Time Preferences: Present-biased preferences

EE416 Sem2/2019

Three Important Differences between exponential discounting and β, δ preferences

(1) ____________________:

- Exponential discounting implies __________ discounting:
  - How you feel about a specific delay is independent of how far into the future that delay occurs.
  - If you prefer 15 utils in 26 weeks over 10 utils in 25 weeks, then you also prefer 15 utils now over 10 utils next week.

Three Important Differences between exponential discounting and $\beta\delta$ preferences

(1) Nature of impatience:

- β, δ preferences implies that you are more impatient about __________trade-offs than you are about ___________________trade-offs
  - How you feel about a specific delay is dependent of how far into the future that delay occurs.
  - You might prefer 10 utils now over 15 utils next week, but prefer 15 utils in 26 weeks over 10 utils in 25 weeks.

Three Important Differences between exponential discounting and $\beta\delta$ preferences

(2) Time ______________vs. time_____________:

- Exponential discounting implies time consistency.
  - If you currently prefer 15 utils on Apr 11 over 10 utils on Apr 4,
  - then on Apr 4 you will still prefer 15 utils on Apr 11 (next week) over 10 utils on Apr 4 (now).

Three Important Differences between exponential discounting and $\beta\delta$ preferences

(2) Time consistency vs. time inconsistency:

- β, δ preferences can generate time inconsistency.
  - Even if you currently prefer 15 utils on Apr 11 over 10 utils on Apr 4,
  - When Apr 4 arrives you might instead prefer 10 utils on Apr 4 (now) over 15 utils on Apr 11 (next week).

Three Important Differences between exponential discounting and $\beta\delta$ preferences

(3) Is there a______________________________?

- Imagine that on Apr 4 you will choose between 10 utils on Apr 4 vs. 15utils on Apr 11.
- Imagine further that you have the option to __________________________by committing yourself now to getting 14 utils on Apr 11.

Three Important Differences between exponential discounting and $\beta\delta$ preferences

(3) Is there a strict preference for commitment?

- Exponential discounting implies no strict preference for commitment.
- In this example, you would definitely not commit.

(3) Is there a strict preference for commitment?

- β, δ preferences can generate a strict preference for commitment.
  - If you predict that on Apr 4 you would choose 10 utils on Apr 4 over 15 utils on Apr 11, and if you currently prefer 15 utils on Apr 11 to 10 utils on Apr 4,
  - then you might commit now to eliminate the future choice on Apr 4.

O'Donoghue&Rabin(AER 1999)

Doing It Now or Later

By TED O'DONOGHUE AND MATTHEW RABIN*

We examine self-control problems—modeled as time-inconsistent, present-biased preferences—in a model where a person must do an activity exactly once. We emphasize two distinctions: Do activities involve immediate costs or immediate rewards, and are people sophisticated or naive about future self-control problems? Naive people procrastinate immediate-cost activities and preproperate—do too soon—immediate-reward activities. Sophistication mitigates procrastination, but exacerbates preproperation. Moreover, with immediate costs, a small present bias can severely harm only naive people, whereas with immediate rewards it can severely harm only sophisticated people. Lessons for savings, addiction, and elsewhere are discussed. (*JEL* A12, B49, C70, D11, D60, D74, D91, E21)

People are impatient—they like to experience rewards soon and to delay costs until later. Economists almost always capture impatience by assuming that people discount streams of utility over time exponentially. Such preferences are *time-consistent*: A person's relative preference for well-being at an earlier date over a later date is the same no matter when she is asked.

immediate rewards and to avoid immediate costs in a way that our "long-run selves" do not appreciate. For example, when presented a choice between doing seven hours of an unpleasant activity on April 1 versus eight hours on April 15, if asked on February 1 virtually everyone would prefer the seven hours on April 1. But come April 1, given the same choice, most of us are apt to put off the work

O'Donoghue&Rabin(AER 1999)

- The paper explores some basic principles of present-biased (β, δ) preferences.

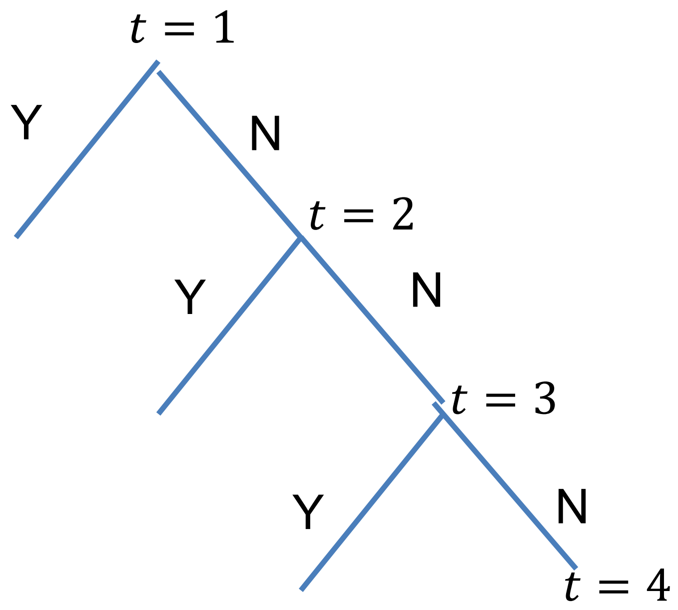
- The paper emphasizes the importance of two distinctions:
  - ______________________________
  - ______________________________

O'Donoghue&Rabin(AER 1999): Model

- Must perform an activity exactly once
- $T < \infty$ periods in which to perform it
- Each period, choose to _______or _______(no commitment)
- If wait until period T, must do it then.

O’Donoghue&Rabin(AER 1999): Model

- If do activity in period t, incur cost $c_t \geq 0$ and receive reward $v_t \geq 0$.
  - Reward schedule ______________________
  - Cost schedule__________________________
- Example, if $T = 4$



O’Donoghue&Rabin(AER 1999): Model

- Two cases:
- ____________________: incur cost when you do it, receive reward after some delay.

- _____________________: receive reward when you do it, incur cost after some delay.

O'Donoghue&Rabin(AER 1999): Model

- Assume (β, δ)- intertemporal preferences
- $\mathrm{U}(x_t, \dots, x_T) = u(x_t) + \_\_\_\_ \sum_{\tau=t+1}^{T} \_\_\_\_\_ u(x_\tau)$
- Assume $\delta =$ ____ for simplicity
- Period-t intertemporal utility if do it in period $\tau \geq t$:
- For immediate costs:

$$U^t = \begin{cases} \_\_\_\_\_\_\_\_\_\_\_\_ & if\ \tau = t \\ \_\_\_\_\_\_\_\_\_\_\_\_ & if\ \tau > t \end{cases}$$

- For immediate rewards:

$$U^t = \begin{cases} \_\_\_\_\_\_\_\_\_\_\_\_ & if\ \tau = t \\ \_\_\_\_\_\_\_\_\_\_\_\_ & if\ \tau > t \end{cases}$$

O’Donoghue&Rabin(AER 1999): TC, Sophisticates, Naifs

- There are 3 types of agents:

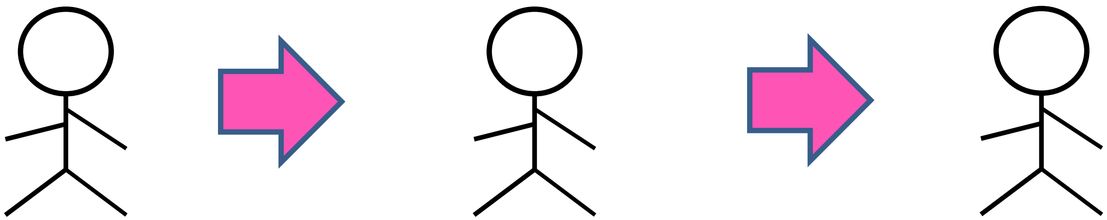
  - ______________are time consistent ($\beta = 1$).

  - ______________are time-inconsistent ($\beta < 1$) but are______ aware of their future present bias and therefore correctly predict future behavior.
  - _______________are time-inconsistent ($\beta < 1$) and are fully _________of their future present bias and therefore expect to behave in future exactly as they currently would like themselves to behave in the future.

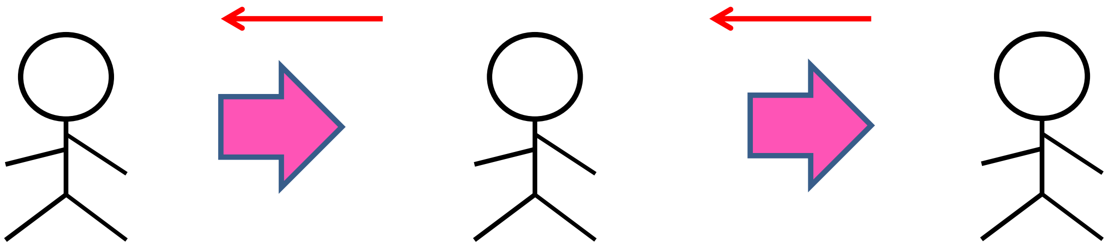
O'Donoghue&Rabin(AER 1999): TC, Sophisticates, Naifs

- There are 3 types of agents:

➢ **Naifs**



➢ **Sophisticates**



O'Donoghue&Rabin(AER 1999): EX1 Immediate cost

- Suppose costs are immediate.
- $T = 4, \beta = \frac{1}{2}, \delta = 1$
- Reward schedule is $\mathrm{V} \equiv (0, \ldots, 0)$.
- Cost schedule is $\mathrm{C} \equiv (3, 5, 8, 13)$.

➢ TC, with $\beta = 1$, will write the report on _______________ because it maximizes utility (, here minimize cost).

	$\boldsymbol{\tau = 1}$	$\boldsymbol{\tau = 2}$	$\boldsymbol{\tau = 3}$	$\boldsymbol{\tau = 4}$
$U(\tau)$				

O'Donoghue&Rabin(AER 1999): EX1 Immediate cost

- Suppose costs are immediate.
- $T = 4, \beta = \frac{1}{2}, \delta = 1$
- Reward schedule is $\mathrm{V} \equiv (0, \ldots, 0)$.
- Cost schedule is $\mathrm{C} \equiv (3, 5, 8, 13)$.

➢ $\beta = \frac{1}{2}$

	$\boldsymbol{\tau = 1}$	$\boldsymbol{\tau = 2}$	$\boldsymbol{\tau = 3}$	$\boldsymbol{\tau = 4}$
At $\mathrm{t} = 1$: $U^1(\tau)$				
At $\mathrm{t} = 2$: $U^2(\tau)$				
At $\mathrm{t} = 3$: $U^3(\tau)$				

O'Donoghue&Rabin(AER 1999): EX1 Immediate cost

- Naif:

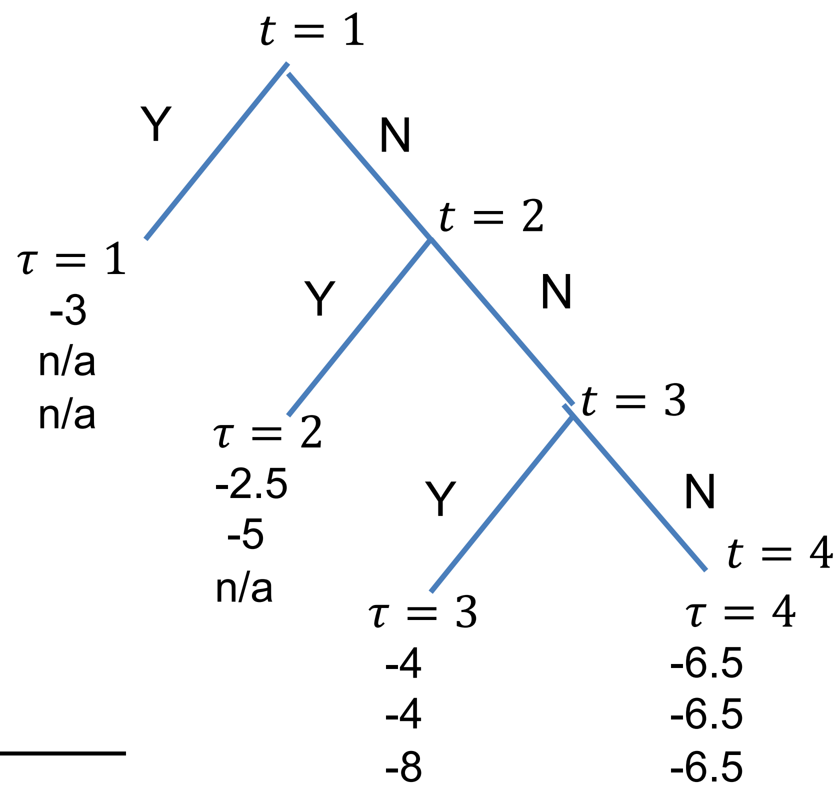
	$\tau = 1$	$\tau = 2$	$\tau = 3$	$\tau = 4$
At t = 1: $U^1(\tau)$	-3	-2.5	-4	-6.5
At t = 2: $U^2(\tau)$	n/a	-5	-4	-6.5
At t = 3: $U^3(\tau)$	n/a	n/a	-8	-6.5

- At t = 1: ____
- At t = 2:____
- At t = 3: ____
- Have to do the report on__________________________
- Naif ends up with__________________

O'Donoghue&Rabin(AER 1999): EX1 Immediate cost

- Sophisticates:

	$\tau = 1$	$\tau = 2$	$\tau = 3$	$\tau = 4$
At t = 1: $U^1(\tau)$	-3	-2.5	-4	-6.5
At t = 2: $U^2(\tau)$	n/a	-5	-4	-6.5
At t = 3: $U^3(\tau)$	n/a	n/a	-8	-6.5



- $\tau_{sophisticate} =$ ______

O'Donoghue&Rabin(AER 1999): EX2 Immediate reward

- Suppose rewards are immediate.
- $T = 4, \beta = \frac{1}{2}, \delta = 1$
- Reward schedule is $\mathrm{V} \equiv (3,5,8,13)$.
- Cost schedule is $\mathrm{C} \equiv (0, 0, 0, 0)$.

➢ TC, with $\beta = 1$, will see movie on period 4 ($\tau_{TC} = 4$) because it maximizes utility.

	$\boldsymbol{\tau = 1}$	$\boldsymbol{\tau = 2}$	$\boldsymbol{\tau = 3}$	$\boldsymbol{\tau = 4}$
$U(\tau)$				

O'Donoghue&Rabin(AER 1999): EX2 Immediate reward

- Suppose rewards are immediate.
- $T = 4, \beta = \frac{1}{2}, \delta = 1$
- Reward schedule is $\mathrm{V} \equiv (3,5,8,13)$.
- Cost schedule is $\mathrm{C} \equiv (0, 0, 0, 0)$.

➢ $\beta = \frac{1}{2}$

	$\boldsymbol{\tau = 1}$	$\boldsymbol{\tau = 2}$	$\boldsymbol{\tau = 3}$	$\boldsymbol{\tau = 4}$
At $\mathrm{t} = 1$: $U^1(\tau)$				
At $\mathrm{t} = 2$: $U^2(\tau)$				
At $\mathrm{t} = 3$: $U^3(\tau)$				

O'Donoghue&Rabin(AER 1999): EX1 Immediate reward

- Naif:

	$\boldsymbol{\tau = 1}$	$\boldsymbol{\tau = 2}$	$\boldsymbol{\tau = 3}$	$\boldsymbol{\tau = 4}$
At $\mathrm{t} = 1$: $U^1(\tau)$	3	2.5	4	6.5
At $\mathrm{t} = 2$: $U^2(\tau)$	n/a	5	4	6.5
At $\mathrm{t} = 3$: $U^3(\tau)$	n/a	n/a	8	6.5

- At $\mathrm{t} = 1$: ____
- At $\mathrm{t} = 2$: ____
- At $\mathrm{t} = 3$: ____
- See movie on________________________

O'Donoghue&Rabin(AER 1999): EX1 Immediate reward

- Sophisticates:

	$\boldsymbol{\tau = 1}$	$\boldsymbol{\tau = 2}$	$\boldsymbol{\tau = 3}$	$\boldsymbol{\tau = 4}$
At $\mathrm{t} = 1$: $U^1(\tau)$	3	2.5	4	6.5
At $\mathrm{t} = 2$: $U^2(\tau)$	n/a	5	4	6.5
At $\mathrm{t} = 3$: $U^3(\tau)$	n/a	n/a	8	6.5

- $\tau_{sophisticate} =$ ____
- Preproperation:____________________