Behavioral Economics

Topic 2: Intertemporal Choice
Lecture 15: Utility from Anticipation

Professor Bushong

MICHIGAN STATE
UNIVERSITY



Taking Stock

Last class:

- Applications of present bias

Taking Stock

Last class:

- Applications of present bias

Today:

- Utility from anticipation — savoring and dread
- Belief-based utility

Taking Stock

Last class:

- Applications of present bias

Today:

- Utility from anticipation — savoring and dread
- Belief-based utility

Logistics:

- Problem Set 4 is due Tuesday, November 3
- Problem Set 5 is due Thursday, November 12

Motivating Experiment

Based on Loewenstein (*EJ* 1987)

Motivating experiment: Ask subjects

- (1) their *WTP* for a kiss from a movie star of their choice at date x.

Motivating Experiment

Based on Loewenstein (*EJ* 1987)

Motivating experiment: Ask subjects

- (1) their *WTP* for a kiss from a movie star of their choice at date x.
- (2) their *WTP* to avoid a 110-volt shock at date x.

Motivating Experiment

Based on Loewenstein (*EJ* 1987)

Motivating experiment: Ask subjects

- (1) their *WTP* for a kiss from a movie star of their choice at date x.
- (2) their *WTP* to avoid a 110-volt shock at date x.

He uses a within-subjects design, and uses $x =$ now, 3 hrs, 24 hrs, 3 days, 1 yr, and 10 yrs.

Motivating Experiment

Let's denote the *WTP* for c at date x by $WTP(c, x)$.

Motivating Experiment

Let's denote the *WTP* for c at date x by $WTP(c, x)$.

Under the "standard" discounted-utility interpretation,

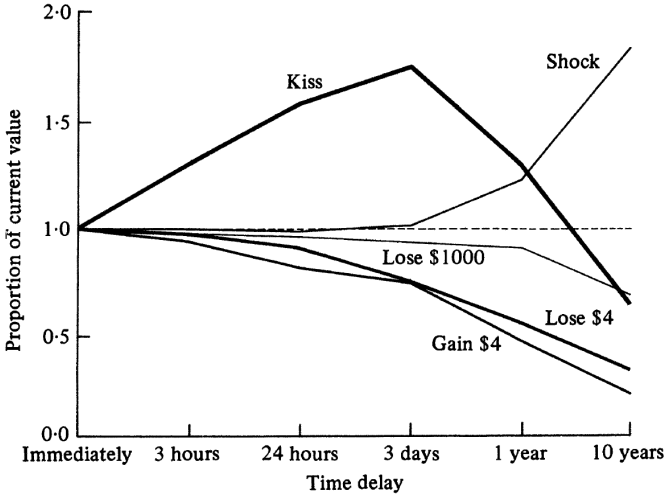
$$WTP(c, x) = D(x) * v(c)$$

- $v(c)$ is the instantaneous utility from c.
- $D(x)$ is discounting associated with delay x.

Normalizing $D(0) = 1$, this implies:

$$\frac{WTP(c, x)}{WTP(c, 0)} = \frac{D(x)v(c)}{D(0)v(c)} = D(x)$$

Motivating Experiment: Results



Interpretation: Anticipatory Utility

Loewenstein interprets as evidence of “anticipatory utility”:

Interpretation: Anticipatory Utility

Loewenstein interprets as evidence of “anticipatory utility”:

- Leading up to the kiss, you get positive utility from anticipating it; hence, you may prefer to delay the kiss so that you can properly anticipate it.

Interpretation: Anticipatory Utility

Loewenstein interprets as evidence of “anticipatory utility”:

- Leading up to the kiss, you get positive utility from anticipating it; hence, you may prefer to delay the kiss so that you can properly anticipate it.
- Leading up to the shock, you get negative utility from anticipating it; hence, you may prefer to accelerate the shock so that you do NOT need to anticipate it.

A Model with Utility from Anticipation

Instantaneous utility in period t given by

$$u(c_t, c_{t+1}) = v(c_t) + w^A(c_{t+1}).$$

- $v(c_t)$ is utility from current consumption.
- $w^A(c_{t+1})$ is utility from anticipating future consumption.

A Model with Utility from Anticipation

Instantaneous utility in period t given by

$$u(c_t, c_{t+1}) \;=\; v(c_t) \;+\; w^A(c_{t+1}).$$

- $v(c_t)$ is utility from current consumption.
- $w^A(c_{t+1})$ is utility from anticipating future consumption.

In period 1, the person chooses $(c_1, c_2, ...)$ to maximize

$$U^1 \;\equiv\; \sum_{\tau=1}^{\infty} \delta^{\tau-1}\, u(c_\tau, c_{\tau+1}).$$

A Model with Utility from Anticipation

Instantaneous utility in period t given by

$$u(c_t, c_{t+1}) = v(c_t) + w^A(c_{t+1}).$$

- $v(c_t)$ is utility from current consumption.
- $w^A(c_{t+1})$ is utility from anticipating future consumption.

In period 1, the person chooses $(c_1, c_2, ...)$ to maximize

$$U^1 \equiv \sum_{\tau=1}^{\infty} \delta^{\tau-1} u(c_\tau, c_{\tau+1}).$$

What is $w^A(c_{t+1})$? Let's assume

$$w^A(c_{t+1}) = \varphi * v(c_{t+1})$$

- Anticipatory utility is proportional to consumption utility; $\varphi < 1$ reflects the "vividness".

Example: The “Kiss”

Recall:

$$u(c_t, c_{t+1}) = v(c_t) + \varphi * v(c_{t+1})$$

Period-1 intertemporal utility of “kiss”:

Example: The "Kiss"

Recall:

$$u(c_t, c_{t+1}) = v(c_t) + \varphi * v(c_{t+1})$$

Period-1 intertemporal utility of "kiss":

- Kiss in period 1: v(kiss)

Example: The "Kiss"

Recall:

$$u(c_t, c_{t+1}) = v(c_t) + \varphi * v(c_{t+1})$$

Period-1 intertemporal utility of "kiss":

- Kiss in period 1: $v(\text{kiss})$
- Kiss in period 2: $\varphi * v(\text{kiss}) + \delta * v(\text{kiss})$

Example: The "Kiss"

Recall:

$$u(c_t, c_{t+1}) = v(c_t) + \varphi * v(c_{t+1})$$

Period-1 intertemporal utility of "kiss":

- Kiss in period 1: $v(\text{kiss})$
- Kiss in period 2: $\varphi * v(\text{kiss}) + \delta * v(\text{kiss})$
- Kiss in period 3: $0 + \delta * \varphi * v(\text{kiss}) + \delta^2 * v(\text{kiss})$

Example: The "Kiss"

Recall:

$$u(c_t, c_{t+1}) = v(c_t) + \varphi * v(c_{t+1})$$

Period-1 intertemporal utility of "kiss":

- Kiss in period 1: $v(\text{kiss})$
- Kiss in period 2: $\varphi * v(\text{kiss}) + \delta * v(\text{kiss})$
- Kiss in period 3: $0 + \delta * \varphi * v(\text{kiss}) + \delta^2 * v(\text{kiss})$

If $\varphi + \delta < 1$, optimal to have kiss now (in period 1).

Example: The "Kiss"

Recall:

$$u(c_t, c_{t+1}) = v(c_t) + \varphi * v(c_{t+1})$$

Period-1 intertemporal utility of "kiss":

- Kiss in period 1: $v(\text{kiss})$
- Kiss in period 2: $\varphi * v(\text{kiss}) + \delta * v(\text{kiss})$
- Kiss in period 3: $0 + \delta * \varphi * v(\text{kiss}) + \delta^2 * v(\text{kiss})$

If $\varphi + \delta < 1$, optimal to have kiss now (in period 1).

If $\varphi + \delta > 1$, optimal to have kiss in near future (in period 2).

More Examples of Anticipatory Utility

Suppose you're thinking about going on vacation:

More Examples of Anticipatory Utility

Suppose you're thinking about going on vacation:

- For a long time, you thought probably no time for a 3-day vacation.

More Examples of Anticipatory Utility

Suppose you're thinking about going on vacation:

- For a long time, you thought probably no time for a 3-day vacation.
- Then one day find out that probably will have time off (80%).

More Examples of Anticipatory Utility

Suppose you're thinking about going on vacation:

- For a long time, you thought probably no time for a 3-day vacation.
- Then one day find out that probably will have time off (80%).

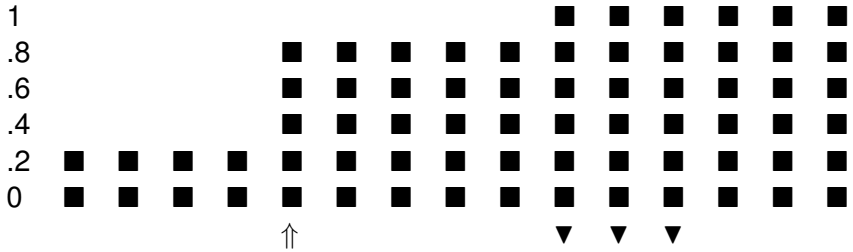
  . . . and then confirmed as 100% likely when it happens.

More Examples of Anticipatory Utility

Suppose you're thinking about going on vacation:

- For a long time, you thought probably no time for a 3-day vacation.
- Then one day find out that probably will have time off (80%).

  . . . and then confirmed as 100% likely when it happens.
- Belief evolution:



More Examples of Anticipatory Utility

As with other parts of this course, we'll discuss utility in time.

More Examples of Anticipatory Utility

As with other parts of this course, we'll discuss utility in time.

- That is, we will talk about real-time "happiness" without choice.

More Examples of Anticipatory Utility

As with other parts of this course, we'll discuss utility in time.

- That is, we will talk about real-time "happiness" without choice.

This isn't radical, even though it might seem even farther from mainstream. Stay calm.

More Examples of Anticipatory Utility

As with other parts of this course, we'll discuss utility in time.

- That is, we will talk about real-time "happiness" without choice.

This isn't radical, even though it might seem even farther from mainstream. Stay calm.

- As before, this will have implications for choice.

More Examples of Anticipatory Utility

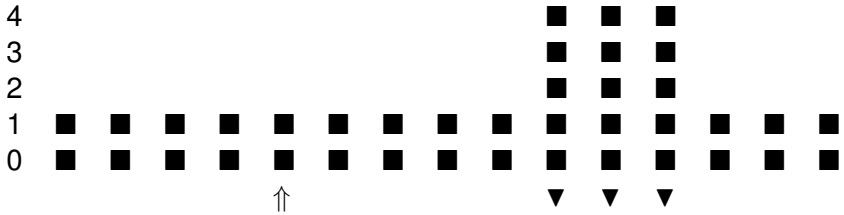
As with other parts of this course, we'll discuss utility in time.

- That is, we will talk about real-time "happiness" without choice.

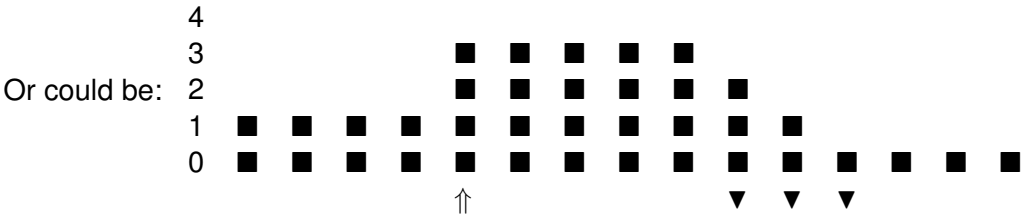
This isn't radical, even though it might seem even farther from mainstream. Stay calm.

- As before, this will have implications for choice.

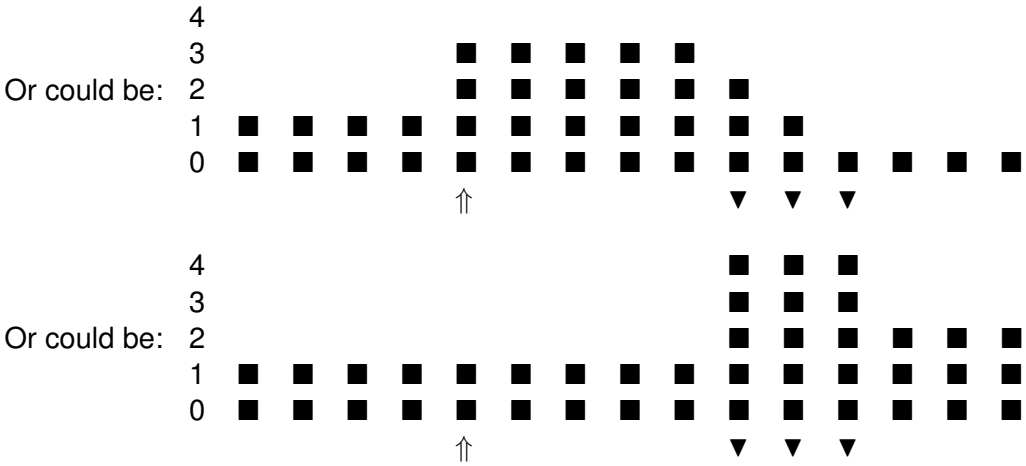
So let's consider the utility of a person who has the beliefs from previous slide. Could be:



Belief-Based Utility



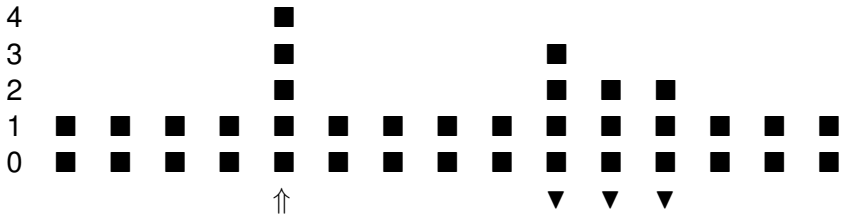
Belief-Based Utility



↬

Belief-Based Utility

Or could be (my personal vote):



Belief-Based Utility

So what?

Belief-Based Utility

So what?

- Why care about the timing or reason for enjoying a vacation?

Belief-Based Utility

So what?

- Why care about the timing or reason for enjoying a vacation?
- Often: We don't. All captured by u(vacation).

Belief-Based Utility

So what?

- Why care about the timing or reason for enjoying a vacation?
- Often: We don't. All captured by u(vacation).
  - Reduced form probably best for "remembered utility".

Belief-Based Utility

So what?

- Why care about the timing or reason for enjoying a vacation?
- Often: We don't. All captured by u(vacation).
  - Reduced form probably best for "remembered utility".

But can matter for various reasons. Three are:

Belief-Based Utility

So what?

- Why care about the timing or reason for enjoying a vacation?
- Often: We don't. All captured by u(vacation).
  - Reduced form probably best for "remembered utility".

But can matter for various reasons. Three are:

- Use direct happiness data if and only if our theories specify timing of utility.

Belief-Based Utility

So what?

- Why care about the timing or reason for enjoying a vacation?
- Often: We don't. All captured by u(vacation).
  - Reduced form probably best for "remembered utility".

But can matter for various reasons. Three are:

- Use direct happiness data if and only if our theories specify timing of utility.
  - (Not a topic of this course, but interesting to think about).

Belief-Based Utility

So what?

- Why care about the timing or reason for enjoying a vacation?
- Often: We don't. All captured by u(vacation).
  - Reduced form probably best for "remembered utility".

But can matter for various reasons. Three are:

- Use direct happiness data if and only if our theories specify timing of utility.
  - (Not a topic of this course, but interesting to think about).
- Beliefs/information matter even when behavior is unaffected.

Belief-Based Utility

So what?

- Why care about the timing or reason for enjoying a vacation?
- Often: We don't. All captured by u(vacation).
  - Reduced form probably best for "remembered utility".

But can matter for various reasons. Three are:

- Use direct happiness data if and only if our theories specify timing of utility.
  - (Not a topic of this course, but interesting to think about).
- Beliefs/information matter even when behavior is unaffected.
- Affects choice: including time inconsistency, commitment, etc.

Belief-Based Utility

Suppose planning vacation:

- Have anticipatory preferences *for holiday-making only*.

Belief-Based Utility

Suppose planning vacation:

- Have anticipatory preferences *for holiday-making only*.
- Club Copacabana holiday package, *total* anticipatory utility plus consumption and remembered utility well worth $10,000.

Belief-Based Utility

Suppose planning vacation:

- Have anticipatory preferences *for holiday-making only*.
- Club Copacabana holiday package, *total* anticipatory utility plus consumption and remembered utility well worth $10,000.
- But without anticipatory utility, *not* nearly worth it.

Belief-Based Utility

Suppose planning vacation:

- Have anticipatory preferences *for holiday-making only*.
- Club Copacabana holiday package, *total* anticipatory utility plus consumption and remembered utility well worth $10,000.
- But without anticipatory utility, *not* nearly worth it.
- Can/must buy months in advance.

Belief-Based Utility

Suppose planning vacation:

- Have anticipatory preferences *for holiday-making only*.
- Club Copacabana holiday package, *total* anticipatory utility plus consumption and remembered utility well worth $10,000.
- But without anticipatory utility, *not* nearly worth it.
- Can/must buy months in advance.

Situation A: All but $50 is fully refundable if 24 hours in advance.

Belief-Based Utility

Suppose planning vacation:

- Have anticipatory preferences *for holiday-making only*.
- Club Copacabana holiday package, *total* anticipatory utility plus consumption and remembered utility well worth $10,000.
- But without anticipatory utility, *not* nearly worth it.
- Can/must buy months in advance.

Situation A: All but $50 is fully refundable if 24 hours in advance.

- What would a fully rational (sophisticated) person do?

Belief-Based Utility

Suppose planning vacation:

- Have anticipatory preferences *for holiday-making only*.
- Club Copacabana holiday package, *total* anticipatory utility plus consumption and remembered utility well worth $10,000.
- But without anticipatory utility, *not* nearly worth it.
- Can/must buy months in advance.

Situation A: All but $50 is fully refundable if 24 hours in advance.

- What would a fully rational (sophisticated) person do?
- She **would**/**would not** (cross out one) buy the package, and then she **would**/**would not** (cross out one) go on the vacation.

Belief-Based Utility

Suppose planning vacation:

- Have anticipatory preferences *for holiday-making only*.
- Club Copacabana holiday package, *total* anticipatory utility plus consumption and remembered utility well worth $10,000.
- But without anticipatory utility, *not* nearly worth it.
- Can/must buy months in advance.

Situation A: All but $50 is fully refundable if 24 hours in advance.

- What would a fully rational (sophisticated) person do?
- She **would**/**would not** (cross out one) buy the package, and then she **would**/**would not** (cross out one) go on the vacation.
  - She **would**/**would not** buy the package, and then **would not** go on the vacation.

Belief-Based Utility

Suppose planning vacation:

- Have anticipatory preferences *for holiday-making only*.
- Club Copacabana holiday package, *total* anticipatory utility plus consumption and remembered utility well worth $10,000.
- But without anticipatory utility, *not* nearly worth it.
- Can/must buy months in advance.

Situation A: All but $50 is fully refundable if 24 hours in advance.

- What would a fully rational (sophisticated) person do?
- She **would**/**would not** (cross out one) buy the package, and then she **would**/**would not** (cross out one) go on the vacation.
  - She **would**/**would not** buy the package, and then **would not** go on the vacation.

$\Rightarrow$ She **would not** buy the package, then **would not** go on the vacation.

Belief-Based Utility

If fully rational and have the specified preferences

Belief-Based Utility

If fully rational and have the specified preferences

- You won't sign up under Situation A,

Belief-Based Utility

If fully rational and have the specified preferences

- You won't sign up under Situation A,
  - because you'll cancel, *and know you'll cancel*.

Belief-Based Utility

If fully rational and have the specified preferences

- You won't sign up under Situation A,
  - because you'll cancel, *and know you'll cancel*.
- Won't get anticipatory utility after all.

Belief-Based Utility

If fully rational and have the specified preferences

- You won't sign up under Situation A,
  - because you'll cancel, *and know you'll cancel*.
- Won't get anticipatory utility after all.

"Fully rational" defined (or, sophisticated):

Belief-Based Utility

If fully rational and have the specified preferences

- You won't sign up under Situation A,
  - because you'll cancel, *and know you'll cancel*.
- Won't get anticipatory utility after all.

"Fully rational" defined (or, sophisticated):

- Dynamically optimal, anticipating correctly own conduct.

Belief-Based Utility

If fully rational and have the specified preferences

- You won't sign up under Situation A,
  - because you'll cancel, *and know you'll cancel*.
- Won't get anticipatory utility after all.

"Fully rational" defined (or, sophisticated):

- Dynamically optimal, anticipating correctly own conduct.
- But **not** the beliefs that make you happiest.

Belief-Based Utility

If fully rational and have the specified preferences

- You won't sign up under Situation A,
  - because you'll cancel, *and know you'll cancel*.
- Won't get anticipatory utility after all.

"Fully rational" defined (or, sophisticated):

- Dynamically optimal, anticipating correctly own conduct.
- But **not** the beliefs that make you happiest.
- With belief-based preferences, the two are *different*.

Belief-Based Utility

If fully rational and have the specified preferences

- You won't sign up under Situation A,
  - because you'll cancel, *and know you'll cancel*.
- Won't get anticipatory utility after all.

"Fully rational" defined (or, sophisticated):

- Dynamically optimal, anticipating correctly own conduct.
- But **not** the beliefs that make you happiest.
- With belief-based preferences, the two are *different*.

Situation B: Contract allows no refunds. What would a person do?

Belief-Based Utility

If fully rational and have the specified preferences

- You won't sign up under Situation A,
  - because you'll cancel, *and know you'll cancel*.
- Won't get anticipatory utility after all.

"Fully rational" defined (or, sophisticated):

- Dynamically optimal, anticipating correctly own conduct.
- But **not** the beliefs that make you happiest.
- With belief-based preferences, the two are *different*.

Situation B: Contract allows no refunds. What would a person do?

- Buy package? Go on vacation?

Belief-Based Utility

If fully rational and have the specified preferences

- You won't sign up under Situation A,
  - because you'll cancel, *and know you'll cancel*.
- Won't get anticipatory utility after all.

"Fully rational" defined (or, sophisticated):

- Dynamically optimal, anticipating correctly own conduct.
- But **not** the beliefs that make you happiest.
- With belief-based preferences, the two are *different*.

Situation B: Contract allows no refunds. What would a person do?

- Buy package? Go on vacation?
  - She **would** buy the package, and then she **would** go on the vacation.

Belief-Based Utility

Predictions in A&B **do**/**do not** violate classical assumptions about preferences?

Belief-Based Utility

Predictions in A&B **do**/**do not** violate classical assumptions about preferences?

- This **does** violate classical axioms/assumptions about preferences.

Belief-Based Utility

Predictions in A&B **do**/**do not** violate classical assumptions about preferences?

- This **does** violate classical axioms/assumptions about preferences.
  - Chose plan "No Buy" from {No Buy, Go, Cancel} in Situation A.

Belief-Based Utility

Predictions in A&B **do**/**do not** violate classical assumptions about preferences?

- This **does** violate classical axioms/assumptions about preferences.
  - Chose plan "No Buy" from {No Buy, Go, Cancel} in Situation A.
  - "Go" from {No Buy, Go} in Situation B.

Belief-Based Utility

Predictions in A&B **do**/**do not** violate classical assumptions about preferences?

- This **does** violate classical axioms/assumptions about preferences.
  - Chose plan "No Buy" from {No Buy, Go, Cancel} in Situation A.
  - "Go" from {No Buy, Go} in Situation B.
  - And worse off in Situation A

Belief-Based Utility

Predictions in A&B **do**/**do not** violate classical assumptions about preferences?

- This **does** violate classical axioms/assumptions about preferences.
  - Chose plan "No Buy" from {No Buy, Go, Cancel} in Situation A.
  - "Go" from {No Buy, Go} in Situation B.
  - And worse off in Situation A

This **should**/**should not** (cross out one) freak you out?

Belief-Based Utility

Predictions in A&B **do**/**do not** violate classical assumptions about preferences?

- This **does** violate classical axioms/assumptions about preferences.
  - Chose plan "No Buy" from {No Buy, Go, Cancel} in Situation A.
  - "Go" from {No Buy, Go} in Situation B.
  - And worse off in Situation A

This **should**/**should not** (cross out one) freak you out?

- This **should not** freak you out.

Belief-Based Utility

Predictions in A&B **do**/**do not** violate classical assumptions about preferences?

- This **does** violate classical axioms/assumptions about preferences.
  - Chose plan "No Buy" from {No Buy, Go, Cancel} in Situation A.
  - "Go" from {No Buy, Go} in Situation B.
  - And worse off in Situation A

This **should**/**should not** (cross out one) freak you out?

- This **should not** freak you out.

Violating such an axiom **should**/**should not** (cross out one) thrill you?

Belief-Based Utility

Predictions in A&B **do**/**do not** violate classical assumptions about preferences?

- This **does** violate classical axioms/assumptions about preferences.
  - Chose plan "No Buy" from {No Buy, Go, Cancel} in Situation A.
  - "Go" from {No Buy, Go} in Situation B.
  - And worse off in Situation A

This **should**/**should not** (cross out one) freak you out?

- This **should not** freak you out.

Violating such an axiom **should**/**should not** (cross out one) thrill you?

- It **should not** thrill you.

Belief-Based Utility

Predictions in A&B **do**/**do not** violate classical assumptions about preferences?

- This **does** violate classical axioms/assumptions about preferences.
  - Chose plan "No Buy" from {No Buy, Go, Cancel} in Situation A.
  - "Go" from {No Buy, Go} in Situation B.
  - And worse off in Situation A

This **should**/**should not** (cross out one) freak you out?

- This **should not** freak you out.

Violating such an axiom **should**/**should not** (cross out one) thrill you?

- It **should not** thrill you.

Instead it gets us thinking about realism, insight, and importance of assumptions.

Consumption & Savings with Anticipatory Preferences

Setting and Preferences

Yugi will live for 3 periods, has $\$Y$ to spend over that time (no interest), seeks to maximize his (undiscounted) lifetime utility $U^1 = u_1 + u_2 + u_3$.

Consumption & Savings with Anticipatory Preferences

Setting and Preferences

Yugi will live for 3 periods, has $\$Y$ to spend over that time (no interest), seeks to maximize his (undiscounted) lifetime utility $U^1 = u_1 + u_2 + u_3$.

- In period t, "consumption utility" m_t that depends on c_t.

Consumption & Savings with Anticipatory Preferences

Setting and Preferences

Yugi will live for 3 periods, has $\$Y$ to spend over that time (no interest), seeks to maximize his (undiscounted) lifetime utility $U^1 = u_1 + u_2 + u_3$.

- In period t, "consumption utility" m_t that depends on c_t.
- Also gets utility from anticipating his future consumption utility.

Consumption & Savings with Anticipatory Preferences

Setting and Preferences

Yugi will live for 3 periods, has $\$Y$ to spend over that time (no interest), seeks to maximize his (undiscounted) lifetime utility $U^1 = u_1 + u_2 + u_3$.

- In period t, "consumption utility" m_t that depends on c_t.
- Also gets utility from anticipating his future consumption utility.
- Why from anticipating solely his future consumption utility?
  - Why not also from future anticipatory utility? We'll ignore that...

Belief-Based Utility

Attempt to model this:

$$u_1 = m(c_1) + \varphi[m(c_2) + m(c_3)]$$
$$u_2 = m(c_2) + \varphi[m(c_3)]$$
$$u_3 = m(c_3)$$

- where $\varphi \geq 0$ is relative concern for anticipatory utility.

Belief-Based Utility

Attempt to model this:

$$u_1 = m(c_1) + \varphi[m(c_2) + m(c_3)]$$
$$u_2 = m(c_2) + \varphi[m(c_3)]$$
$$u_3 = m(c_3)$$

- where $\varphi \geq 0$ is relative concern for anticipatory utility.

Question: what is *incoherent* about such preferences?

Belief-Based Utility

Attempt to model this:

$$u_1 = m(c_1) + \varphi[m(c_2) + m(c_3)]$$
$$u_2 = m(c_2) + \varphi[m(c_3)]$$
$$u_3 = m(c_3)$$

- where $\varphi \geq 0$ is relative concern for anticipatory utility.

Question: what is *incoherent* about such preferences?

- u_1 cannot depend on c_2 or c_3. Only **beliefs** about c_2, c_3.

Belief-Based Utility

2nd attempt to model:

- $u_1 = m(c_1) + \varphi E_1\{m(c_2) + m(c_3)\}$
- $u_2 = m(c_2) + \varphi E_2\{m(c_3)\}$
- $u_3 = m(c_3)$

where $E_t\{m(c_\tau)\}$ is period-t expectations of period-τ consumption.

Belief-Based Utility

2nd attempt to model:

- $u_1 = m(c_1) + \varphi E_1\{m(c_2) + m(c_3)\}$
- $u_2 = m(c_2) + \varphi E_2\{m(c_3)\}$
- $u_3 = m(c_3)$

where $E_t\{m(c_\tau)\}$ is period-t expectations of period-τ consumption.

- Would want more complete version of this if there is uncertainty.

Belief-Based Utility

2nd attempt to model:

- $u_1 = m(c_1) + \varphi E_1\{m(c_2) + m(c_3)\}$
- $u_2 = m(c_2) + \varphi E_2\{m(c_3)\}$
- $u_3 = m(c_3)$

where $E_t\{m(c_\tau)\}$ is period-t expectations of period-τ consumption.

- Would want more complete version of this if there is uncertainty.

When beliefs deterministic, shorthand:

- $u_1 = m(c_1) + \varphi[m(\widetilde{c}_2^1) + m(\widetilde{c}_3^1)]$
- $u_2 = m(c_2) + \varphi[m(\widetilde{c}_3^2)]$
- $u_3 = m(c_3)$

where $\widetilde{c}_\tau^t$ are Yugi's period-t beliefs about period-τ consumption.

Belief-Based Utility

What will Yugi do?

Belief-Based Utility

What will Yugi do?

Candidate solution: Yugi solves

$$\text{Max}_{c_1,c_2} = m(c_1) + (1+\varphi)m(c_2) + (1+2\varphi)m(Y - c_1 - c_2).$$

Belief-Based Utility

What will Yugi do?

Candidate solution: Yugi solves

$$\text{Max}_{c_1,c_2} = m(c_1) + (1+\varphi)m(c_2) + (1+2\varphi)m(Y - c_1 - c_2).$$

- E.g., if $m(x) = \ln(x)$, then:

Belief-Based Utility

What will Yugi do?

Candidate solution: Yugi solves

$$\text{Max}_{c_1,c_2} = m(c_1) + (1+\varphi)m(c_2) + (1+2\varphi)m(Y - c_1 - c_2).$$

- E.g., if $m(x) = \ln(x)$, then:
  - $c_1^{**} = \frac{1}{3+3\varphi} Y, \qquad c_2^{**} = \frac{1+\varphi}{3+3\varphi} Y, \qquad c_3^{**} = \frac{1+2\varphi}{3+3\varphi} Y$

Belief-Based Utility

What will Yugi do?

Candidate solution: Yugi solves

$$\text{Max}_{c_1,c_2} = m(c_1) + (1+\varphi)m(c_2) + (1+2\varphi)m(Y - c_1 - c_2).$$

- E.g., if $m(x) = \ln(x)$, then:
  - $c_1^{**} = \frac{1}{3+3\varphi} Y, \qquad c_2^{**} = \frac{1+\varphi}{3+3\varphi} Y, \qquad c_3^{**} = \frac{1+2\varphi}{3+3\varphi} Y$
- How do these depend on φ?

Belief-Based Utility

What will Yugi do?

Candidate solution: Yugi solves

$$\text{Max}_{c_1,c_2} = m(c_1) + (1+\varphi)m(c_2) + (1+2\varphi)m(Y - c_1 - c_2).$$

- E.g., if $m(x) = \ln(x)$, then:
  - $c_1^{**} = \frac{1}{3+3\varphi} Y, \qquad c_2^{**} = \frac{1+\varphi}{3+3\varphi} Y, \qquad c_3^{**} = \frac{1+2\varphi}{3+3\varphi} Y$
- How do these depend on φ?
  - Respectively decreasing, independent of, and increasing in φ.
  - Intuition?

Belief-Based Utility

What will Yugi do?

Candidate solution: Yugi solves

$$\text{Max}_{c_1,c_2} = m(c_1) + (1+\varphi)m(c_2) + (1+2\varphi)m(Y - c_1 - c_2).$$

- E.g., if $m(x) = \ln(x)$, then:
  - $c_1^{**} = \frac{1}{3+3\varphi} Y, \qquad c_2^{**} = \frac{1+\varphi}{3+3\varphi} Y, \qquad c_3^{**} = \frac{1+2\varphi}{3+3\varphi} Y$
- How do these depend on φ?
  - Respectively decreasing, independent of, and increasing in φ.
  - Intuition?
- If $\varphi = 1$, then:
  - $c_1^{**} = \frac{3}{18} Y, , \qquad c_2^{**} = \frac{6}{18} Y, \qquad c_3^{**} = \frac{9}{18} Y$

Belief-Based Utility

Is this what Yugi will do?

Belief-Based Utility

Is this what Yugi will do?

Claim: We have under-specified features of the environment.

Belief-Based Utility

Is this what Yugi will do?

Claim: We have under-specified features of the environment.

- We need to say when Yugi is making (committed) choices.

Belief-Based Utility

Is this what Yugi will do?

Claim: We have under-specified features of the environment.

- We need to say when Yugi is making (committed) choices.
- Situation 1:

Belief-Based Utility

Is this what Yugi will do?

Claim: We have under-specified features of the environment.

- We need to say when Yugi is making (committed) choices.
- Situation 1:
  - Yugi fully rational and can commit, then yes.

Belief-Based Utility

Is this what Yugi will do?

Claim: We have under-specified features of the environment.

- We need to say when Yugi is making (committed) choices.
- Situation 1:
  - Yugi fully rational and can commit, then yes.
- Situation 2:

Belief-Based Utility

Is this what Yugi will do?

Claim: We have under-specified features of the environment.

- We need to say when Yugi is making (committed) choices.
- Situation 1:
  - Yugi fully rational and can commit, then yes.
- Situation 2:
  - Yugi fully rational and *cannot* commit, then only c_1^* is right.

Belief-Based Utility

Is this what Yugi will do?

Claim: We have under-specified features of the environment.

- We need to say when Yugi is making (committed) choices.
- Situation 1:
  - Yugi fully rational and can commit, then yes.
- Situation 2:
  - Yugi fully rational and *cannot* commit, then only c_1^* is right.

E.g., if $\varphi = 1$, then ...

Belief-Based Utility

	Can Commit	Cannot Commit
c_1^*:	$\frac{3}{18}Y$	$\frac{3}{18}Y$
c_2^*:	$\frac{6}{18}Y$	$\frac{5}{18}Y$
c_3^*:	$\frac{9}{18}Y$	$\frac{10}{18}Y$

What is interesting?

- Consumes more period 2 with commitment than without!

Belief-Based Utility

	Can Commit	Cannot Commit
c_1^*:	$\frac{3}{18}Y$	$\frac{3}{18}Y$
c_2^*:	$\frac{6}{18}Y$	$\frac{5}{18}Y$
c_3^*:	$\frac{9}{18}Y$	$\frac{10}{18}Y$

What is interesting?

- Consumes more period 2 with commitment than without!
- Why does commitment increase period-2 consumption?

Belief-Based Utility

	Can Commit	Cannot Commit
c_1^*:	$\frac{3}{18}Y$	$\frac{3}{18}Y$
c_2^*:	$\frac{6}{18}Y$	$\frac{5}{18}Y$
c_3^*:	$\frac{9}{18}Y$	$\frac{10}{18}Y$

What is interesting?

- Consumes more period 2 with commitment than without!
- Why does commitment increase period-2 consumption?
  - Because assumed anticipation is over future consumption utility alone, happier looking forward to smoothed consumption than back-weighted consumption.

Belief-Based Utility

	Can Commit	Cannot Commit
c_1^*:	$\frac{3}{18}Y$	$\frac{3}{18}Y$
c_2^*:	$\frac{6}{18}Y$	$\frac{5}{18}Y$
c_3^*:	$\frac{9}{18}Y$	$\frac{10}{18}Y$

What is interesting?

- Consumes more period 2 with commitment than without!
- Why does commitment increase period-2 consumption?
  - Because assumed anticipation is over future consumption utility alone, happier looking forward to smoothed consumption than back-weighted consumption.
  - But in period 2, this is no longer a consideration.

Belief-Based Utility

Reasons increased consumption profiles besides anticipatory utility?

Belief-Based Utility

Reasons increased consumption profiles besides anticipatory utility?

- Precautionary savings.

Belief-Based Utility

Reasons increased consumption profiles besides anticipatory utility?

- Precautionary savings.
- Backward-looking habit formation.

Belief-Based Utility

Reasons increased consumption profiles besides anticipatory utility?

- Precautionary savings.
- Backward-looking habit formation.

Reasons we may rarely see increasing consumption?

Belief-Based Utility

Reasons increased consumption profiles besides anticipatory utility?

- Precautionary savings.
- Backward-looking habit formation.

Reasons we may rarely see increasing consumption?

- Present bias: consumption smoothing may be self-control problem.

Belief-Based Utility

Reasons increased consumption profiles besides anticipatory utility?

- Precautionary savings.
- Backward-looking habit formation.

Reasons we may rarely see increasing consumption?

- Present bias: consumption smoothing may be self-control problem.
- Because: anticipatory model isn't quite right.

Belief-Based Utility

Reasons increased consumption profiles besides anticipatory utility?

- Precautionary savings.
- Backward-looking habit formation.

Reasons we may rarely see increasing consumption?

- Present bias: consumption smoothing may be self-control problem.
- Because: anticipatory model isn't quite right.
- Reminder: models should own *all* their implications
  - Anticipatory utility makes some strange ones.

Belief-Based Utility

Stepping (well) outside the rational framework:

- What if Yugi can fool himself into believing lifetime income Y is something else?

Belief-Based Utility

Stepping (well) outside the rational framework:

- What if Yugi can fool himself into believing lifetime income Y is something else?
- What might he tell himself?

Belief-Based Utility

Stepping (well) outside the rational framework:

- What if Yugi can fool himself into believing lifetime income Y is something else?
- What might he tell himself?
  - Choose to be optimistic to consume anticipation.

Belief-Based Utility

Stepping (well) outside the rational framework:

- What if Yugi can fool himself into believing lifetime income Y is something else?
- What might he tell himself?
  - Choose to be optimistic to consume anticipation.
  - But trades off against induced under-saving.

Belief-Based Utility

Stepping (well) outside the rational framework:

- What if Yugi can fool himself into believing lifetime income Y is something else?
- What might he tell himself?
  - Choose to be optimistic to consume anticipation.
  - But trades off against induced under-saving.
  - See, e.g., Brunnermeier and Parker (2005).

Belief-Based Utility

Stepping (well) outside the rational framework:

- What if Yugi can fool himself into believing lifetime income Y is something else?
- What might he tell himself?
  - Choose to be optimistic to consume anticipation.
  - But trades off against induced under-saving.
  - See, e.g., Brunnermeier and Parker (2005).
- But ... what if Yugi can tell himself other stories?

Belief-Based Utility

Stepping (well) outside the rational framework:

- What if Yugi can fool himself into believing lifetime income Y is something else?
- What might he tell himself?
  - Choose to be optimistic to consume anticipation.
  - But trades off against induced under-saving.
  - See, e.g., Brunnermeier and Parker (2005).
- But ... what if Yugi can tell himself other stories?
  - Like that he earns lots of interest on his savings?

Belief-Based Utility

Stepping (well) outside the rational framework:

- What if Yugi can fool himself into believing lifetime income Y is something else?
- What might he tell himself?
  - Choose to be optimistic to consume anticipation.
  - But trades off against induced under-saving.
  - See, e.g., Brunnermeier and Parker (2005).
- But ... what if Yugi can tell himself other stories?
  - Like that he earns lots of interest on his savings?
  - Or wonderful afterlife if maximize true lifetime utility.

Belief-Based Utility

Stepping (well) outside the rational framework:

- What if Yugi can fool himself into believing lifetime income Y is something else?
- What might he tell himself?
  - Choose to be optimistic to consume anticipation.
  - But trades off against induced under-saving.
  - See, e.g., Brunnermeier and Parker (2005).
- But ... what if Yugi can tell himself other stories?
  - Like that he earns lots of interest on his savings?
  - Or wonderful afterlife if maximize true lifetime utility.
- Fundamental Theorem of Optimal Distortion of Anticipatory Prefs:

Belief-Based Utility

Stepping (well) outside the rational framework:

- What if Yugi can fool himself into believing lifetime income Y is something else?
- What might he tell himself?
  - Choose to be optimistic to consume anticipation.
  - But trades off against induced under-saving.
  - See, e.g., Brunnermeier and Parker (2005).
- But ... what if Yugi can tell himself other stories?
  - Like that he earns lots of interest on his savings?
  - Or wonderful afterlife if maximize true lifetime utility.
- Fundamental Theorem of Optimal Distortion of Anticipatory Prefs:
  - If no restrictions, then choose beliefs to maximize **both** anticipatory preferences and "direct-consumption" utility.

Belief-Based Utility

More generally, models (that many of us have tried) for "motivated" *willful* distortion of beliefs, if not Bayesian (as about to see!) run into problems...

- Psychological realism?

$\Rightarrow$ Need a model of what are the limits to distortions.

Example: Measuring the Discounting Function



Suppose we observe a person make the following choices over a cash payment:

- 85 now $\succ$ 100 next week

Example: Measuring the Discounting Function



Suppose we observe a person make the following choices over a cash payment:

- 85 now $\succ$ 100 next week $\Rightarrow 85 > D(1 \text{ week}) \cdot 100$

Example: Measuring the Discounting Function



Suppose we observe a person make the following choices over a cash payment:

- 85 now $\succ$ 100 next week $\Rightarrow 85 > D(1 \text{ week}) \cdot 100$
- 95 now $\prec$ 100 next week

Example: Measuring the Discounting Function



Suppose we observe a person make the following choices over a cash payment:

- 85 now $\succ$ 100 next week $\Rightarrow 85 > D(1 \text{ week}) \cdot 100$
- 95 now $\prec$ 100 next week $\Rightarrow 95 < D(1 \text{ week}) \cdot 100$

Example: Measuring the Discounting Function



Suppose we observe a person make the following choices over a cash payment:

- 85 now $\succ$ 100 next week $\Rightarrow 85 > D(1 \text{ week}) \cdot 100$
- 95 now $\prec$ 100 next week $\Rightarrow 95 < D(1 \text{ week}) \cdot 100$
- 90 now $\sim$ 100 next week

Example: Measuring the Discounting Function



Suppose we observe a person make the following choices over a cash payment:

- 85 now $\succ$ 100 next week $\Rightarrow 85 > D(1 \text{ week}) \cdot 100$
- 95 now $\prec$ 100 next week $\Rightarrow 95 < D(1 \text{ week}) \cdot 100$
- 90 now $\sim$ 100 next week $\Rightarrow 90 = D(1 \text{ week}) \cdot 100$

Example: Measuring the Discounting Function

Suppose we observe a person make the following choices over a cash payment:

- 85 now $\succ$ 100 next week $\Rightarrow 85 > D(1 \text{ week}) \cdot 100$
- 95 now $\prec$ 100 next week $\Rightarrow 95 < D(1 \text{ week}) \cdot 100$
- 90 now $\sim$ 100 next week $\Rightarrow 90 = D(1 \text{ week}) \cdot 100$
- 95 next week $\sim$ 100 in two weeks

Example: Measuring the Discounting Function



Suppose we observe a person make the following choices over a cash payment:

- 85 now $\succ$ 100 next week $\Rightarrow 85 > D(1 \text{ week}) \cdot 100$
- 95 now $\prec$ 100 next week $\Rightarrow 95 < D(1 \text{ week}) \cdot 100$
- 90 now $\sim$ 100 next week $\Rightarrow 90 = D(1 \text{ week}) \cdot 100$
- 95 next week $\sim$ 100 in two weeks $\Rightarrow D(1 \text{ week}) \cdot 95 = D(2 \text{ weeks}) \cdot 100$

Example: Measuring the Discounting Function

Suppose we observe a person make the following choices over a cash payment:

- 85 now $\succ$ 100 next week $\Rightarrow 85 > D(1 \text{ week}) \cdot 100$
- 95 now $\prec$ 100 next week $\Rightarrow 95 < D(1 \text{ week}) \cdot 100$
- 90 now $\sim$ 100 next week $\Rightarrow 90 = D(1 \text{ week}) \cdot 100$
- 95 next week $\sim$ 100 in two weeks $\Rightarrow D(1 \text{ week}) \cdot 95 = D(2 \text{ weeks}) \cdot 100$
- 90 in two weeks $\sim$ 100 in three weeks

Example: Measuring the Discounting Function

Suppose we observe a person make the following choices over a cash payment:

- 85 now $\succ$ 100 next week $\Rightarrow 85 > D(1 \text{ week}) \cdot 100$
- 95 now $\prec$ 100 next week $\Rightarrow 95 < D(1 \text{ week}) \cdot 100$
- 90 now $\sim$ 100 next week $\Rightarrow 90 = D(1 \text{ week}) \cdot 100$
- 95 next week $\sim$ 100 in two weeks $\Rightarrow D(1 \text{ week}) \cdot 95 = D(2 \text{ weeks}) \cdot 100$
- 90 in two weeks $\sim$ 100 in three weeks $\Rightarrow D(2 \text{ weeks}) \cdot 98 = D(3 \text{ weeks}) \cdot 100$

Example: Measuring the Discounting Function

Suppose we observe a person make the following choices over a cash payment:

- 85 now $\succ$ 100 next week $\Rightarrow 85 > D(1 \text{ week}) \cdot 100$
- 95 now $\prec$ 100 next week $\Rightarrow 95 < D(1 \text{ week}) \cdot 100$
- 90 now $\sim$ 100 next week $\Rightarrow 90 = D(1 \text{ week}) \cdot 100$
- 95 next week $\sim$ 100 in two weeks $\Rightarrow D(1 \text{ week}) \cdot 95 = D(2 \text{ weeks}) \cdot 100$
- 90 in two weeks $\sim$ 100 in three weeks $\Rightarrow D(2 \text{ weeks}) \cdot 98 = D(3 \text{ weeks}) \cdot 100$

What can we conclude about $D(1 \text{ week})$, etc?

Example: Measuring the Discounting Function

Suppose we observe a person make the following choices over a cash payment:

- 85 now $\succ$ 100 next week $\Rightarrow 85 > D(1 \text{ week}) \cdot 100$
- 95 now $\prec$ 100 next week $\Rightarrow 95 < D(1 \text{ week}) \cdot 100$
- 90 now $\sim$ 100 next week $\Rightarrow 90 = D(1 \text{ week}) \cdot 100$
- 95 next week $\sim$ 100 in two weeks $\Rightarrow D(1 \text{ week}) \cdot 95 = D(2 \text{ weeks}) \cdot 100$
- 90 in two weeks $\sim$ 100 in three weeks $\Rightarrow D(2 \text{ weeks}) \cdot 98 = D(3 \text{ weeks}) \cdot 100$

What can we conclude about $D(1 \text{ week})$, etc?

- From first 2 choices: $0.85 < D(1 \text{ week}) < 0.95$

Example: Measuring the Discounting Function

Suppose we observe a person make the following choices over a cash payment:

- 85 now $\succ$ 100 next week $\Rightarrow 85 > D(1 \text{ week}) \cdot 100$
- 95 now $\prec$ 100 next week $\Rightarrow 95 < D(1 \text{ week}) \cdot 100$
- 90 now $\sim$ 100 next week $\Rightarrow 90 = D(1 \text{ week}) \cdot 100$
- 95 next week $\sim$ 100 in two weeks $\Rightarrow D(1 \text{ week}) \cdot 95 = D(2 \text{ weeks}) \cdot 100$
- 90 in two weeks $\sim$ 100 in three weeks $\Rightarrow D(2 \text{ weeks}) \cdot 98 = D(3 \text{ weeks}) \cdot 100$

What can we conclude about $D(1 \text{ week})$, etc?

- From first 2 choices: $0.85 < D(1 \text{ week}) < 0.95$
- From 3rd choice: $D(1 \text{ week}) = 0.9$

Example: Measuring the Discounting Function

Suppose we observe a person make the following choices over a cash payment:

- 85 now $\succ$ 100 next week $\Rightarrow 85 > D(1 \text{ week}) \cdot 100$
- 95 now $\prec$ 100 next week $\Rightarrow 95 < D(1 \text{ week}) \cdot 100$
- 90 now $\sim$ 100 next week $\Rightarrow 90 = D(1 \text{ week}) \cdot 100$
- 95 next week $\sim$ 100 in two weeks $\Rightarrow D(1 \text{ week}) \cdot 95 = D(2 \text{ weeks}) \cdot 100$
- 90 in two weeks $\sim$ 100 in three weeks $\Rightarrow D(2 \text{ weeks}) \cdot 98 = D(3 \text{ weeks}) \cdot 100$

What can we conclude about $D(1 \text{ week})$, etc?

- From first 2 choices: $0.85 < D(1 \text{ week}) < 0.95$
- From 3rd choice: $D(1 \text{ week}) = 0.9$
- From 4th choice: $D(2 \text{ weeks}) = D(1) \cdot 0.95 = 0.86$

Example: Measuring the Discounting Function

Suppose we observe a person make the following choices over a cash payment:

- 85 now $\succ$ 100 next week $\Rightarrow 85 > D(1 \text{ week}) \cdot 100$
- 95 now $\prec$ 100 next week $\Rightarrow 95 < D(1 \text{ week}) \cdot 100$
- 90 now $\sim$ 100 next week $\Rightarrow 90 = D(1 \text{ week}) \cdot 100$
- 95 next week $\sim$ 100 in two weeks $\Rightarrow D(1 \text{ week}) \cdot 95 = D(2 \text{ weeks}) \cdot 100$
- 90 in two weeks $\sim$ 100 in three weeks $\Rightarrow D(2 \text{ weeks}) \cdot 98 = D(3 \text{ weeks}) \cdot 100$

What can we conclude about $D(1 \text{ week})$, etc?

- From first 2 choices: $0.85 < D(1 \text{ week}) < 0.95$
- From 3rd choice: $D(1 \text{ week}) = 0.9$
- From 4th choice: $D(2 \text{ weeks}) = D(1) \cdot 0.95 = 0.86$
- From 5th choice: $D(3 \text{ weeks}) = D(2) \cdot 0.98 = 0.84$

Is this data consistent with exponential discounting or hyperbolic discounting or present bias?

Example: Measuring the Discounting Function

Is this data consistent with exponential discounting or hyperbolic discounting or present bias?

Example: Measuring the Discounting Function

Is this data consistent with exponential discounting or hyperbolic discounting or present bias?

Recall:

- Exponential: $\frac{D(1)}{D(0)} = \frac{D(2)}{D(1)} = \frac{D(3)}{D(2)}$
- Hyperbolic: $\frac{D(1)}{D(0)} < \frac{D(2)}{D(1)} < \frac{D(3)}{D(2)}$
- Present bias: $\frac{D(1)}{D(0)} < \frac{D(2)}{D(1)} = \frac{D(3)}{D(2)}$

From previous slide: $\frac{D(1)}{D(0)} = 0.9$; $\frac{D(2)}{D(1)} = 0.95$; $\frac{D(3)}{D(2)} = 0.98$

Anticipatory Utility

Example: When to go for a nice Dinner?

Suppose you're on a 3-day vacation, and one night you'll go for a nice dinner

- The enjoyment you derive from the dinner itself has value 100
- On day 1 of trip, must make reservation – what day do you pick?

Recall: $u_t(c_t, c_{t+1}) = v(c_t) + \varphi * v(c_{t+1})$

Total intertemporal utility (from period-1 perspective) for each possible choice:

Example: When to go for a nice Dinner?

Suppose you're on a 3-day vacation, and one night you'll go for a nice dinner

- The enjoyment you derive from the dinner itself has value 100
- On day 1 of trip, must make reservation – what day do you pick?

Recall: $u_t(c_t, c_{t+1}) = v(c_t) + \varphi * v(c_{t+1})$

Total intertemporal utility (from period-1 perspective) for each possible choice:

- Day 1: receive $v(\text{dinner}) = 100$ on day 1, 0 day 2; 0 on day 3

Example: When to go for a nice Dinner?

Suppose you're on a 3-day vacation, and one night you'll go for a nice dinner

- The enjoyment you derive from the dinner itself has value 100
- On day 1 of trip, must make reservation – what day do you pick?

Recall: $u_t(c_t, c_{t+1}) = v(c_t) + \varphi * v(c_{t+1})$

Total intertemporal utility (from period-1 perspective) for each possible choice:

- Day 1: receive $v(\text{dinner}) = 100$ on day 1, 0 day 2; 0 on day 3
- Day 2: receive $\varphi * v(\text{dinner}) = \varphi * 100$ on day 1; $\delta * 100 = \delta * 100$ on day 2; 0 on day 3

Example: When to go for a nice Dinner?

Suppose you're on a 3-day vacation, and one night you'll go for a nice dinner

- The enjoyment you derive from the dinner itself has value 100
- On day 1 of trip, must make reservation – what day do you pick?

Recall: $u_t(c_t, c_{t+1}) = v(c_t) + \varphi * v(c_{t+1})$

Total intertemporal utility (from period-1 perspective) for each possible choice:

- Day 1: receive $v(\text{dinner}) = 100$ on day 1, 0 day 2; 0 on day 3
- Day 2: receive $\varphi * v(\text{dinner}) = \varphi * 100$ on day 1; $\delta * 100 = \delta * 100$ on day 2; 0 on day 3
- Day 3: receive 0 on day 1; $\delta * \varphi * v(\text{dinner}) = \delta * \varphi * 100$ on day 2; $\delta^2 * v(\text{dinner}) = \delta^2 * 100$ on day 3

Example: When to go for a nice Dinner?

Suppose you're on a 3-day vacation, and one night you'll go for a nice dinner

- The enjoyment you derive from the dinner itself has value 100
- On day 1 of trip, must make reservation – what day do you pick?

Recall: $u_t(c_t, c_{t+1}) = v(c_t) + \varphi * v(c_{t+1})$

Total intertemporal utility (from period-1 perspective) for each possible choice:

- Day 1: receive $v(\text{dinner}) = 100$ on day 1, 0 day 2; 0 on day 3
- Day 2: receive $\varphi * v(\text{dinner}) = \varphi * 100$ on day 1; $\delta * 100 = \delta * 100$ on day 2; 0 on day 3
- Day 3: receive 0 on day 1; $\delta * \varphi * v(\text{dinner}) = \delta * \varphi * 100$ on day 2; $\delta^2 * v(\text{dinner}) = \delta^2 * 100$ on day 3

If $\varphi + \delta < 1$, optimal to pick day 1; if $\varphi + \delta > 1$, optimal to pick day 2

Consumption-Savings Problems with Anticipatory Ut

- Suppose a person needs to split wealth W across 3 periods
- Much like the previous examples, they might push consumption toward later periods
- We might see $c_1 < c_2 < c_3$
- Note that anticipatory utility pushes in the opposite direction of present bias
- In the real world, both forces are likely happening, which is may explain why don't always see crisp patterns in how people spend over time
  - We can sometimes see overspending in the present (from impatience and present bias) and underspending in the present (due to anticipatory utility)

Next Class

Today: Utility from anticipation

Next class: Projection bias — mispredicting future tastes

Remember:

- Problem Set 4 is due Tuesday — before the start of class