Charging Myopically Ahead
Evidence on Present-Biased Preferences and Credit Card Borrowing

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. . . for everything else there are credit cards!

Consumer Debt in the US

1. Households carry large amount of debt
   - On average, $12,900 in non-mortgage debt
   - 20% on credit cards (SCF 2004)
   - Consumers owed in total $930b in revolving credit (Fed, 2007)
2. Large heterogeneity in credit card borrowing:
   - Only 58% of cardholders had a balance and, on average, $5,100 in revolving debt (SCF 2004)

This paper:

Empirically tests whether impatience and present biased preferences explain such heterogeneity in credit card borrowing

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The Effect of Present-Biased Preferences

- We focus on two factors potentially affecting credit decisions:

  1. How important is the future? $\rightarrow$ the discount factor
  2. How important is **instantaneous** gratification? $\rightarrow$ present bias

- The effect of present bias:
  - People may value the present too much given their long-run plan
    $\rightarrow$ dynamic inconsistency
  - Overborrowing given long-run plan (discount factor)
  - Evidence on existence of present bias:
    - **Instantaneous** benefits trigger affective decision-making system
      (McClure et al. 2007)
    - Survey by Frederick et al. (2002)

Should We Care About Present-Bias?

- Individuals borrow too much given their own long-run plan
    - Many individuals claim to have debt problems
    - Growing client base and revenue of counseling industry
- Competition on price might not work (Ausubel 1991, Gabaix and Laibson 2006)
    - Credit card operations are very profitable
$\rightarrow$ Regulation?

- Prominent in behavioral economics literature. Evidence?

Two Previous Empirical Approaches

1. Measuring discount rates from aggregate data
   - Laibson et al. (2005, 2007)
   - Shui and Ausubel (2005)
   - Skiba and Tobacman (2007)

2. Combining experimentally measured discount rates and *self-reported* spending patterns
   - Harrison et al. (2002)
   - Dohmen et al. (2006)

- As self-reported debt data is particularly problematic, we combine objective credit data and choice experiments

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Preview of Results

- Field study that combines. . .
    - Choice experiments to measure time preferences
    - Objective credit data from individual credit reports
    - Income information from tax data

1. Substantial heterogeneity in time preferences and present bias

2. Long-run discount factors are not associated with revolving debt

3. Present bias is associated with revolving debt

4. Result is particularly strong for people with at least one credit card

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Outline

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Conceptual Framework

- $(\beta\text{-}\delta)$-model (e.g. Laibson '97) represents one formulation:

  $U_i = u(c_t) + \beta(\delta(u(c_{t+1}) + \delta^2 u(c_{t+2}) + \ldots + \delta^T u(c_{t+T}))$

  - β: present-bias parameter
  - δ: long-run discount factor

- Implications for discounting:
  - More patient in the long vs. the short-run
  - More impatient when present is involved $\rightarrow$ dynamic inconsistency

Example: Choice of a Present-Biased Individual

Today vs. 1 month	**6 vs. 7 months**
Indifferent between . . .	Indifferent between . . .
\$65 today and \$80 in one month	\$75 in 6 and \$80 in 7 months
Discount factor = 0.81	Discount factor = 0.94
$\beta = 0.86$ & $\delta = 0.94$	

Outline

Setup of Field Study

- Volunteer Income Tax Assistance (VITA) sites
  - Currently 22 sites in Boston
  - Volunteers provide EITC recipients with free tax preparation
- Procedure of study in VITA sites
  - Participants get offered access to their credit report
  - Independently, measuring individual's time preferences
  - Match credit data, time preferences, and tax data
- Field study in two sites in two years
  - 2006 in Dorchester ($N = 139$)
  - 2007 in Roxbury ($N = 467$)
- 606 individuals without mortgages
- 541 have a usable measure of time preferences

Selection of Subjects

- By design, focus on LMI individuals
    - For LMI families, suboptimal behavior can have severe implications
    - Growing market for marginal borrowers
- In addition, selection of more patient and more sophisticated individuals (Meier and Sprenger 2008b)

Socio-Demographic Characteristics

Variable	N	Mean	s.d.
Age	541	35.9	13.4
Gender (Male=1)	510	0.35	0.48
Race (African-American=1)	491	0.80	0.40
College Experience (=1)	465	0.52	0.50
Disposable Income	541	18,517	13,693
# of Dependents	541	0.52	0.84

Panel A in Table 1

Credit Data

- In the US, three major credit bureaus collect detailed information on individuals' credit history
- Reports from *TransUnion & Co.* provide objective data on:
  1. Amount on revolving accounts (mainly credit cards)
  2. Credit (FICO) score (between 300 and 850)
  3. Information about credit constraints

  (Revolving balance much lower for those 'who pay full amount at end of month')

Design of Choice Experiments (1/2)

- Choices between a smaller reward ($$X$) in period t and a larger reward ($$Y > X) in period $t + \tau > t$

Example: $t = 0$, $\tau = 1$: Option A (**TODAY**) or Option B (**IN A MONTH**)

Decision (1): $ 75 guaranteed **today** - $ 80 guaranteed **in a month**
Decision (2): $ 70 guaranteed **today** - $ 80 guaranteed **in a month**
Decision (3): $ 65 guaranteed **today** - $ 80 guaranteed **in a month**
Decision (4): $ 60 guaranteed **today** - $ 80 guaranteed **in a month**
Decision (5): $ 50 guaranteed **today** - $ 80 guaranteed **in a month**
Decision (6): $ 40 guaranteed **today** - $ 80 guaranteed **in a month**

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Design of Choice Experiments (2/2)

- X is varied in three time frames:
    1. t is the present ($t = 0$) and τ is one month ($\tau = 1$)
    2. t is the present ($t = 0$) and τ is six months ($\tau = 6$)
    3. t is in six months ($t = 6$) and τ is seven months ($\tau = 1$)
- Y and X varies in 2006 and 2007
    - 2006: $Y = 80$ and X varied from \$75 to \$30
    - 2007: $Y = 50$ and X varied from \$49 to \$14
- Both studies are analyzed jointly controlling for the year

Payments

- 10% of participants were paid according to their choices
- Determined by raffle ticket
- To ensure credibility of payments
    - Money orders filled out on the spot
    - Payment guaranteed by Federal Reserve Bank
    - Send by mail (pseudo front-end-delay)

Measures of Impatience

Our measures of impatience:

1. Individual discount factor (*IDF*)
   - Average monthly discount factor = 0.86
2. Present bias
   - 25% are present-biased (= dynamically inconsistent)
   - (2% are future-biased)

Choices in the Experiment and Credit Constraints?

- Measuring time preferences using monetary rewards:
  - Similar to using primary rewards (Reuben et al. 2008)
  - Similar to using response rate data (Chabris et al. 2008)

- Present Bias does not correlate with credit limit
- Present Bias predicts borrowing one-year later
- Controlling for credit limit and FICO does not affect results

Outline

Empirical Specifications

$$Borrowing_i = \alpha + \gamma_1 Discount\ Factor_i + \gamma_2 Present\ Biased_i$$
$$+ \gamma_4 Y_i + \gamma_5 X_i + \epsilon_i$$

- $Borrowing_i$: individual i's balance on revolving accounts
- $Discount\ Factor_i$: i's discount factor (the closer to one the more patient)
- $Present\ Biased_i$: Dummy $= 1$ if individual i is present-biased
- Y_i: dummy for the year of study
- X_i: control variables (age, gender, race, education, future-biased, disposable income and the number of dependents)

Difference in Outstanding Balances & Present Bias
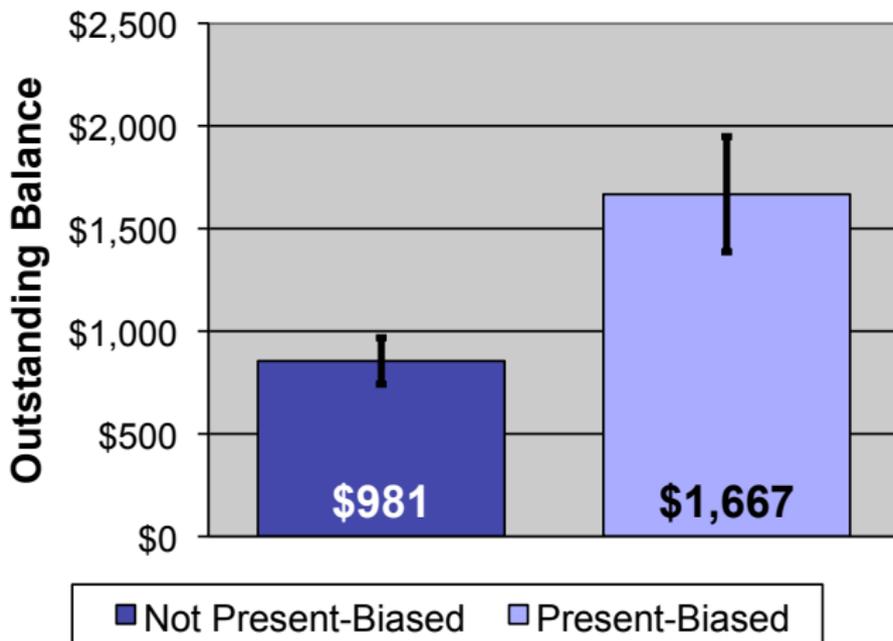
Note: Outstanding Balance on Revolving Accounts. N = 541. Standard errors of the mean. *p* < 0.01 in *t*-test.

Present Bias and Credit Card Borrowing

Dependent variable: Outstanding balance on revolving accounts

	(1)	(2)
IDF	1746.343	113.774
	(1604.307)	(1573.015)
Present Bias (=1)	1246.680**	1588.578***
	(516.997)	(507.844)
Dummy for Year of Study	Yes	Yes
Control Variables	No	Yes
Log Likelihood	-2352.80	-2324.70
N	541	541

Note: This is table 2. Tobit regressions. Standard errors in parentheses. Control variables include ln(disposable income), number of dependents, age, gender, race, college experience, future-biased and dummies for imputed income, age, gender, race, and education.
Level of significance: $^*p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

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Borrowing One Year After Choice Experiments

- Does choice experiments in period t predict borrowing in $t + 1$?
- For 2006 sample, we got access to credit reports one year later

Borrowing One Year After Choice Experiments
Dependent variable: Outstanding balance one year after choice experiment

	(1)	(2)
IDF	5613.736	2229.050
	(7568.913)	(7099.805)
Present Bias (=1)	3069.762*	3013.868*
	(1649.718)	(1595.827)
Control Variables	No	Yes
Log Likelihood	-701.50	-694.10
N	123	123

Note: This is table 3. Tobit regressions. Standard errors in parentheses. The sample consists of participants in 2006. Control variables include ln(disposable income), number of dependents, age, gender, race, college experience, a constant term and dummies for imputed gender, race, education, and future bias.
Level of significance: $*p < 0.1$

Borrowing Conditional on Having a Credit Card

- Commitment not to have a credit card or to have a low credit limit
- $\rightarrow$ Control for credit limit > 0 and level of limit

- Firms might charge higher rates for present-biased individuals
- $\rightarrow$ Control for FICO score as a proxy for interest rate

Borrowing Controlling for Limit and FICO

Dependent variable: Outstanding balance on revolving accounts

	(1)	(2)
$\overline{IDF}$	-147.858	-234.196
	(1586.510)	(1316.621)
Present Bias (=1)	1842.106***	2101.634***
	(526.882)	(432.810)
ln(Credit Limit)		1448.964***
		(137.079)
FICO Score		-6.755***
		(2.579)
Dummy for Year of Study	Yes	Yes
Control Variables	No	Yes
Log Likelihood	-2057.74	-1993.89
N	269	269

Note: This is Table 5. Tobit regressions. Standard errors in parentheses. Control variables include ln(disposable income), number of dependents, age, gender, race, college experience, future-biased and dummies for imputed income, age, gender, race, and education.
Level of significance: *$p < 0.1$, **$p < 0.05$, ***$p < 0.01$

Robustness

The results are robust to . . .

- Alternative measures of dynamic inconsistency
- Including risk attitudes and moving expectations
- Non-missing control variables
- Including multiple switchers

Outline

Conclusions

- Study combining experiments with behavior outside the 'lab'

- Structure of time preferences can explain credit behavior
  - Long-run discount rate does not explain borrowing
  - Present-biased preferences are highly correlated with credit card borrowing

- Implications:
  - Behavioral IO
  - Protecting vulnerable consumers?

- Future work:
  - Present Bias and credit contracts: FRM vs. ARM?
  - Sophistication and commitment?

THANK YOU!

Outline

5. Additional Materials

Information on Credit Behavior

Variable	N	Mean	s.d.
Debt (=1)	541	0.41	0.49
Revolving Balance	541	1,059	2,414
Credit Constrained (=1)	541	0.55	0.50
Revolving Credit Limit	541	4,764	11,850
Amount Able to Borrow	541	3,754	10,709
Having a Revolving Account (=1)	541	0.53	0.50
FICO Score	390	610	84

Panel B in Table 1

Challenges

- "Multiple switchers"?
    - 11% are excluded in the main analysis
    - Inclusion does not change results qualitatively
- Outside borrowing and lending opportunities?
    - Invest money if higher outside interest rate
      Interest rate in $\tau = 1 >$ than in $\tau = 6 \rightarrow$ but still more patient choices in latter
    - Borrow externally and pay off with lab money
      But, not many choose $Y
- Credit constrained individuals appear impatient?
    - Credit constraints are not correlated with $\overline{IDF}$ or present/future bias
    - Controlling for credit constraints does not change results

Decisions Affected by Outside Borrowing and Lending Opportunities?

- Arbitrage experiment if higher lending opportunities
  - In $\tau = 1$ implied interest rate is 27% (2007) and 116% (2006), which is hard to beat
  - In $\tau = 6$ implied interest rate is substantially lower

Borrowing Conditional on Having a Credit Card

Dependent variable: Outstanding balance on revolving accounts

	(1)	(2)
$\overline{IDF}$	-332.459	-747.800
	(1565.758)	(1282.354)
Present Bias (=1)	1651.144***	2033.051***
	(509.402)	(422.587)
ln(Credit Limit)		1290.379***
		(114.640)
Dummy for Year of Study	Yes	Yes
Control Variables	No	Yes
Log Likelihood	-2141.73	-2076.86
N	285	285

Note: This is Table 4. Tobit regressions. Standard errors in parentheses. Control variables include ln(disposable income), number of dependents, age, gender, race, college experience, future-biased and dummies for imputed income, age, gender, race, and education.
Level of significance: *$p < 0.1$, **$p < 0.05$, ***$p < 0.01$