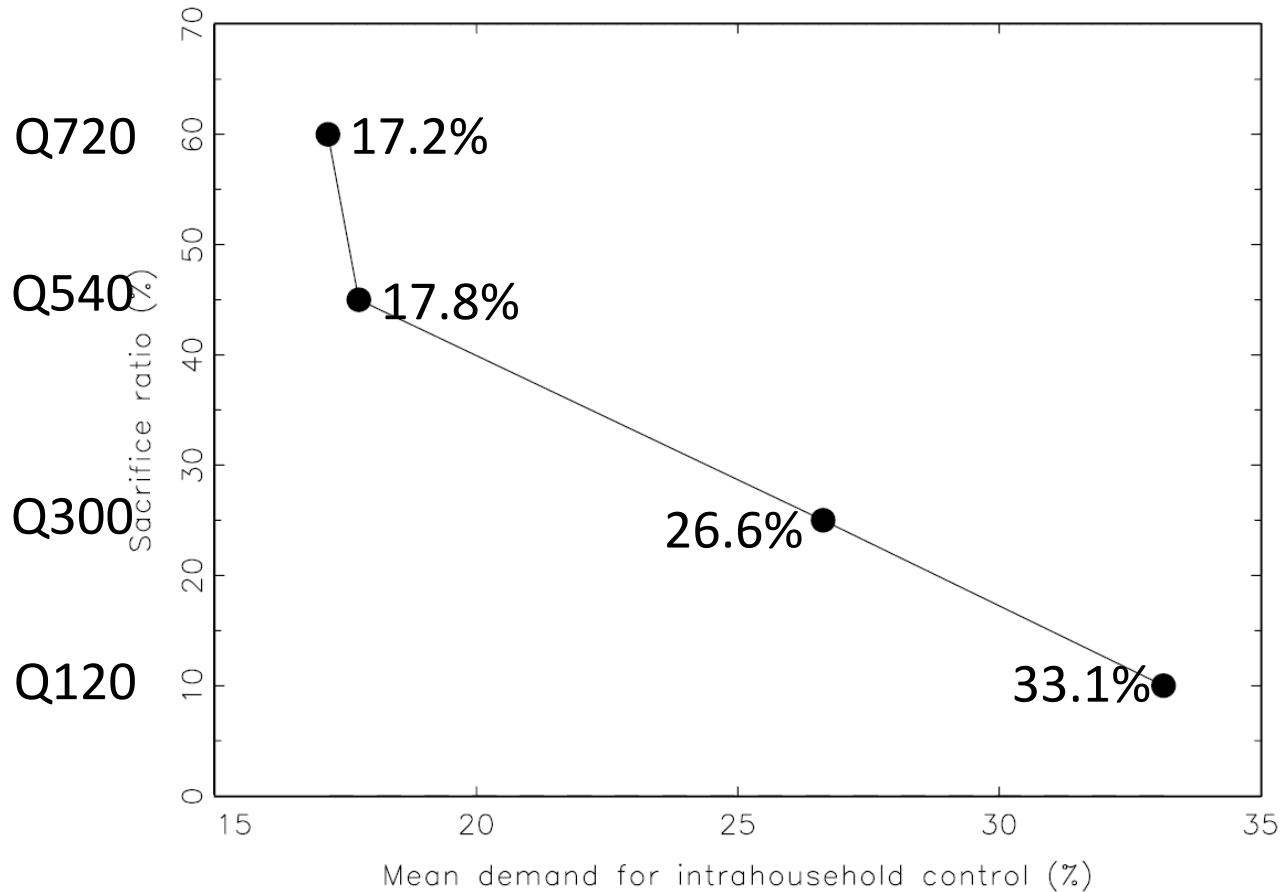
- Monotonic demand at aggregate level
- Some multiple switching at the individual level (7.69%)

Demand for intra-HH control

- High and inelastic demand for control
  - 39.3% of participants expressed demand for intra-household control at least once
  - Inelastic demand (ε between -0.11 and -0.67)

Price of Control	Frequency	%
Q720 (60%)	29/169	17.16%
Q540 (45%)	30/169	17.75%
Q300 (25%)	45/169	26.63%
Q120 (10%)	56/169	33.14%

Probit estimates of demand for intra-household control

	(1)	(2)	(3)
Price of intra-household control	-0.337***	-0.437***	-0.357***
	(0.071)	(0.069)	(0.073)
Husband is alternate recipient		-0.173*	-0.144*
		(0.078)	(0.072)
Father is alternate recipient		0.140	0.206**
		(0.112)	(0.079)
Married		0.155*	0.148*
		(0.067)	(0.067)
Order of alternatives		0.086	0.083
		(0.056)	(0.055)
Municipality		-0.000	-0.003
		(0.025)	(0.024)
Dummy for inconsistent choice			0.290***
			(0.074)
Observations	676	624	676
Log likelihood	-362.201	-296.589	-338.332
Clusters	169	156	169

Order of alternatives is equal to one if the alternate recipient receiving the full amount
($Q1$, 200) is the first option
Specification (2) drops inconsistent obsevations
Robust standard errors clustered at the individual level in parenthesis
$^*p < 0.05,$ $^{**} p < 0.01,$ $^{***} p < 0.001$

*Reporting marginal effects

Econometric framework

- Preferences over the sooner payment and the later payment are modeled using the following time-separable quasi-hyperbolic utility function (Laibson (1997)).

$$U\left(x_{it}, x_{it+k}\right) = \begin{cases} x_{it}^{\alpha} + \beta\delta^{k}x_{it+k}^{\alpha} & \text{if } t = 0 \\ x_{it}^{\alpha} + \delta^{k}x_{it+k}^{\alpha} & \text{if } t > 0. \end{cases}$$

Econometric framework

- mCTB is a discrete choice task ➜ estimate α, β and δ using interval censored tobits.
  - Similar to that of Andreoni et al. (2013)

- Estimate the model by the QML method with robust standard errors (Quasi-maximum likelihood).

Extended model

- We group participants in two clusters, by whether or not they expressed demand for Intra HH Control.
  - Allow α, β, and δ to vary by cluster

- We also parametrize the discount factor δ.
  - We include a 10 x 1 vector of individual-specific explanatory variables plus a constant
    $$\delta_i = \exp(\delta_0 + \delta_1 z_{1i} + \ldots + \delta_{10} z_{10i})$$

Estimates of α, β and δ

Table 11: Parameter estimates and statistical tests

	(1)	(2)
α_0	0.52***	0.46***
	(0.03)	(0.06)
α_1		0.54***
		(0.03)
β_0	1.10***	1.05***
	(0.03)	(0.05)
β_1		1.13***
		(0.03)
δ_0	0.57***	0.71***
	(0.01)	(0.20)
δ_1		0.51***
		(0.09)
σ_0	1.62***	1.59***
	(0.08)	(0.08)
σ_1	1.47***	1.47***
	(0.06)	(0.06)
Log likelihood	-6649.00	-6646.12
Akaike information criterion	13314.00	13314.24

H_0 : Equality of fit[b]		(1) = (2)
Statistic		5.76
p-value		0.12
$H_0 : \alpha_0 = \alpha_1$		
Statistic		1.28
p-value		0.2
$H_0 : \beta_0 = \beta_1$		
Statistic		1.31
p-value		0.19
$H_0 : \delta_0 = \delta_1$		
Statistic		-0.9
p-value		0.37
$H_0 : \beta_0 \leq 1$		
Statistic	3.73***	1.07
p-value	0.00	0.14
$H_0 : \beta_1 \leq 1$		
Statistic		3.79***
p-value		0.00

[a]We use the non-nested likelihood-ratio test of Vuong (1989)
*$p < 0.05$,** $p < 0.01$,*** $p < 0.001$
QML standard errors are reported in parenthesis

Parameter estimates

- Participants exhibit much higher levels of risk aversion than is typically observed in the developed world.

($\alpha=0.52$ vs. 0.87 for a population of undergraduate students at an American university, Andreoni (2012)).

- The annualized discount factor exhibited in our data lies between the two most comparable estimates from the literature.

($\delta = 0.57$ vs. AKS reports 0.63 and Andreoni and Sprenger (2012) reports 0.32).

Parameter estimates

- No evidence that CCT recipients are present biased, on average (β= 1.10). That is, participants prefer, on average, to shift monetary payments to the future.

- There are evidence that CCT recipients present high level of risk aversion (strong preference for consumption smoothing) and high discounting of the future.

Are women in households with intra-household conflict different than their peers?

- We find that women who demand intra-household control are less risk averse, and have a lower discount factor. Yet, these differences are not significant at conventional levels.

- Women with no demand for control are not future biased ($\beta = 1.13$ vs. 1.05).

Comments? Questions?