Temptation and Self Control: Evidence

Mark Dean

Behavioral Economics G6943
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A sketch of the theoretical conclusions

- People who suffer from temptation and who are
  - Certain about the future
  - Sophisticated

  Should exhibit preferences for commitment

- Non-exponential discounting should lead to
  - Preference reversals in intertemporal choice
  - Preference for commitment

In this lecture we will talk about the evidence for

- Preference for commitment
- Preference for flexibility
- Preference reversals in discounting experiments
- The link between the two
- Sophistication
Preference for Commitment

- Do we see much evidence for ‘Preference for Commitment’ in the field?
- Arguably not much
- Some evidence for ‘informal’ commitment devices
  - New year’s resolutions
  - Joining a gym
  - ROSCAs
- Most formal commitment devices have been generated by behavioral economists
  - Stiikk
  - Beeminder
  - SMART
- And are relatively small in scale
  - e.g. Stickk has 329,000 ‘commitments’
Can We Generate A Preference for Commitment?

- Two examples:
  - Lab: "Temptation and commitment in the laboratory," [Hauser et al 2010]
    - See also "Eliciting temptation and self-control through menu choices: a lab experiment" [Toussaert 2015]
  - Field: “Self Control at Work” [Kaur et al 2015]
    - See also "Tying Odysseus to the Mast: Evidence from a Commitment Savings Product in the Philippines," [Ashraf et al 2006]
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Basic set up: Counting Task
Temptation and Commitment in the Laboratory

- Basic set up: Counting Task
  - Counting task appeared every 1, 2 or 3 minutes
  - Experiment lasts 2 hrs
  - Subjects earn $15 if they get at least 70% of all counting tasks correct
  - (This is a really unpleasant task)

- Every so often, (and to their surprise) subjects would face a temptation screen
Thank you for participating in today's experiment. You have earned $10.00.

You will now be given access to the internet, so that you can pass the time until the experiment ends for all participants. If you like, you can also continue in the counting experiment. If you continue in the counting experiment you can earn up to an additional $5.00. You will be given access to the internet unless you press the "Continue Counting" button.

Continue Counting

Click here if you want to continue counting without any more opportunities to access the internet. There is a $1.00 charge for clicking this button. You will continue counting until the experiment ends. You can earn up to $4.00 in addition to your earnings.

Continue Counting and Remove Internet-Option

Time left for decision: 102 s
<table>
<thead>
<tr>
<th>Phase</th>
<th>Duration</th>
<th>Number of counting tasks</th>
<th>Number of temptation screens</th>
<th>Commitment cost [in $]</th>
<th>Final payoff if surfing [in $]</th>
<th>Additional payoff for counting to end of experiment [in $]</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>30 min</td>
<td>15</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>45 min</td>
<td>12</td>
<td>6</td>
<td>( C )</td>
<td>( P_1 )</td>
<td>( W_1 = 15 - P_1 )</td>
</tr>
<tr>
<td>2</td>
<td>45 min</td>
<td>12</td>
<td>6</td>
<td>( C )</td>
<td>( P_2 )</td>
<td>( W_2 = 15 - P_2 )</td>
</tr>
</tbody>
</table>
Temptation and Commitment in the Laboratory

Graphs showing commitment and surfing share across temptation screens for different conditions:
- **Commitment Share**
  - **C = $0**
  - **C = $1**

- **Surfing Share**
  - **C = $0**
  - **C = $1**

Specifications for each condition:
- **N(C=$0): 46, N(C=$1): 42**
- **N(W1=$5): 49, N(W1=$7): 39**
Temptation and Commitment in the Laboratory

- There are subjects who prefer commitment (40%)
  - Though few are prepared to pay for it (20%)
- Higher rewards lead to more preference for commitment
  - What one would expect if the pay enters $u$ but not $v$
- Evidence of ‘strict set betweenness’?
  - Subjects will ignore temptation and choose commitment
- Inefficient dynamics:
  - If you are going to pay for commitment, should pay for it straight away
- But there are problems with the design
  - Unmodelled dynamic problem
  - Subjects surprised by surfing screen
  - Temptation and commitment offered at the same time
Can We Generate A Preference for Commitment?

- Two examples:
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• Consider a job in which you get paid piece rate
  • Paid only at the end of the week

• What is the effect of temptation (e.g. hyperbolic discounting)?
  • Pay day effects: work harder when reward is immediate
  • May work less hard in period $t+1$ than would like in period $t$:
    Creates a demand for commitment

• Test this using an experiment with a data entry firm in Mysore, India
• 102 workers over 8 months
• Number of additional fields (over a base of about 5000)
• Size of effect inconsistent with discounting
• Gradual slope: incommensurate with quasi-hyperbolic discounting?
Dominated Contracts: Reduce pay if target is not met

- A form of commitment, as it removes the possibility of producing less than the target at the same pay
• In some weeks, workers offered the chance to choose a target
  
  • Receive half pay if fail to hit target
  
  • t=0 the same as the standard contract
Self Control at Work

Panel B: Treatment Effects of Contracts

<table>
<thead>
<tr>
<th>Sample</th>
<th>Control &amp; Option Obs (1)</th>
<th>Control &amp; Option Obs (2)</th>
<th>Full Sample (3)</th>
<th>Full Sample (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option to choose dominated contract</td>
<td>120</td>
<td>(59)**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evening option to choose dominated contract</td>
<td>156</td>
<td>(69)**</td>
<td>150</td>
<td>0.01</td>
</tr>
<tr>
<td>Morning option to choose dominated contract</td>
<td>84</td>
<td>(69)</td>
<td>73</td>
<td>-0.00</td>
</tr>
<tr>
<td>Target imposed: Low target</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Target imposed: Medium target</td>
<td>213</td>
<td>(91)**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Target imposed: High target</td>
<td>334</td>
<td>(150)**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Observations: worker-days</td>
<td>6310</td>
<td>6310</td>
<td>8423</td>
<td>8423</td>
</tr>
<tr>
<td>R2</td>
<td>0.60</td>
<td>0.60</td>
<td>0.59</td>
<td>0.15</td>
</tr>
<tr>
<td>Dependent variable mean</td>
<td>5311</td>
<td>5311</td>
<td>5337</td>
<td>0.88</td>
</tr>
</tbody>
</table>

- Targets increased output
  - If they were self imposed (columns 1 and 2)
  - Exogenously imposed (3)
Those with high payday impacts more likely to take up dominated contract

Output also more affected
Those with high payday impacts also chose the dominated contract more with experience.
So we **can** generate preference for commitment

But (perhaps) surprisingly little of it

Why?

(At least) two possibilities

- Preference for Flexibility (Discuss this now)
- Lack of sophistication (Discuss after we have talked about time preference experiments)

Not an exhaustive list

- e.g. self signalling?
Preference uncertainty is the enemy of preference for commitment
  - Creates preference for flexibility
Can we find evidence for preference uncertainty?
  - Dean and McNeill [2015]
Preference Uncertainty Model

- $X$ : set of alternatives
- $S$ : set of states
- $\mu \in \Delta(S)$: probability distribution over states
- $u : X \times S \to \mathbb{R}$: utility function
  - $u(x, s)$ utility of alternative $x$ in state $s$
- Preference uncertainty driven by uncertainty about $s$
- Use this model to think about
  - Choices **between** menus of alternatives
  - Choices **from** those menus
- i.e. do people use the flexibility they desire?
• Let $A$ be a menu of alternatives
• Choice from $A$ will take place after the state is known
• Value of $A$ before the state is known given by

\[ U(A) = \sum_{s \in S} \mu(s) \max_{x \in A} u(x, s) \]

• $U$ represents choice between menus
The same model also makes predictions about choices from menus.

\[ P(y, A) : \text{Probability of choosing alternative } y \text{ from menu } A \]

\[ P(y, A) = \sum_{s \in S} \mu(s) \mathbf{1}[x \in \arg \max_{y \in A} u(y, s)] \]

Preference uncertainty implies a link between menu preference and stochastic choice.

- See Ahn and Sarver [2013]
Weak Preference for Flexibility  For any two menus $A \succeq B$,  
$A \cup B \succeq A$

- The union of two menus weakly preferred to each individually
- Rules out ‘preference for commitment’ i.e.  
  $A \cup B \prec A$
  - Observable implication of temptation
- Note: $A \cup B \succ A$ only if there is preference uncertainty (i.e. $S$ is not a singleton)
  - If there is no uncertainty, $A \cup B \sim A$
  - Call this strict preference ‘Preference for Flexibility’
Implications [Ahn and Sarver 2013]

**Consequentialism** \( A \cup \{x\} \succ A \Rightarrow P(x, A \cup \{x\}) > 0 \)

- If you would pay for \( x \) to be added to the menu \( A \), must sometimes choose \( x \)
- If it is never chosen it cannot be increasing the value of the menu

**Responsive Menu Preferences** \( P(x, A \cup \{x\}) > 0 \Rightarrow A \cup \{x\} \succ A \)

- If \( x \) is sometimes chosen when added to \( A \), the larger menu must be preferred
- Except in the case of indifference (which we will discuss later)
• Simulated workplace environment
• Subject perform real effort tasks for payment according to payment contracts
  • Choice from menus
• Subjects choose between different payment contracts
  • Choice between menus
Tasks

- Simple addition tasks

Task 3

422 + 538 =

Entry: |

Time remaining in section: 13:43.
- Low \((L)\), High \((H)\) and Flex \((F)\)

<table>
<thead>
<tr>
<th>Tasks completed</th>
<th>Payment</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-4</td>
<td>0.00</td>
</tr>
<tr>
<td>5-9</td>
<td>0.00</td>
</tr>
<tr>
<td>10-14</td>
<td>0.00</td>
</tr>
<tr>
<td>15-19</td>
<td>0.00</td>
</tr>
<tr>
<td>20-49</td>
<td>0.20</td>
</tr>
<tr>
<td>50+</td>
<td>0.20</td>
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<tr>
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<tr>
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<td>0.20</td>
</tr>
<tr>
<td>50+</td>
<td>0.40</td>
</tr>
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</table>
• Each contact offers two or three undominated options

<table>
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<tr>
<th></th>
<th>Tasks</th>
<th>Payment</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>H</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>F</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

• Note that $F = L \cup H$
### Choice of Contracts

#### Three questions:
- $H$ vs $L$
- $H$ vs $F$
- $L$ vs $F$

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<td>0.00</td>
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</tr>
<tr>
<td>20-49</td>
<td>0.00</td>
<td>20-49</td>
<td>0.20</td>
</tr>
<tr>
<td>50+</td>
<td>0.40</td>
<td>50+</td>
<td>0.40</td>
</tr>
</tbody>
</table>

- Contract 25 + $0.50$
- Contract 25 + $0.15$
- Contract 25 + $0.10$
- Contract 25 + $0.05$
- Contract 25 + $0.01$
- Contract 25
- Contract 24 + $0.01$
- Contract 24 + $0.05$
- Contract 24 + $0.10$
- Contract 24 + $0.15$
- Contract 24 + $0.50$
Experimental Structure - Main Experiment

- Instructions, comprehension check
- Example tasks
- Exogenous contracts section
  - Perform tasks under 3 contracts: High, Low, Flex
- Additional instructions
- Contract selection questions
- Endogenous contract section
  - Realization of one selected contract
- Payment
Identifying Menu Preferences and Random Choice

- **Menu Preferences**
  - Use data from the multiple price list question to construct preferences
  - $A \succ B$ if subject is prepared to pay for menu $A$ over menu $B$
  - $A \sim B$ if neither $A \succ B$ nor $B \succ A$

- **Random choice**
  - In order to estimate random choice need multiple observations
  - Not enough data to do so for individual subjects
  - **Group** subjects based on their menu preferences
  - Estimate random choice function for each group using behavior in exogenous contracts
Evidence for Preference for Flexibility

- Can identify five types of subject
- Preference for flex
  - $F \succ L$ and $F \succ H$
- Standard
  - $F \sim L \succ H$ or $F \sim H \succ L$
- Indifferent
  - $F \sim L \sim H$
- Commitment
  - $L \succ F$ or $H \succ F$
- Intransitive
Evidence for Preference for Flexibility

- Benchmark 1: Uniform random choice over transitive preference profiles
- Benchmark 2: Randomizing between preferences at each choice

<table>
<thead>
<tr>
<th>Type</th>
<th>N</th>
<th>Percent</th>
<th>Benchmark I</th>
<th>p-value</th>
<th>Benchmark II</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexibility</td>
<td>43</td>
<td>35%</td>
<td>17%</td>
<td>0.00</td>
<td>6%</td>
<td>0.00</td>
</tr>
<tr>
<td>Standard</td>
<td>40</td>
<td>32%</td>
<td>17%</td>
<td>0.00</td>
<td>6%</td>
<td>0.00</td>
</tr>
<tr>
<td>Indifferent</td>
<td>23</td>
<td>19%</td>
<td>25%</td>
<td>0.12</td>
<td>13%</td>
<td>0.06</td>
</tr>
<tr>
<td>Commitment</td>
<td>7</td>
<td>6%</td>
<td>42%</td>
<td>0.00</td>
<td>16%</td>
<td>0.00</td>
</tr>
<tr>
<td>Intransitive</td>
<td>11</td>
<td>9%</td>
<td>-</td>
<td>-</td>
<td>59%</td>
<td>0.00</td>
</tr>
</tbody>
</table>
Evidence for Preference for Flexibility

- 85% of subjects can be explained by the model
- 35% can only be explained by the model if there is preference uncertainty
- 15% not explained by the model
- Of which 9% are intransitive
- Very little (6%) evidence of preference for commitment
Evidence for Consequentialism

- Subjects who strictly prefer $F$ to $H$ ($L$) make use of the additional available option
- Do so at a higher rate than those that do not have such a preference
### Evidence for Responsive Menu Preferences

Most subjects who do low (high) number of acts prefer $F$ to $H$ ($L$).

This is near universal in the case of non-indifferent subjects.

<table>
<thead>
<tr>
<th>Do Low number in Flex</th>
<th>Menu Preference: $Flex ≻ High$</th>
<th>All Subj.</th>
<th>Non-Indiff.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do High number in Flex</td>
<td>$Flex ≻ Low$</td>
<td>0.71</td>
<td>0.83</td>
</tr>
</tbody>
</table>

<table>
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• Typical time preference experiment [e.g. Benhabib Bisin Schotter 2007]:
  - Identify $x$ that is indifferent to $y$ in 1 month’s time
  - Identify $z$ in 1 month’s time that is indifferent to $w$ in 2 month’s time

• Approximate the discount rates as

$$
\delta(0, 1) = \frac{x}{y} \\
\delta(1, 2) = \frac{z}{w}
$$

• Evidence of present bias if

$$
\frac{x}{y} < \frac{z}{w}
$$
What are some of the problems with this approach?

- Curvature of the utility function
- Transaction costs/trust
- Income smoothing and shocks
What are some of the problems with this approach?

- Curvature of the utility function
- Transaction costs/trust
- Income smoothing and shocks
Curvature of the Utility Function

- Assume that money is consumed in the period it is received.
- Background consumption $\bar{c}$ in each period
- Indifference point occurs when

$$ u(\bar{c} + x) + \delta(0, 1)u(\bar{c}) + \sum_{t=2}^{\infty} \delta(0, t)u(\bar{c}) $$

$$ = u(\bar{c}) + \delta(0, 1)u(\bar{c} + y) + \sum_{t=2}^{\infty} \delta(0, t)u(\bar{c}) $$

- Which implies

$$ \delta(0, 1) = \frac{u(\bar{c} + x) - u(\bar{c})}{u(\bar{c} + y) - u(\bar{c})} $$

- Which equals $\frac{x}{y}$ only if $u$ is locally linear
- Note, will not affect identification of present bias, but will affect identification of discount factor
Curvature of the Utility Function

- Solution #1: "Eliciting Risk and Time Preferences " [Andersen et al 2008]

- (As the name suggests) measure risk and time preferences for each subject
  - MPL to measure indifference point between present and future consumption
  - MPL to measure indifference point between safe and risky prospects

- Use the latter to estimate curvature of the utility function

- Replace $\frac{x}{y}$ with $\frac{u(x)}{u(y)}$

- Reduces estimated annual discount rates from around 25% to around 10%

- Note: assumes same curvature in ‘risk’ and ‘time’ preferences
Curvature of the Utility Function

- Solution #2: "Estimating Time Preferences from Convex Budgets" [Andreoni and Sprenger]

- Assuming subjects do not pick at the endpoints, can estimate curvature and discount rate
• What are some of the problems with this approach?
  • Curvature of the utility function
  • Transaction costs/trust
  • Income smoothing and shocks
Imagine that you think that the experimenter is forgetful. If they give you the money today, they will remember for sure. If they are supposed to give you the money in the future, there is a $\gamma$ probability they will forget. Then indifference point between today and one month (assuming linear utility) if

$$\frac{x}{y} = \gamma \delta(0, 1)$$

And between one month and two months

$$\frac{z}{w} = \delta(1, 2)$$

Even an exponential discounted will look like they have present bias. Same effect if there are transaction costs to collecting money on any day other than today.
Various authors have made different attempts to solve this problem:

- Andreoni and Sprenger [2013]
  - All payments (current and future) paid to campus mailbox
  - Always payments in all periods
  - Self addressed envelopes
  - Provided with the address of the experimenter

- Halevy [2015]
  - Repeated visits to classroom

- Dean and Sautmann [2015]
  - Repeated survey visits to household

Generally studies that take these measures find little present bias for money
Experiment in urban Mali
Surveyors came to the house every week
No problem with transaction costs or trust
No present bias!
What are some of the problems with this approach?

- Curvature of the utility function
- Transaction costs/trust
- Income smoothing and shocks
So far, we have assumed that experimental payments take place in isolation.

But this may be inappropriate:

- Subjects may suffer shocks to income/value of consumption:
  - Get paid today
  - Have a big bill due today
- May smooth consumption by borrowing and saving.
Income Smoothing and Shocks

- Recall the Strong Hyperbolic Euler Equation

\[
\frac{\partial u(c_t)}{\partial c_t} = R_t E_t \left[ (\beta \delta c_{t+1} + (1 - c'_{ct+1})\delta) \frac{\partial u(c_{t+1})}{\partial c_{t+1}} \right]
\]

\[
= R_t E_t d_t \frac{\partial u(c_{t+1})}{\partial c_{t+1}}
\]

- It can be shown that, if experimental payments are small

\[
\frac{y}{x} = R_t = MRS_t = \frac{\frac{\partial u(c_t)}{\partial c_t}}{E_t \left( d_t \frac{\partial u(c_{t+1})}{\partial c_{t+1}} \right)}
\]

- Experimental payments measure MRS not time prefs
This does **NOT** rely on direct arbitrage of experimental payments

- Only that experimental subjects obey Euler Equation
- Take their actual MRS into account when making experimental decisions
\[
\frac{y}{x} = R_t = MRS_t = \frac{\frac{\partial u(c_t)}{\partial c_t}}{E_t \left(d_t \frac{\partial u(c_{t+1})}{\partial c_{t+1}}\right)}
\]

- What will we see in time preference experiments?
- Depends on the interest rate regime
  - Perfect credit markets with market interest rate \( \bar{R} \)
    \[
    \frac{y}{x} = R_t = \bar{R}
    \]
• No access to credit

\[
\frac{y}{x} = \frac{\frac{\partial u(y_t)}{\partial y_t}}{E_t \left( d_t \frac{\partial u(y_{t+1})}{\partial y_{t+1}} \right) + \frac{\partial u(y_t)}{\partial y_t}} - \frac{\beta \delta E_t \left( \frac{\partial u(y_{t+1})}{\partial y_{t+1}} \right)}}
\]

• No smoothing, but measured MRS affected by shocks
• 'Present bias' individual could just be having a bad day
• Will give \(\beta \delta\) ‘on average’
Income Smoothing and Shocks

- Partial access to credit: $R_t = R(s_t)$
  - Interest rates increase with borrowing (decrease with savings)
- Implies that measured MRS should
  - Fall with exogenous increase in income
  - Rise with an exogenous increase to $\frac{\partial u(c_{t+1})}{\partial c_{t+1}}$ (i.e. expenditure shock such as family illness)
  - Fall with an increase in savings
- Test this using the experiment in Mali
## Income Smoothing and Shocks

<table>
<thead>
<tr>
<th></th>
<th>OLS</th>
<th>OLS</th>
<th>OLS</th>
<th>OLS</th>
<th>IV</th>
<th>IV</th>
<th>CL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labor income</td>
<td>-0.185</td>
<td>-0.189</td>
<td>-0.153</td>
<td>-0.159</td>
<td>-0.262</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.142)</td>
<td>(0.143)</td>
<td>(0.163)</td>
<td>(0.142)</td>
<td>(0.136)</td>
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<tr>
<td>Nonlabor income &quot;endogenous&quot;</td>
<td>-0.330</td>
<td>-0.321</td>
<td>-0.268</td>
<td>-0.265</td>
<td>-0.316</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.251)</td>
<td>(0.258)</td>
<td>(0.261)</td>
<td>(0.270)</td>
<td>(0.282)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nonlabor income &quot;exogenous&quot;</td>
<td>-0.409 **</td>
<td>-0.409 **</td>
<td>-0.382 **</td>
<td>-0.384 **</td>
<td>-0.378 *</td>
<td>-0.380 *</td>
<td>-0.379 *</td>
</tr>
<tr>
<td></td>
<td>(0.142)</td>
<td>(0.149)</td>
<td>(0.125)</td>
<td>(0.133)</td>
<td>(0.171)</td>
<td>(0.149)</td>
<td>(0.171)</td>
</tr>
<tr>
<td>Other spending</td>
<td>0.268 *</td>
<td>0.245 +</td>
<td>0.192</td>
<td>0.177</td>
<td>0.215 +</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.128)</td>
<td>(0.131)</td>
<td>(0.141)</td>
<td>(0.132)</td>
<td>(0.119)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adv. event expense</td>
<td>0.252 +</td>
<td>0.233 +</td>
<td>0.251</td>
<td>0.222</td>
<td>1.683 +</td>
<td>1.562 *</td>
<td>0.390 *</td>
</tr>
<tr>
<td></td>
<td>(0.145)</td>
<td>(0.139)</td>
<td>(0.182)</td>
<td>(0.183)</td>
<td>(0.761)</td>
<td>(0.769)</td>
<td>(0.199)</td>
</tr>
<tr>
<td>1/(error SD)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.916 **</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(0.044)</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>4.69 **</td>
<td>4.782 **</td>
<td>4.56 **</td>
<td>4.67 **</td>
<td>4.527 **</td>
<td>4.622 **</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.011)</td>
<td>(0.059)</td>
<td>(0.093)</td>
<td>(0.125)</td>
<td>(0.144)</td>
<td>(0.145)</td>
<td></td>
</tr>
<tr>
<td>Ind FE</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Time FE</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Observations</td>
<td>2540</td>
<td>2540</td>
<td>2390</td>
<td>2390</td>
<td>2390</td>
<td>2390</td>
<td>12608</td>
</tr>
</tbody>
</table>

*Standard errors clustered at the individual level (in parentheses). Significance levels + p<0.10, * p<0.05, ** p<0.01*
### Table 8: Savings and $MRS_t$.  

<table>
<thead>
<tr>
<th></th>
<th>OLS</th>
<th>OLS</th>
<th>CL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Savings (I-E)</td>
<td>-0.291 **</td>
<td>-0.279 **</td>
<td>-0.291 **</td>
</tr>
<tr>
<td></td>
<td>(0.076)</td>
<td>(0.079)</td>
<td>(0.080)</td>
</tr>
<tr>
<td>1/(error SD)</td>
<td>-</td>
<td>-</td>
<td>0.916 **</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.044)</td>
</tr>
<tr>
<td>Constant</td>
<td>4.584 **</td>
<td>4.673 **</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>(0.029)</td>
<td>(0.070)</td>
<td></td>
</tr>
<tr>
<td>Ind FE</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Time FE</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Observations</td>
<td>2390</td>
<td>2390</td>
<td>12608</td>
</tr>
</tbody>
</table>

*Standard errors clustered at the individual level (in parentheses). Significance levels $p<0.10$, $*p<0.05$, $**p<0.01$*
So what can we learn from time preference experiments?
If people are not 'narrow bracketers’ then not a lot about time preferences

- Measured MRS reports effective market interest rate
- Income and expenditure shocks can look like present bias
- In complete credit constraints case, average of repeated measures can be used to estimate parameters

However, we can potentially learn about the shocks and constrains on a household finances

- Less credit constrained $\Rightarrow$ less volatile MRS
- Positive correlation between spending and MRS $\Rightarrow$ importance of expenditure shocks
Given these problems, how can we measure time preferences?

We could use something other than money

- Primary Rewards: e.g. "Time Discounting for Primary Rewards" [McClure et al 2007]
- Effort: e.g "Working Over Time: Dynamic Inconsistency in Real Effort Tasks" [Augenblick et al 2015]

Does this solve the problem?

Depends on

- Whether or not people suffer shocks to the cost of effort
- Can 'smooth' effort
Job 1 Transcription

Please use the sliders to allocate tasks between Week 2 and Week 3.

- **Decision 1:** TASK RATE 1: 1.50
  - Week 2: 0
  - Week 3: 33

- **Decision 2:** TASK RATE 1: 1.25
  - Week 2: 10
  - Week 3: 32

- **Decision 3:** TASK RATE 1: 1.00
  - Week 2: 19
  - Week 3: 31

- **Decision 4:** TASK RATE 1: 0.75
  - Week 2: 18
  - Week 3: 42

- **Decision 5:** TASK RATE 1: 0.50
  - Week 2: 44
  - Week 3: 12

Submit
<table>
<thead>
<tr>
<th>Present Bias Parameter: $\hat{\beta}$</th>
<th>Monetary Discounting</th>
<th>Effort Discounting</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1) All Delay Lengths</td>
<td>(2) Three Week Delay Lengths</td>
</tr>
<tr>
<td></td>
<td>0.974 (0.009)</td>
<td>0.988 (0.009)</td>
</tr>
<tr>
<td>Daily Discount Factor: $\delta$</td>
<td>0.998 (0.000)</td>
<td>0.997 (0.000)</td>
</tr>
<tr>
<td>Monetary Curvature Parameter: $\hat{\alpha}$</td>
<td>0.975 (0.006)</td>
<td>0.976 (0.005)</td>
</tr>
<tr>
<td>Cost of Effort Parameter: $\gamma$</td>
<td></td>
<td></td>
</tr>
<tr>
<td># Observations</td>
<td>1500</td>
<td>1125</td>
</tr>
<tr>
<td># Clusters</td>
<td>75</td>
<td>75</td>
</tr>
<tr>
<td>Job Effects</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$H_0 : \beta = 1$

$\chi^2(1) = 8.77$ (p < 0.01)  

$H_0 : \beta(\text{Col. 1}) = \beta(\text{Col. 5})$

$\chi^2(1) = 6.37$ (p = 0.01)  

$H_0 : \beta(\text{Col. 2}) = \beta(\text{Col. 5})$

$\chi^2(1) = 8.26$ (p < 0.01)
Augenblick et al. [2015] find preference reversals in the real effort task.

Does this lead to a preference for commitment?

Recall:

- Non-exponential discounting
- Preference reversals
- Demand for commitment

Subjects offered a commitment device

- Choice for effort at $t + 1$ vs $t + 2$ made at time $t$ and $t + 1$
- Commitment: Higher probability that time $t$ choice would be operationalized
Table 4: Monetary and Real Effort Discounting by Commitment

<table>
<thead>
<tr>
<th></th>
<th>Monetary Discounting</th>
<th>Effort Discounting</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Commit (=0)</td>
<td>Commit (=1)</td>
</tr>
<tr>
<td></td>
<td>Tobit</td>
<td>Tobit</td>
</tr>
<tr>
<td>Present Bias Parameter: $\hat{\beta}$</td>
<td>0.999 (0.010)</td>
<td>0.981 (0.013)</td>
</tr>
<tr>
<td>Daily Discount Factor: $\hat{\delta}$</td>
<td>0.997 (0.000)</td>
<td>0.997 (0.001)</td>
</tr>
<tr>
<td>Monetary Curvature Parameter: $\hat{\alpha}$</td>
<td>0.981 (0.009)</td>
<td>0.973 (0.007)</td>
</tr>
<tr>
<td>Cost of Effort Parameter: $\hat{\gamma}$</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td># Observations</td>
<td>420</td>
<td>705</td>
</tr>
<tr>
<td># Clusters</td>
<td>28</td>
<td>47</td>
</tr>
<tr>
<td>Job Effects</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

$H_0: \beta = 1$

- $x_2^2(1) = 0.01$ ($p = 0.94$)
- $x_2^2(1) = 2.15$ ($p = 0.14$)
- $x_2^2(1) = 2.64$ ($p = 0.10$)
- $x_2^2(1) = 9.00$ ($p < 0.01$)

$H_0: \beta(\text{Col. 1}) = \beta(\text{Col. 2})$

- $x_2^2(1) = 1.29$ ($p = 0.26$)

$H_0: \beta(\text{Col. 3}) = \beta(\text{Col. 4})$

- $x_2^2(1) = 4.85$ ($p = 0.03$)
• Subjects who commit have higher measured present bias
• However, as usual, hard to get people to pay for commitment
Is the fact that present bias agents won’t pay for commitment a sign of a lack of sophistication?

Not really

- Technically: violation of sophistication is paying to add an option which you then do not use
- Intuitively: Maybe present bias is not due to non-exponential discounting

Do we have other evidence for lack of sophistication?
"Paying Not to Go to the Gym" [DellaVigna and Malmendier, 2006]

- Test whether people have sophisticated beliefs about their future behavior
- Examine the contract choices of 7978 healthcare members
- Also examine their behavior (i.e. how often they go to the gym)
- Do people overestimate how much they will go to the gym, and so choose the wrong contract?
Three contracts

- Monthly Contract – automatically renews from month to month
- Annual Contract – does not automatically renew
- Pay per usage
 Consumers appear to be overconfident
  - Overestimate future self control in doing costly tasks
    - Going to the gym
    - Cancelling contract
  - 80% of customers who buy monthly contracts would be better off had they paid per visit (assuming same number of visits)
    - Average cost of $17 vs $10
  - Customers predict 9.5 visits per month relative to 4.5 actual visits
  - Customers who choose monthly contracts are 18% more likely to stay beyond a year than those who choose annual contract, and wait 2.29 months after last visit before cancelling
Naivety can also lead people to take up commitment contracts which are bad for them

- "When Commitment Fails - Evidence from a Regular Saver Product in the Philippines" [John 2015]

Subjects offered the chance to take up an "Achiever’s Savings Account"

- Had to make regular payments
- If they failed, paid a ‘default cost’
- Interest rate equal to the standard market rate
• 55% default on contract
• Largely do so ‘immediately’: unlikely to be due to shocks
There are not a lot of naturally occurring commitment devices out there

But people can be induced to take up commitment
  - Often will not pay for it

Two possible reasons for this
  - Preference for flexibility
  - Lack of sophistication

There is evidence for both of these

Time preference experiments run with money are problematic

Other tasks may be better
  - Show more present bias

There is a link between present bias and preference for commitment