THE ROLE OF TEMPTATION AND MARKET SENTIMENT ON SAVINGS AND BORROWING
Facts

- The average U.S. household holds more than $8,000 in revolving credit card debt and $800 billion in aggregate credit card debt (SCF 2004).
- 44% of households have revolving credit card debt but 80% of households also have a retirement savings account.
- Empirical economic literature has consistently documented undersavings than predicted.
- Is this irrational or rational behavior?
  - Penalties to taking out savings to pay debt
  - Economic models have not been able to match credit card borrowing levels

Builds on idea of present-bias but states this bias should be a function of self-control costs.

- Hamburger in periods 2 v. 3 versus 1 v. 2

Formalizes that utility is not only based on the best elements of choice sets, but also its shape.

- Utility may be lower when choosing between hamburger and hummus

Economic models that have come close to matching credit card borrowing / savings levels have all taken the form of models that capture present-bias.
Two-period Example

- On the menu today: no-fat Hummus \( \{x\} \) v. fat-dripping Hamburger \( \{y\} \)
- In morning (period one), \( x \) is strictly preferred to \( y \), but at lunch (period two) \( y \) is tempting → Agent will either use self-control or succumb
- Agent better off if choice sets limited → preferences on menus of lotteries
Hypothesis to Test

- A distinct prediction of the temptation model from other present-bias models is that people are willing to pay a positive amount not to have to go through pain brought by self-control, given that they practice self-control and these costs to this is positive.

  H1: I would not be willing to pay any positive amount to simply limit my choices to the one I would have chosen anyways in the presence of temptation

- In these models, future wealth is a key determinant for the size of these self-control costs

  H2: Market sentiment (or how much I may subjectively perceive may future savings realizations to be) does not effect how I save or borrow today
Experiment

- N = 15 participants
- Asked not to eat or drink 3 hours before the experiment
- Uses a beverage reward system to induce visceral temptation
- Two, 6-round sessions, 1-2 minutes for each round
- Participants told objective is to accumulate as many points as possible
Experiment

- Optimal strategy would have been to save all income and never purchase the beverage
  - Maximum points for period 1 and 2: 34 and 36.7
- In all, 2 people purchased the beverage, both in session 1, and 5 people won a beverage through auction
- Auction used to gauge intrinsic value of the beverage. Difference between this and actual purchase would be lower bound for self-control costs
Concerns

- Thirst impaired better judgement?
- Sample size too small
- Participants not sufficiently thirsty?
- Grand total reward structure and beverage biased results?
Summary of Results

- Not surprisingly, the thirstiest people saved suboptimally.
- Surprisingly, those that bought beverage also had at least moderate aversion towards borrowing.
- Two of three participants who consistently saved 100% took out savings to repay debt in full, only one repaid optimally.
- Both of the participants that bought the beverage did not use money in savings to repay debt. Further, they did not repay debt optimally.
Table 1 provides a summary of the results from the experiment. Participants are said to have saved optimally if they match the criteria stated in the Analysis section. Those that did not meet that criteria are said to have saved suboptimally. Column N shows the number of participants in that particular cohort. BUY gives the number of participants who bought a drink. AUCTION gives the number of participants who won the auction in either session. BORR gives the number of participants who borrowed money during either session. PAYW/S indicates the number of participants who repaid borrowings using savings. PAYOPT indicates the number of participants that repaid debt in the most optimal manner. VeryAverse, ModAverse, and NotAverse lists the number of people in each of the ATB cohort. VeryThirst, ModThirst, and NotThirst lists the number of people in each of the Thirst cohort. The last two columns gives the number of participants that changed their ratings for question one and two between the two session, respectively. For more details, refer to the analysis section.

<table>
<thead>
<tr>
<th>Savings</th>
<th>N</th>
<th>BUY</th>
<th>AUCTION</th>
<th>BORR</th>
<th>PAYW/S</th>
<th>PAYOPT</th>
<th>VeryAverse</th>
<th>ModAverse</th>
<th>NotAverse</th>
<th>VeryThirst</th>
<th>ModThirst</th>
<th>NotThirst</th>
<th>ΔThirst</th>
<th>ΔAverse</th>
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<tbody>
<tr>
<td>Saved Optimally</td>
<td>11</td>
<td>0</td>
<td>3</td>
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<td>2</td>
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<td>4</td>
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<td>1</td>
<td>5</td>
<td>5</td>
<td>6</td>
<td>2</td>
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<tr>
<td>Saved Suboptimally</td>
<td>4</td>
<td>2</td>
<td>2</td>
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<td>1</td>
<td>0</td>
<td>0</td>
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</tr>
</tbody>
</table>
Table 2

Table 2 provides a summary of the results from the experiment. Participants are assigned to a Thirst cohort depending on their rating for question one in the first session. There are three Thirst cohorts: Very (7-10 rating), Moderately (4-6 rating) and Not (1-3 rating) thirsty. Column N shows the number of participants in that particular cohort. SAVOPT liss the number of participants who saved optimally during both of the sessions. BUY gives the number of participants who bought a drink. AUCTION gives the number of participants who won the auction in either session. BORR gives the number of participants who borrowed money during either session. PAYW/S indicates the number of participants who repaid borrowings using savings. PAYOPT indicates the number of participants that repaid debt in the most optimal manner. VeryAverse, ModAverse, and NotAverse lists the number of people in each of the ATB cohort. The last two columns gives the number of participants that changed their ratings for question one and two between the two session, respectively. For more details, refer to the analysis section.

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<tr>
<th>Thirsty Cohort</th>
<th>N</th>
<th>SAVOPT</th>
<th>BUY</th>
<th>AUCTION</th>
<th>BORR</th>
<th>PAYW/S</th>
<th>PAYOPT</th>
<th>VeryAverse</th>
<th>ModAverse</th>
<th>NotAverse</th>
<th>ΔThirst</th>
<th>ΔAverse</th>
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<tbody>
<tr>
<td>Very</td>
<td>4</td>
<td>1</td>
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<td>2</td>
<td>1</td>
<td>0</td>
<td>1</td>
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<td>0</td>
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<td>1</td>
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<tr>
<td>Moderately</td>
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<td>5</td>
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<td>1</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>1</td>
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<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Not</td>
<td>6</td>
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<td>0</td>
<td>2</td>
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<td>1</td>
<td>1</td>
<td>2</td>
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<td>2</td>
</tr>
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Table 3

Table 3 provides a summary of the results from the experiment. Participants are said to have saved optimally if they match the criteria stated in the Analysis section. Those that did not meet that criteria are said to have saved suboptimally. Column N shows the number of participants in that particular cohort. Columns 3 to 5 show how many participants answered 0, 1 or >1 to question 3 in the first session. Columns 6-8 show the similar responses to session 2. STATESAV lists the number of participants who said that the state of the world did effect their savings. The last three columns list the number of participants who does not have a credit card, has one with a positive balance, and has one but does not carry a positive balance.

<table>
<thead>
<tr>
<th>Savings</th>
<th>N</th>
<th>1STCOST0</th>
<th>1STCOST1</th>
<th>1STCOST&gt;1</th>
<th>2NDCOST0</th>
<th>2NDCOST1</th>
<th>2NDCOST&gt;1</th>
<th>STATESAV</th>
<th>CARDN/A</th>
<th>CARD+</th>
<th>CARD0</th>
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</thead>
<tbody>
<tr>
<td>Saved Optimally</td>
<td>11</td>
<td>8</td>
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<td>1</td>
<td>8</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>4</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Saved Suboptimally</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>3</td>
<td>0</td>
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<thead>
<tr>
<th>Thirsty Cohort</th>
<th>N</th>
<th>1STCOST0</th>
<th>1STCOST1</th>
<th>1STCOST&gt;1</th>
<th>2NDCOST0</th>
<th>2NDCOST1</th>
<th>2NSCOST&gt;1</th>
<th>STATESAV</th>
<th>CARDN/A</th>
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<tbody>
<tr>
<td>Very</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Moderately</td>
<td>5</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Not</td>
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<td>0</td>
<td>1</td>
<td>3</td>
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</tr>
</tbody>
</table>
Conclusion

- Self-control costs do appear to play a role in savings and borrowing
- How market sentiment effects savings / borrowing decisions unclear
- Participants borrowed even though none have low apprehension to borrowing
- Heterogeneous, not homogeneous heuristics
  - Models incorporating GP axioms should not be in representative, but heterogeneous agents
- Design of the experiment can be improved