TIME PREFERENCES

Applications

EE416 SEM 2/2021

SUNSIREE KOSINDESHA

GOLDEN EGGS AND HYPERBOLIC DISCOUNTING

DAVID LAIBSON

1997

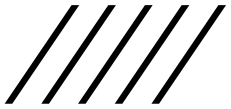
GOLDEN EGGS AND HYPERBOLIC DISCOUNTING*

DAVID LAIBSON

Hyperbolic discount functions induce dynamically inconsistent preferences, implying a motive for consumers to constrain their own future choices. This paper analyzes the decisions of a hyperbolic consumer who has access to an imperfect commitment technology: an illiquid asset whose sale must be initiated one period before the sale proceeds are received. The model predicts that consumption tracks income, and the model explains why consumers have asset-specific marginal propensities to consume. The model suggests that financial innovation may have caused the ongoing decline in U. S. savings rates, since financial innovation increases liquidity, eliminating commitment opportunities. Finally, the model implies that financial market innovation may reduce welfare by providing "too much" liquidity.

Laibson (QJE 1997)

- This is the first paper to apply present-biased preferences to savings-consumption decisions.
- Explores the role of illiquid assets as an imperfect commitment technology in saving-consumption decisions
  - Intrapersonal commitment phenomena
- Illiquid assets: Assets for which either
  - (i) there is a period of time before which you can convert them to cash, or
  - (ii) there is a penalty if you convert them to cash.



Laibson (QJE 1997): Golden egg

- The illiquid assets have the same property as the goose that laid golden eggs.
- The asset promises to generate substantial benefits in the long run, but these benefits are difficult, if not impossible, to realize immediately.
- Trying to do so will result in a substantial capital loss.

Laibson (QJE 1997): Model

- Consumer makes decisions in periods $1, \ldots, T$.
- One liquid asset x and one illiquid asset z.
  - x_t is amount saved in liquid asset in period t
  - z_t is amount saved in iliquid asset in period t
- Exogenous initial asset holdings $x_0, z_0 \geq 0$.

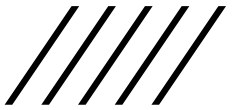
Laibson (QJE 1997): Model

- In period t:
  - earns labor income y_t
  - earns asset income $R_t(x_{t-1} + z_{t-1})$, $R_t = 1 + r_t$ gross return
  - gets access to her liquid savings, $R_t x_{t-1}$
  - chooses consumption c_t and new asset allocation x_t and z_t such that:

$$c_t + x_t + z_t = y_t + R_t(x_{t-1} + z_{t-1})$$

$$c_t \leq y_t + R_t x_{t-1}$$

$$x_t, z_t \geq 0$$

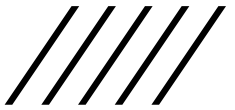


Laibson (QJE 1997): Model

- Period-t intertemporal preferences:

$$U^t = E_t\left[u(c_t) + \beta \sum_{\tau=1}^{T-t} \delta^\tau u(c_{t+\tau})\right]$$

- $0 < \beta < 1$
- This is β, δ time preferences, which mimics the qualitative property of the hyperbolic discount function $(1 + \alpha\tau)^{-\gamma/\alpha}$, $\alpha, \gamma > 0$, discounting events τ periods away.
- Assumes sophistication



Laibson (QJE 1997): Implications

- Hyperbolic discounters endogenously tie up their wealth in illiquid assets (avoid holding wealth in liquid assets).
  - Use illiquid asset to constrain their own future choices
- Hyperbolic discounters will exhibit comovement of consumption and income.
- For hyperbolic discounters, financial innovations that reduce illiquidity (e.g., credit cards) may decrease the savings rate and decrease welfare.

IS THERE A DAILY DISCOUNT RATE?

EVIDENCE FROM THE FOOD STAMP NUTRITION CYCLE

JESSE M. SHAPIRO

2005

ELSEVIER

Journal of Public Economics 89 (2005) 303–325

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Is there a daily discount rate? Evidence from the food stamp nutrition cycle

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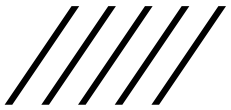
Abstract

Quasi-hyperbolic discounting predicts impatience over short-run tradeoffs. I present a direct non-laboratory test of this implication using data on the nutritional intake of food stamp recipients. Caloric intake declines by 10 to 15 percent over the food stamp month, implying a significant preference for immediate consumption. These findings constitute a rejection of the permanent income hypothesis and are extremely difficult to reconcile with exponential discounting. The data support an explanation based on time preference and reject several alternative explanations, including highly elastic intertemporal substitution. I explore implications for the optimal timing of transfer payments under alternative assumptions about preferences.

Shapiro (2005)

- Several government programs, such as SNAP (food stamps) issue benefits to recipients as a monthly lump sum.
- Receive a voucher (~$130) once a month that can only be redeemed for food
- Recipients can choose to consume these benefits all at once or consume them steadily throughout the month.
- For certain goods (e.g., food), consumers are likely better off with, at least a somewhat smooth consumption path.



- Shapiro (2005) tests for the presence of short-run impatience using data on the caloric intake of food stamp recipients.

Table 1
Monthly patterns in food intake

Dependent variable	(1) log(caloric intake)	(2) log(caloric intake)	(3) caloric intake
Days since receipt of food stamps	− 0.0045 (0.0021)	− 0.0040 (0.0019)	− 7.9439 (3.1772)
Demographics?	No	Yes	No
Dataset	CSFII	CSFII	CSFII
Number of observations	6652	6652	6652
R^2	0.0796	0.1895	0.0966

Shapiro (2005): Results

- For each day after benefit receipt, caloric intake decreases by .4 percent holding demographic characteristics constant.

- The last day of the benefit month, you eat about ~12% fewer calories than on the day you received food stamps.

Does the Exponential Model Match the Data?

- If I decrease consumption each day by .4 percent (0.004), this corresponds to a daily discount factor of .996

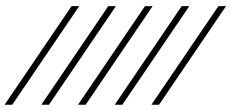
- If $\delta = 0.996, t = one\ day$

➢I discount tomorrow's consumption by: 0.996

➢I discount consumption in a year by: $0.996^{365} = .23$
$(\text{note: } 0.999^{365} = .69)$

➢I discount consumption in 5 year by: $0.996^{365\times5} = .0007$
$(\text{note: } 0.999^{365\times5} = .16)$

- Implausible level of long term patience!



Take-away

- Provides evidence that food stamp recipients consume more calories at the beginning of the benefit period than at the end

➔important for policy

- This daily discount rate suggests implausible long-term discount rates using an exponential discounting model

➔ important for theory

PAYING NOT TO GO TO THE GYM

DELLAVIGNA&
MALMENDIER
2006

Paying Not to Go to the Gym

By STEFANO DELLAVIGNA AND ULRIKE MALMENDIER*

How do consumers choose from a menu of contracts? We analyze a novel dataset from three U.S. health clubs with information on both the contractual choice and the day-to-day attendance decisions of 7,752 members over three years. The observed consumer behavior is difficult to reconcile with standard preferences and beliefs. First, members who choose a contract with a flat monthly fee of over $70 attend on average 4.3 times per month. They pay a price per expected visit of more than $17, even though they could pay $10 per visit using a 10-visit pass. On average, these users forgo savings of $600 during their membership. Second, consumers who choose a monthly contract are 17 percent more likely to stay enrolled beyond one year than users committing for a year. This is surprising because monthly members pay higher fees for the option to cancel each month. We also document cancellation delays and attendance expectations, among other findings. Leading explanations for our findings are overconfidence about future self-control or about future efficiency. Overconfident agents overestimate attendance as well as the cancellation probability of automatically renewed contracts. Our results suggest that making inferences from observed contract choice under the rational expectation hypothesis can lead to biases in the estimation of consumer preferences. (*JEL* D00, D12, D91)

"Saturday 31 December. New Year's Resolutions. I WILL [...] go to the gym three times a week not merely to buy sandwich."
Bridget Jones's Diary: A Novel

"Monday 28 April. [...] Gym visits 0, no. of gym visits so far this year 1, cost of gym membership per year £370; cost of single gym visit £123 (v. bad economy)."
Bridget Jones: The Edge of Reason

Many firms offer consumers a menu of contracts. Cellular phone users choose combinations of monthly airtime minutes and prices. Credit card users choose between teaser rate offers and contracts with a constant interest rate. A large literature in industrial organization analyzes the profit-maximizing contract design (Jean Tirole, 1988). A standard assumption in this literature is that consumers have rational expectations about their future consumption frequency and choose the utility-maximizing contract.

In this paper, we provide evidence that this may not always be the case. We present a novel dataset from three U.S. health clubs that allows us to analyze the contractual choices of consumers in light of their actual consumption behav-

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DellaVigna and Malmendier (2006)

- Exercise as an investment good
- Immediate cost, future benefit
- Present-Bias: Temptation not to exercise

DellaVigna and Malmendier (2006)

- DellaVigna and Malmendier (2006) look at different gym membership contracts
- (i) Pay-as-you-go: $10 per visit
- (ii) Monthly membership: $70/month

- Standard model says you should buy membership if you plan to go more than 7 times per month.

- Finding: the average member only goes 4 times!

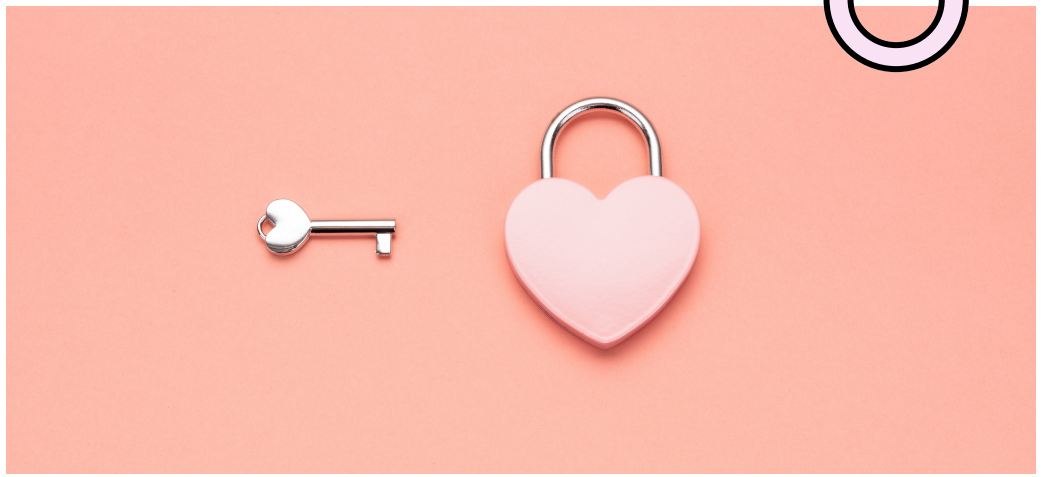
Result

TABLE 3—PRICE PER AVERAGE ATTENDANCE AT ENROLLMENT

	Sample: No subsidy, all clubs		
	Average price per month (1)	Average attendance per month (2)	Average price per average attendance (3)
	Users initially enrolled with a monthly contract		
Month 1	55.23	3.45	16.01
	(0.80)	(0.13)	(0.66)
	$N = 829$	$N = 829$	$N = 829$
Month 2	80.65	5.46	14.76
	(0.45)	(0.19)	(0.52)
	$N = 758$	$N = 758$	$N = 758$
Month 3	70.18	4.89	14.34
	(1.05)	(0.18)	(0.58)
	$N = 753$	$N = 753$	$N = 753$
Month 4	81.79	4.57	17.89
	(0.26)	(0.19)	(0.75)
	$N = 728$	$N = 728$	$N = 728$
Month 5	81.93	4.42	18.53
	(0.25)	(0.19)	(0.80)
	$N = 701$	$N = 701$	$N = 701$
Month 6	81.94	4.32	18.95
	(0.29)	(0.19)	(0.84)
	$N = 607$	$N = 607$	$N = 607$
Months 1 to 6	75.26	4.36	17.27
	(0.27)	(0.14)	(0.54)
	$N = 866$	$N = 866$	$N = 866$
	Users initially enrolled with an annual contract, who joined at least 14 months before the end of sample period		
Year 1	66.32	4.36	15.22
	(0.37)	(0.36)	(1.25)
	$N = 145$	$N = 145$	$N = 145$

TYING ODYSSEUS TO THE MAST: EVIDENCE FROM A COMMITMENT SAVINGS PRODUCT IN THE PHILIPPINES

ASHRAF, KARLAN, & YIN



TYING ODYSSEUS TO THE MAST: EVIDENCE FROM A COMMITMENT SAVINGS PRODUCT IN THE PHILIPPINES*

NAVA ASHRAF
DEAN KARLAN
WESLEY YIN

We designed a commitment savings product for a Philippine bank and implemented it using a randomized control methodology. The savings product was intended for individuals who want to commit now to restrict access to their savings, and who were sophisticated enough to engage in such a mechanism. We conducted a baseline survey on 1777 existing or former clients of a bank. One month later, we offered the commitment product to a randomly chosen subset of 710 clients; 202 (28.4 percent) accepted the offer and opened the account. In the baseline survey, we asked hypothetical time discounting questions. Women who exhibited a lower discount rate for future relative to current trade-offs, and hence potentially have a preference for commitment, were indeed significantly more likely to open the commitment savings account. After twelve months, average savings balances increased by 81 percentage points for those clients assigned to the treatment group relative to those assigned to the control group. We conclude that the savings response represents a lasting change in savings, and not merely a short-term response to a new product.

It can be difficult to save. Why?

- Three broad classes of reasons:
  1. Pressure from others
  2. Pressure from yourself
  3. Lack of secure ways to save

- If savings is useful for *ex ante* consumption smoothing (among other things), then devices that help overcome 1, 2 or 3 may increase welfare by facilitating smoothing

- Of course, informal financial institutions do exist and for some savers they are likely to be sufficient.

Program and design

Commitment savings product offered by a local bank

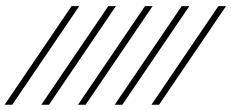
“SEED: Save, Earn, Enjoy Deposits”

- Two ways to set goals: specify amount, or date
- Participants also wrote down a “savings goal” indicating desired use of savings
- Lockbox provided upon request

Program and design

- Lockbox provided upon request
  - Physical ‘piggy bank’ to keep at home
  - Bank holds the key
  - Allowed for frequent small deposits without traveling to bank
  - Breakable if necessary

- Interest rate same as on normal savings accounts: 4%
- This account was a pure commitment savings product that restricted access to deposits as per the client’s instructions upon opening the account, but did not compensate the client for this restriction.



- Uptake is higher for those found to be time inconsistent (impatient now, but patient for future trade-offs)
- Effect is only present for women
- Effects of education and income are statistically significant
- Female effect is driven by single women, so likely not a spousal control story

TABLE V
DETERMINANTS OF SEED TAKE-UP
PROBIT

	(1) All	(2) All	(3) Female	(4) Male
Time inconsistent	0.125*	0.005	0.158*	0.046
	(0.067)	(0.080)	(0.085)	(0.098)
Impatient, now versus 1 month	−0.030	−0.039	−0.036	−0.041
	(0.050)	(0.050)	(0.062)	(0.075)
Patient, now versus 1 month	0.076	0.070	0.035	0.119
	(0.072)	(0.072)	(0.089)	(0.110)
Impatient, 6 months versus 7 months	0.097	0.108*	0.124	0.078
	(0.065)	(0.065)	(0.087)	(0.091)
Patient, 6 months versus 7 months	0.015	0.022	0.057	−0.021
	(0.064)	(0.064)	(0.081)	(0.093)
Female	0.099	0.070		
	(0.137)	(0.138)		
Female X time inconsistent		0.191**		
		(0.090)		
Married X female	−0.113	−0.117		
	(0.091)	(0.090)		
Married	0.049	0.050	−0.080	0.054
	(0.077)	(0.076)	(0.051)	(0.068)
Some college	0.083**	0.081**	0.081	0.079
	(0.038)	(0.038)	(0.050)	(0.055)
Number of household members	0.000	−0.000	0.003	−0.006
	(0.008)	(0.008)	(0.010)	(0.011)
Unemployed	0.040	0.033	0.039	0.059
	(0.109)	(0.108)	(0.115)	(0.290)
Age	−0.002	−0.002	−0.001	−0.003
	(0.001)	(0.001)	(0.002)	(0.002)
Lending client from bank	−0.014	−0.014	−0.059	0.036
	(0.036)	(0.036)	(0.046)	(0.053)
Lending client with default	−0.032	−0.036	−0.019	−0.057
	(0.072)	(0.071)	(0.088)	(0.103)
Total household income	0.049	0.050	0.136***	−0.026
	(0.031)	(0.031)	(0.045)	(0.043)
Total household monthly income—squared	−0.008*	−0.008*	−0.024***	0.001
	(0.004)	(0.004)	(0.008)	(0.004)

Reference

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- O’Donoghue, Ted. 2019. “Applications of present bias” Lecture Note for ECON 7580, Cornell University