Common Pool Problem?

Money on the Table

U.S. MID-RANGE ABATEMENT CURVE – 2030
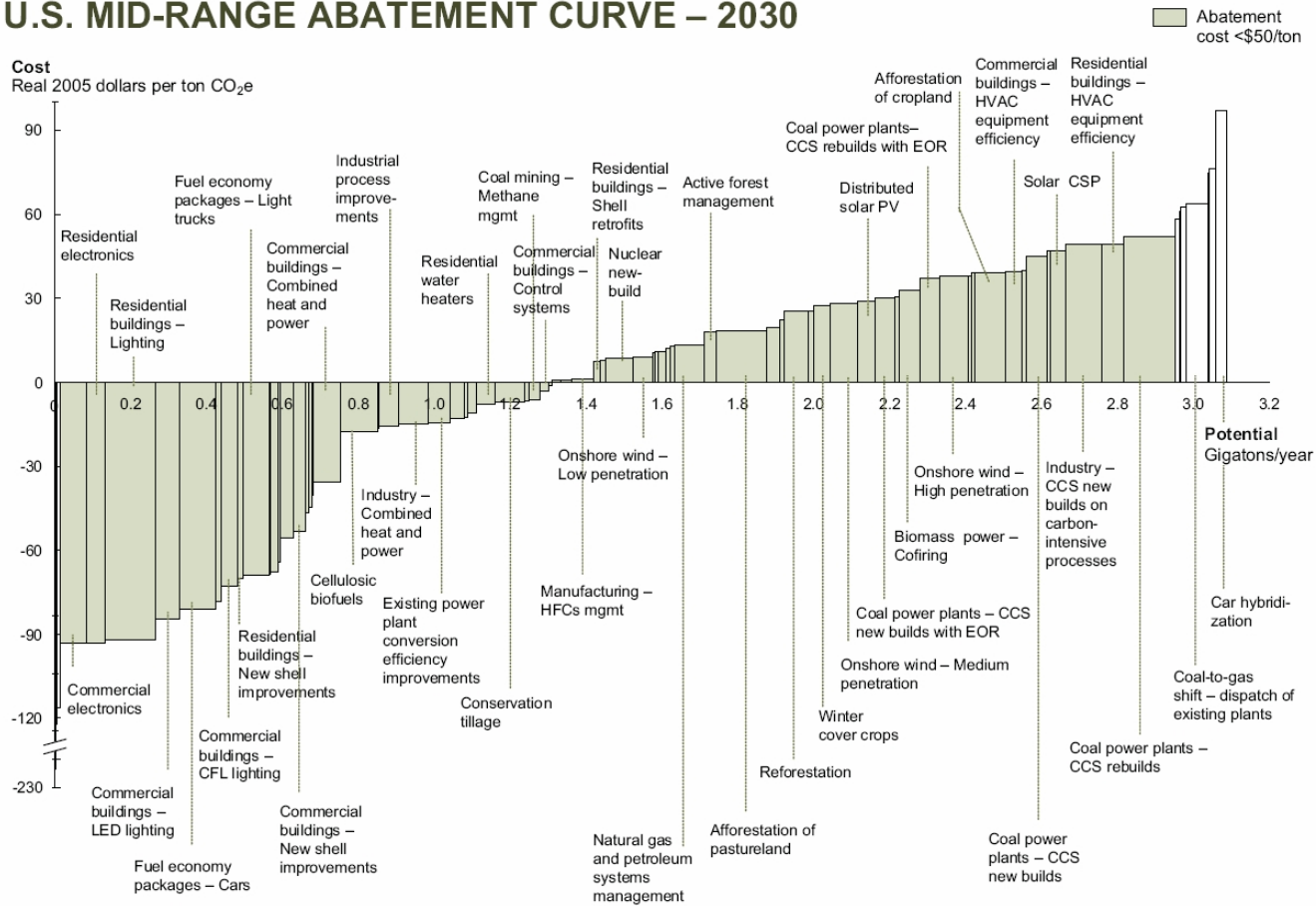
Source: McKinsey analysis

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Discounting

$$PV = \frac{C_n}{(1+r)^n}$$

Hyperbolic Discounting

Would you like to have
A) $10 now
    or
B) $11 in an hour

Would you like to have
C) $10 in a week
    or
D) $11 in a week and an hour

Exponential Discounting

$11 ....

$10 ....

PV
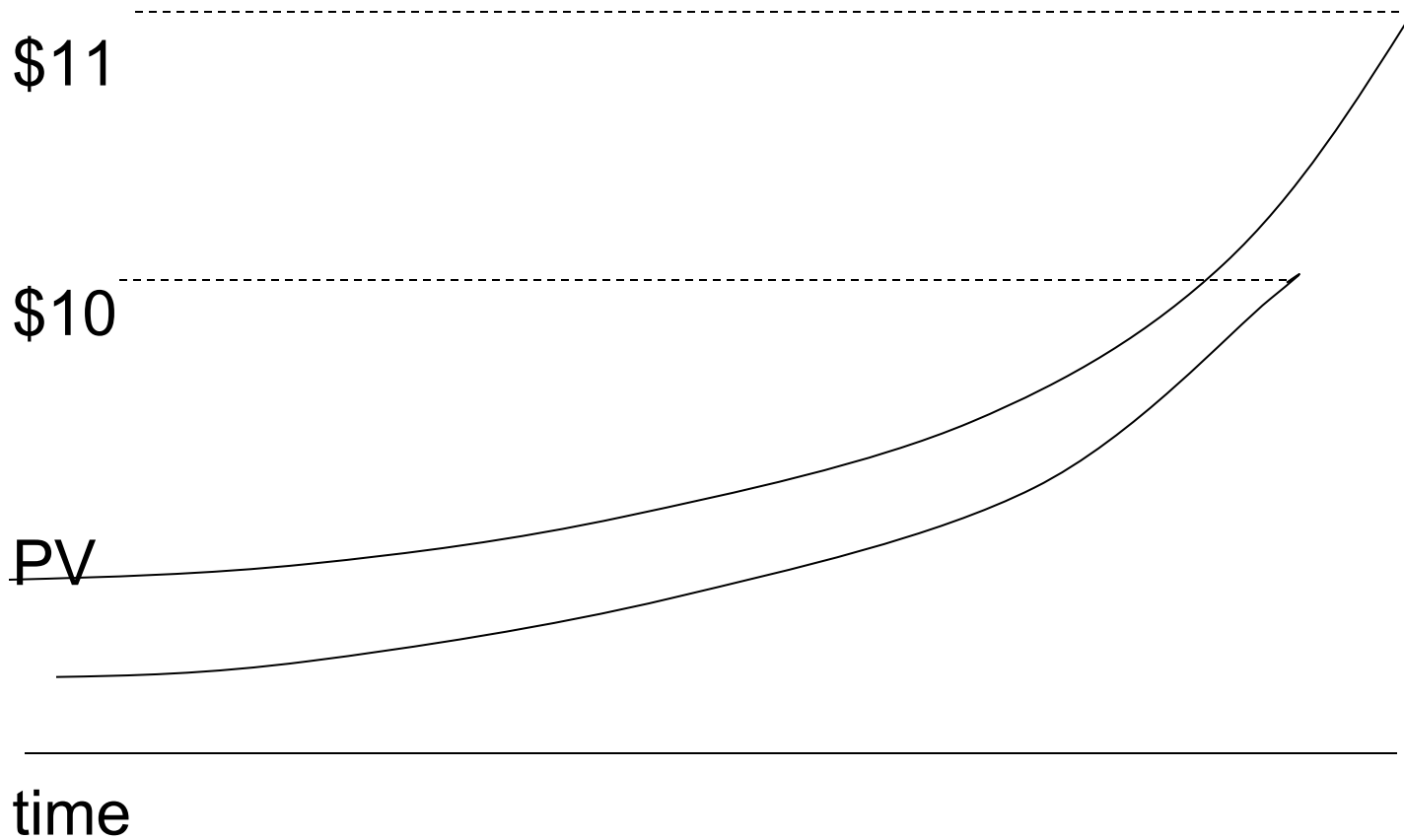
time

Choosing fruit vs. chocolate
Read and van Leeuwen (1998)

Choosing Today   Eating Next Week

Time

If you were deciding today, would you choose fruit or chocolate for next week?

Patient choices for the future:

Choosing Today   Eating Next Week

Time

Today, subjects typically choose fruit for next week.

74% choose fruit

Impatient choices for today:

Choosing and Eating

Simultaneously

Time

If you were deciding today, would you choose fruit or chocolate for today?

Time Inconsistent Preferences:

Choosing and Eating

Simultaneously

Time →
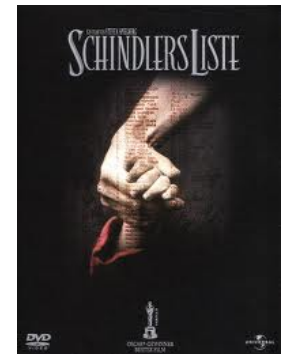
70% choose chocolate

The desire for instant gratification
Read, Loewenstein & Kalyanaraman
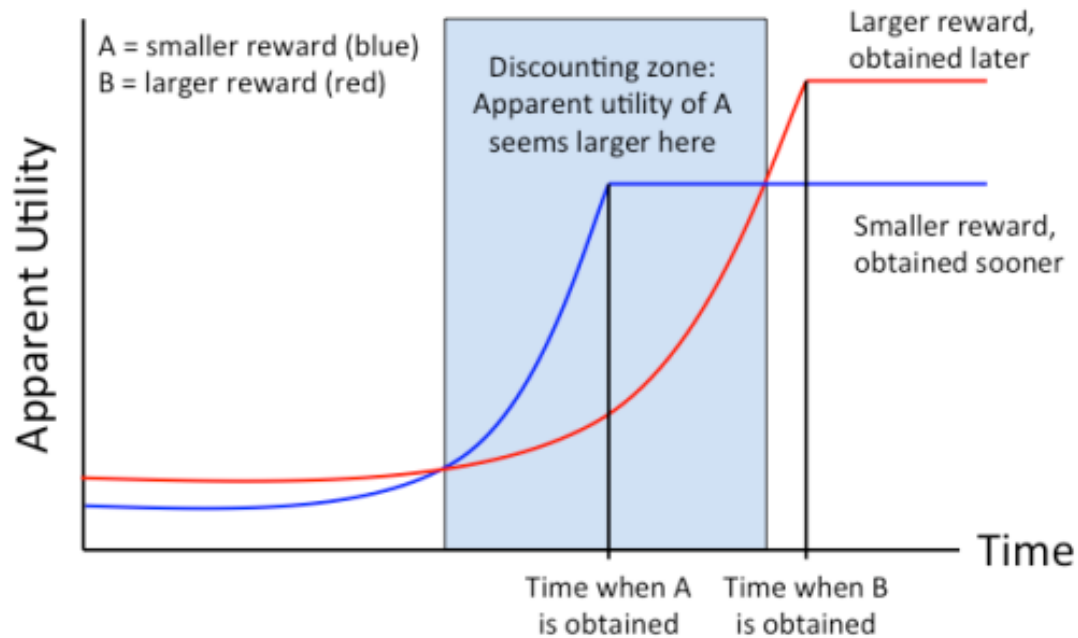
Choose among 24 movie videos
- Some are "low brow":
- Some are "high brow":

- Picking for tonight: 66% of subjects choose low brow.
- Picking for next Thursday: 37% choose low brow.
- Picking for second Thursday: 29% choose low brow.

Discount Rate

Apparent utility as time progresses

A = smaller reward (blue)
B = larger reward (red)

Discounting zone:
Apparent utility of A
seems larger here

Larger reward,
obtained later

Smaller reward,
obtained sooner

Apparent Utility

Time

Time when A
is obtained

Time when B
is obtained

Preference reversal and delayed reinforcement

GEORGE AINSLIE
Massachusetts Mental Health Center, Boston, Massachusetts 02115

and

R. J. HERRNSTEIN
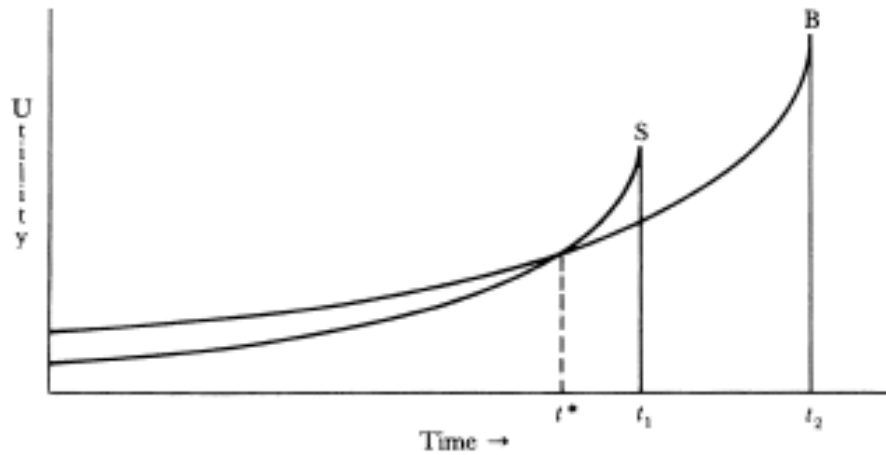Harvard University, Cambridge, Massachusetts 02138

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Hyperbolic Discounting

Figure 2
Non-Exponential Discounting.

Source: Ainslie (1975).

Behavioral Model

- Quasi-hyperbolic discounting (Laibson, 1997)
- Discounted utility function

$$U_t = u_t + \tfrac{1}{2}\left[u_{t+1} + u_{t+2} + u_{t+3} + ...\right]$$

- Discounted utility from the perspective of time t+1.

$$U_{t+1} = u_{t+1} + \tfrac{1}{2}\left[u_{t+2} + u_{t+3} + ...\right]$$

- Discount function reflects dynamic inconsistency: preferences held at date t do not agree with preferences held at date t+1.
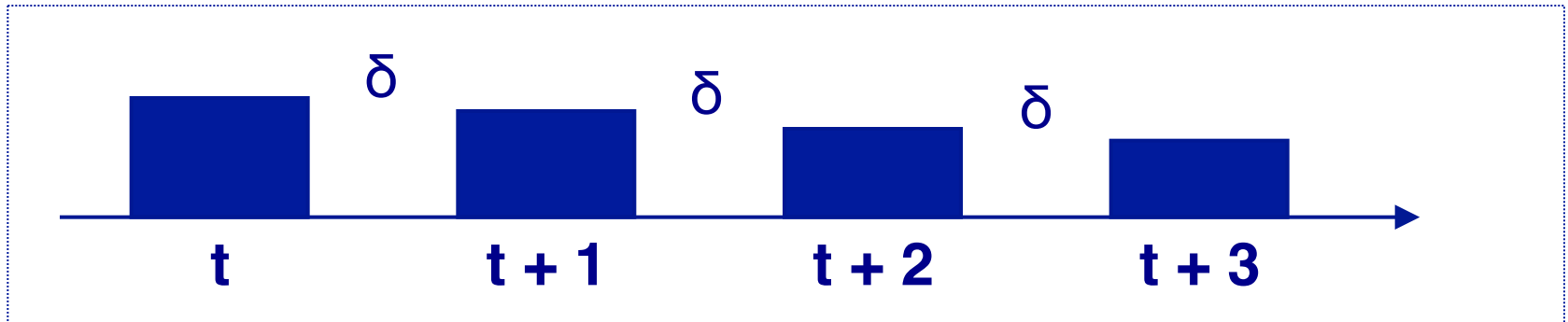
Procrastination
Akerlof 1991

- Suppose you can exercise (effort cost 6) to gain delayed benefits (health value 8).

- When will you exercise?

- Exercise Today: -6 + ½ [8] = -2
- Exercise Tomorrow: 0 + ½ [-6 + 8] = 1

- Happy to make plans today to exercise tomorrow.
- But likely to fail to follow through.
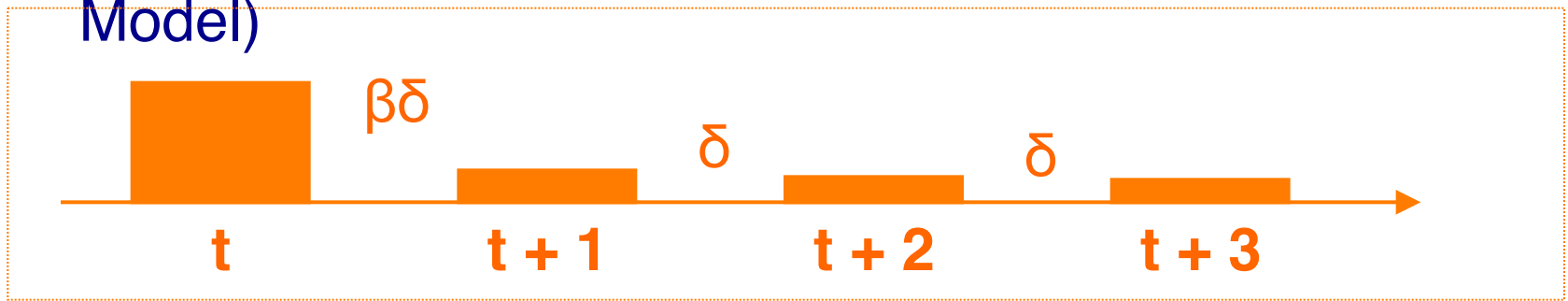
How can declining discounting be explained?

- Standard theory assumes a constant discount factor δ.

- Hyperbolic discounting (Laibson 1997 and others): the higher impatience of people in the present can be modeled with an additional discount factor β that applies to all time points in the future (Beta-Delta-Model).

  - $U = u_t + \beta\delta u_{t+1} + \beta\delta^2 u_{t+2} + \beta\delta^3 u_{t+3} + \ldots$

- Dual-self models (Fudenberg/Levine 2006)

Standard vs. βδ-Model

Standard model: exponential discounitng

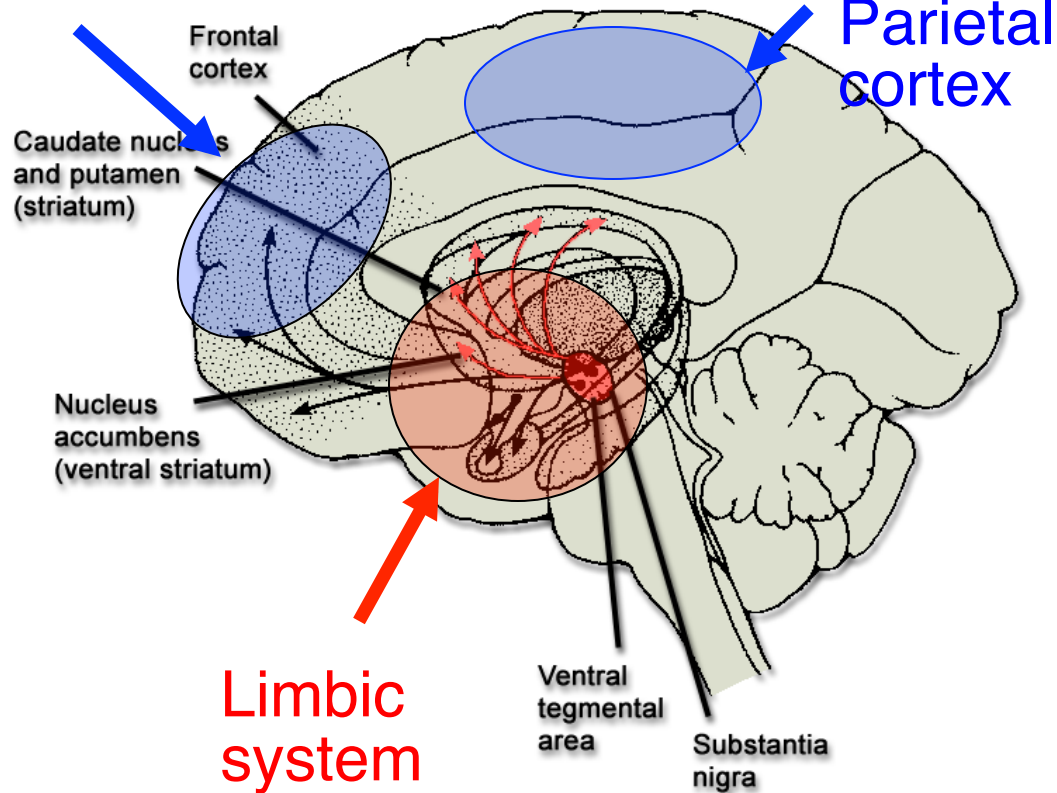## Quasi-hyperbolic discounting (βδ-Model)

Limbic system vs. Fronto-Parietal System

Frontal cortex

Parietal cortex

Frontal cortex

Caudate nucleus and putamen (striatum)

Nucleus accumbens (ventral striatum)
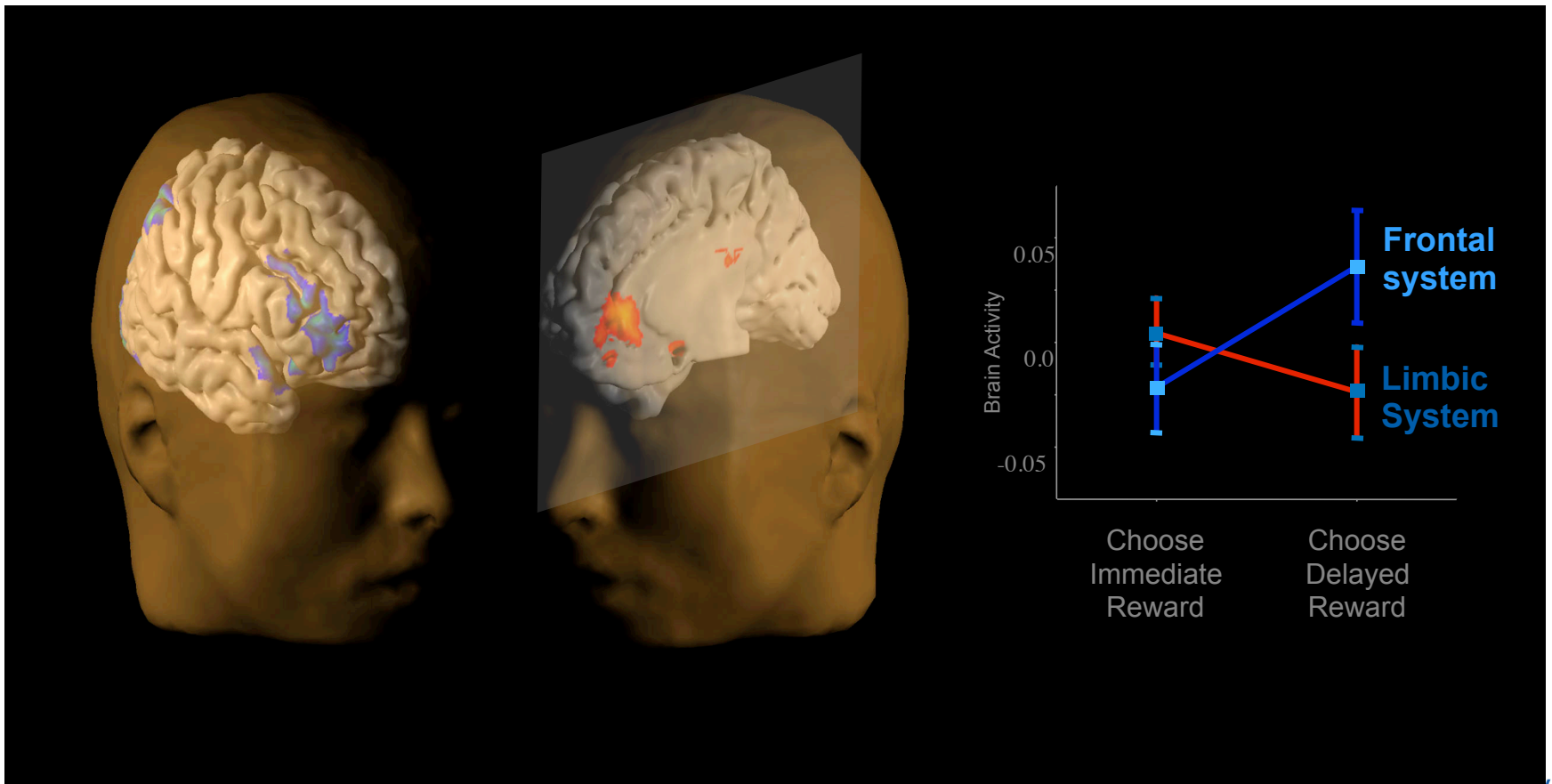
Ventral tegmental area

Substantia nigra

Limbic system

Brain Activity in the Frontal System and Limbic System Predict Behavior
(Data for choices with an immediate option.)

Conclusions of fMRI study

• Time discounting results from the combined influence of two neural systems:

     • Limbic structures are impatient (accounts for β)

     • Fronto-parietal systems are patient. (accounts for δ)

• These two systems are separately implicated in 'emotional (affective)' and 'analytic (cognitive)' brain processes.

• The limbic (emotional) brain, does not value delayed rewards

• The limbic brain creates a drive for instant gratification

• Results have now been replicated with juice rewards

Dual Brain Model

- Again offer subjects a choice between chocolate cake and fruit salad
- While they are presented with this choice, give some of them a distraction tasks.
- Distraction task can be easy: remember three digits
- Or hard, remember 9 digits

Dual Brain Model
Shiv and Fedorikhin (1999)

- Those faced with harder task, chose chocolate cake more often

Processing burden	% choosing cake
Low (remember only 2 digits)	37%
High (remember 7 digits)	59%

Cash or Credit

Always Leave Home Without It: A Further Investigation of the Credit-Card Effect on Willingness to Pay

DRAZEN PRELEC[1] AND DUNCAN SIMESTER[*]

*Sloan School of Management, MIT, 38 Memorial Drive, Cambridge, MA 02142
Tel.: 617-258-0679; fax.: 617-258-7597; e-mail: simester@mit.edu

Table 1. Study 1: Mean values for Celtics tickets, Red Sox tickets, and Banners, by payment method

	Celtics	Red Sox	Banners
Cash mean (N=31)	$28.51	$9.02	$3.32
(std err)	(3.25)	(1.10)	(1.61)
Credit card mean (N=33)	$60.64	$15.92	$5.29
(std err)	(11.09)	(2.66)	(1.66)
Credit card premium	+113%	+76%	+59%
t-test	$t=2.71$, $p<.01$	$t=2.35$, $p<.05$	$t=.85$, ns
Cash median	$25.00	$8.00	$1.00
Credit card median	$41.00	$12.00	$2.00
Wilcoxson rank-sum test	$z=2.64$, $p<.01$	$z=1.42$, ns	$z=1.98$, $p<.05$

Do Payment Mechanisms Change the Way Consumers Perceive Products?
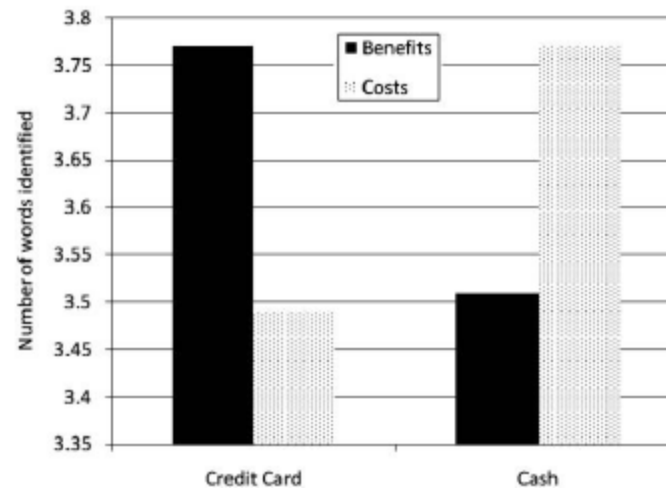
PROMOTHESH CHATTERJEE
RANDALL L. ROSE

Study 1: Differential Errors due to Payment Primes
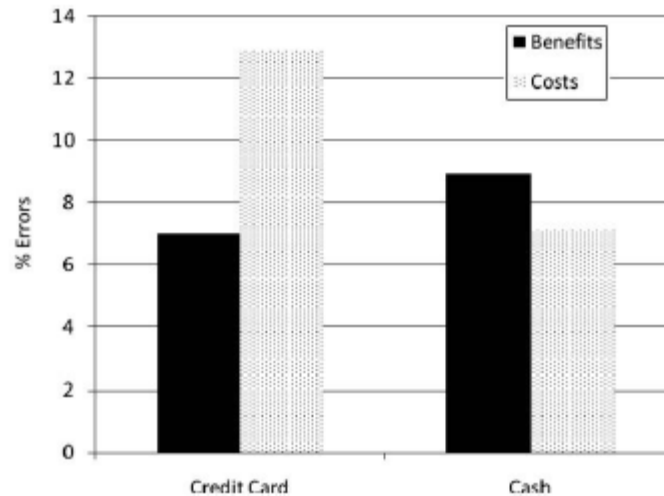
Do Payment Mechanisms Change the Way Consumers Perceive Products?

PROMOTHESH CHATTERJEE
RANDALL L. ROSE

Study 2: Differential Focus due to Payment Primes

Defined Contribution Plans

- Shift from DB to DC
- Usually requires action by employee
- Employees often defer action
- Even when they want to participate
- Even when employees match!

Procrastination in retirement savings
Choi, Laibson, Madrian, Metrick (2002)

- Survey
  - Mailed to 590 employees (random sample)
  - 195 usable responses
  - Matched to administrative data on actual savings behavior
- Consider a population of 100 employees
  - 68 report saving too little
  - 24 of 68 plan to raise 401(k) contribution in next 2 months
  - Only 3 of 24 actually do so in the next 4 months

$100 bills on the sidewalk
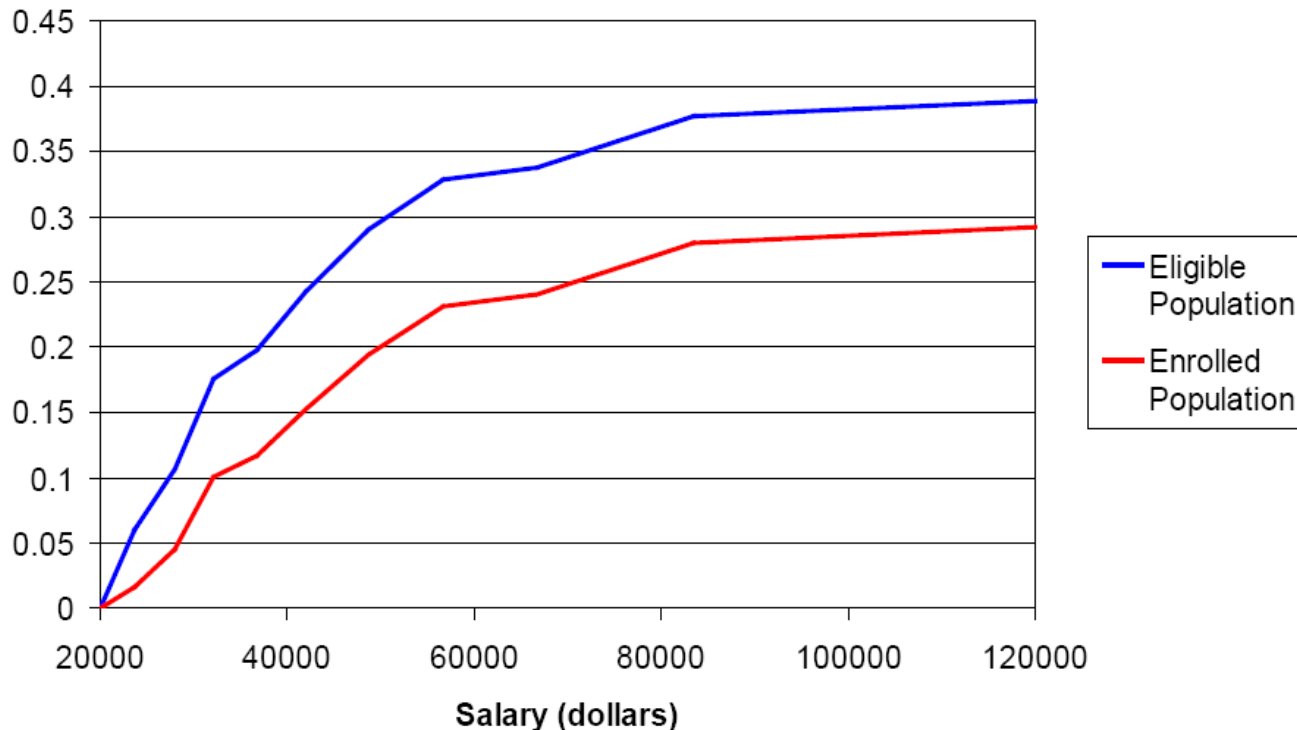
- Sample companies provide a 50% or greater employer match. (13 companies)
- Sample restricted to active employees with tenure ≥ 1 and 20000 ≤ salary ≤ 160000. Eligible population includes 166099 employees. Active population includes 152340 employees.
- Control variables were age, tenure, and company fixed effect dummies.

Source: Choi, Laibson, Madrian, Metrick.

Effort

Effort

Effort

The office candy dish: proximity's influence on estimated and actual consumption
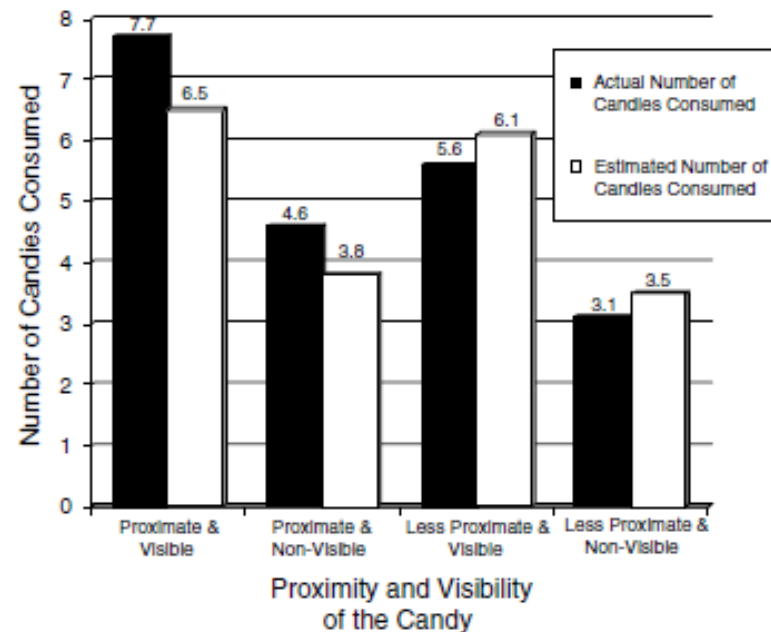
B Wansink[1], JE Painter[2] and Y-K Lee[3]

Figure 1 The impact of proximity on actual and estimated candy consumption.
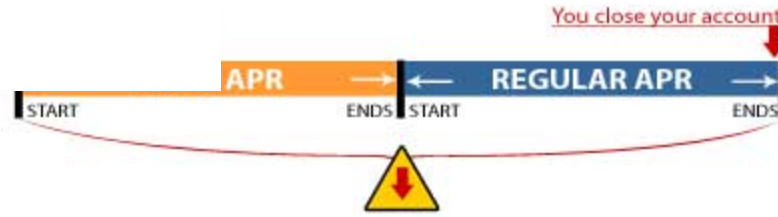
Joining a Gym
Della Vigna and Malmendier (2004)

- Average cost of gym membership: $75 per month
- Average number of visits: 4
- Average cost per visit: $19
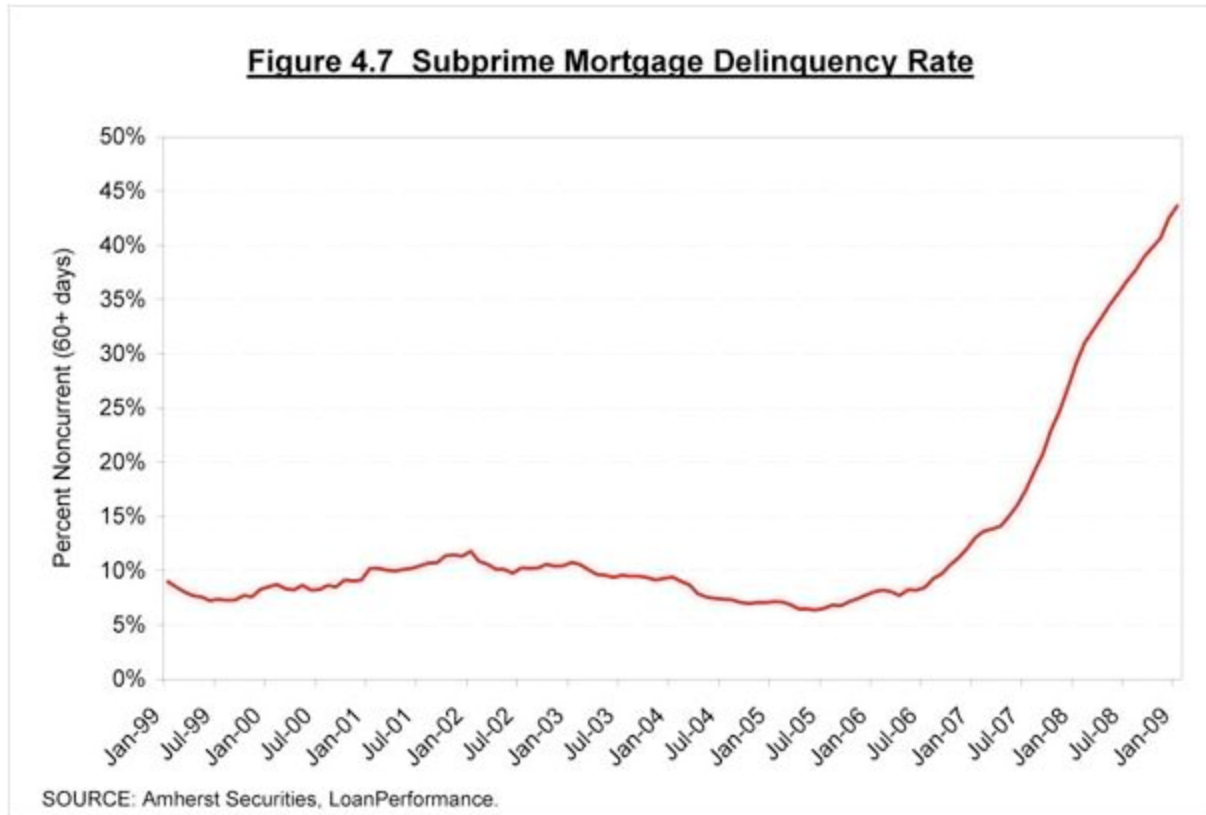- Cost of "pay per visit": $10

Life Cycle Pricing

0% Intro APR on Purchases and Balance Transfers.*

You close your account

| APR | → | ← | **REGULAR APR** | → |
| START | | ENDS | START | ENDS |

DEFAULT APR

At any point your APR can change to the Default APR, if you miss payments and/or go overlimit.

Life Cycle Pricing

Figure 4.7 Subprime Mortgage Delinquency Rate

SOURCE: Amherst Securities, LoanPerformance.

Life Cycle Pricing

1,500 Page Black Toner Cartridge for Dell 1230c Color Laser Printer

Cartridge delivers excellent print quality, sharp images and text – up to a 1,500 pages yield.

Dell Price.. **$63.99**

As low as **$20.00/month***
Apply | Learn More

Add to Cart

Usually Ships: 1-2 Days

Manufacturer Part# : N012K | Dell Part# : 330-3012

★★★★☆
Read 10 Reviews | Write a Review

- Email to a Friend
- Add to Wish List
- Print-Friendly Version
- Compatibility
- What's in the Box
- Click to Call
- Click to Chat

Overview | Tech Specs | Customer Ratings | Glossary And Resource

Highlights

- Part number on carton and label is Y924J
- Compatible with Dell 1230c Laser Printers
- Offers up to 1,500 pages yield based on 5% page coverage

Overview

Cartridge delivers excellent print quality, sharp images and text – up to a 1,500 pages yield.

Manufacturer Part# : N012K
Dell Part# : 330-3012

Compatibility
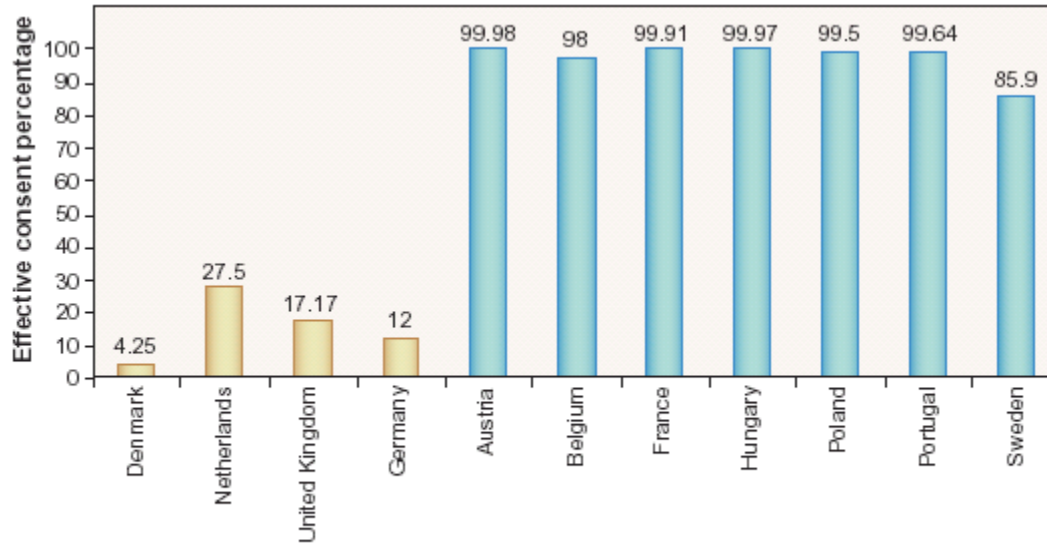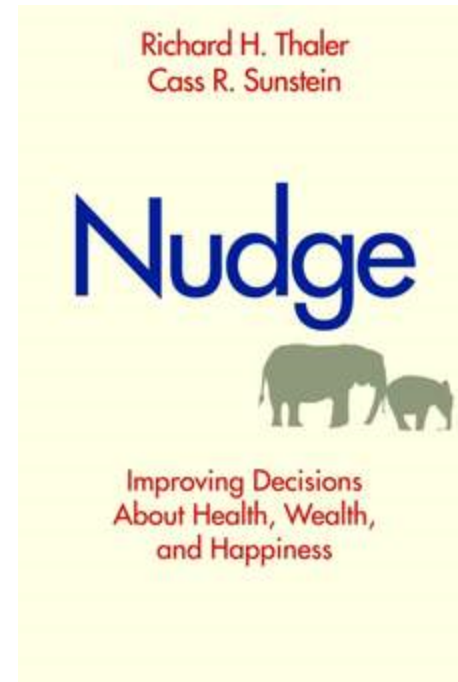
Life Cycle Pricing

Thought Experiment

Hershfield, Goldstein, Sharpe, Fox , Yeykelis, Carstensen, Bailenson, 2011

Inertia

Effective consent rates, by country. Explicit consent (opt-in, gold) and presumed consent (opt-out, blue).
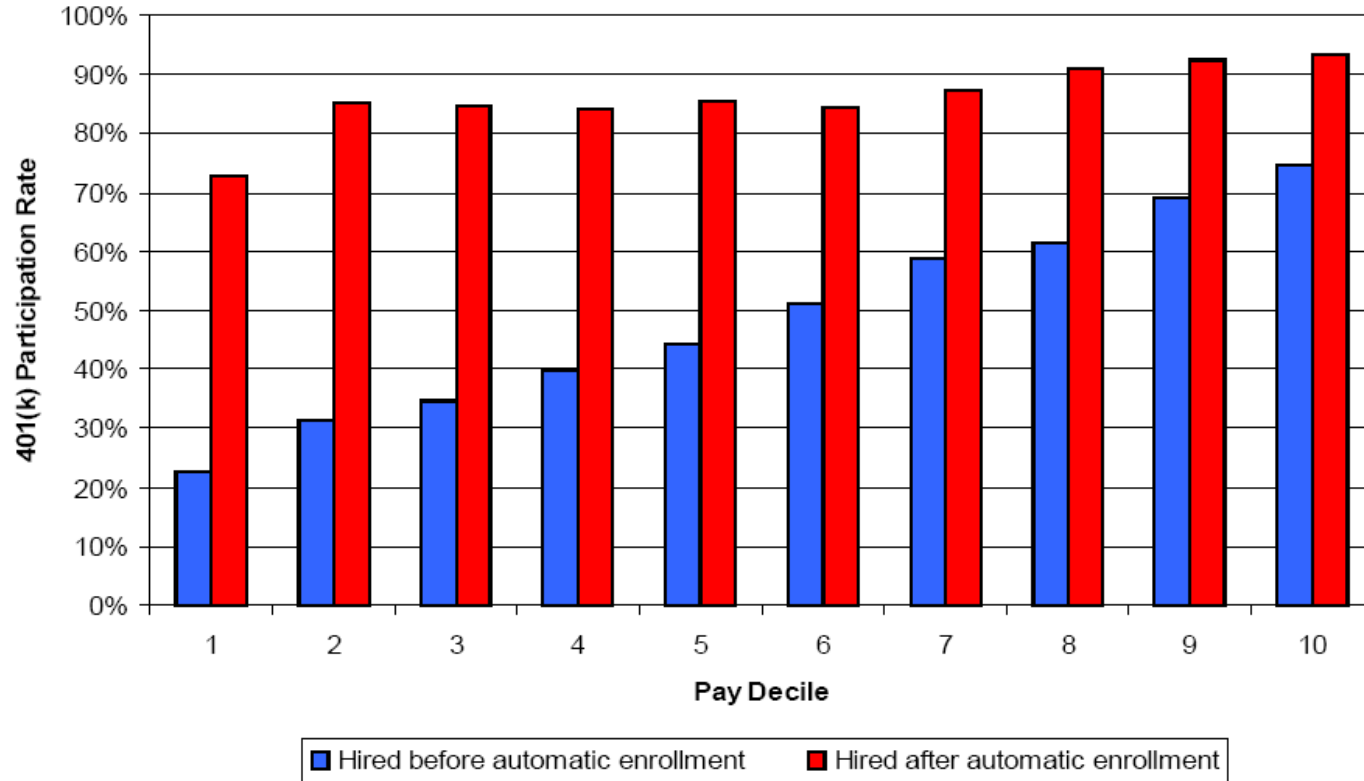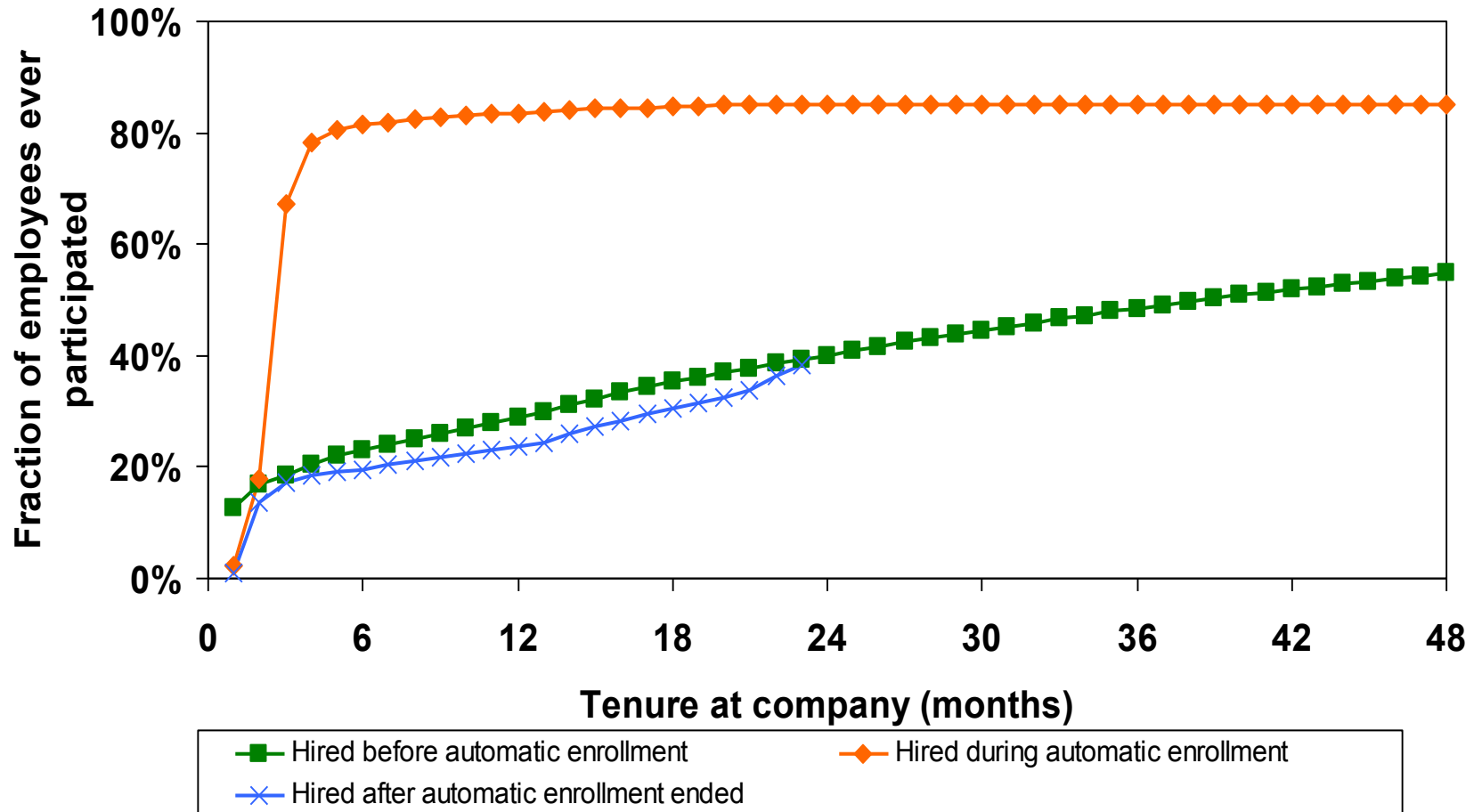
Nudge

Richard H. Thaler
Cass R. Sunstein

Nudge

Improving Decisions
About Health, Wealth,
and Happiness

Nudge

Automatic Enrollment

Source: Choi, Laibson, Madrian, Metrick (2002)

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Madrian and Shea (2001)
Choi, Laibson, Madrian, Metrick (2004)

401(k) participation by tenure at firm

Chart legend:
- Hired before automatic enrollment
- Hired during automatic enrollment
- Hired after automatic enrollment ended

X-axis: Tenure at company (months)
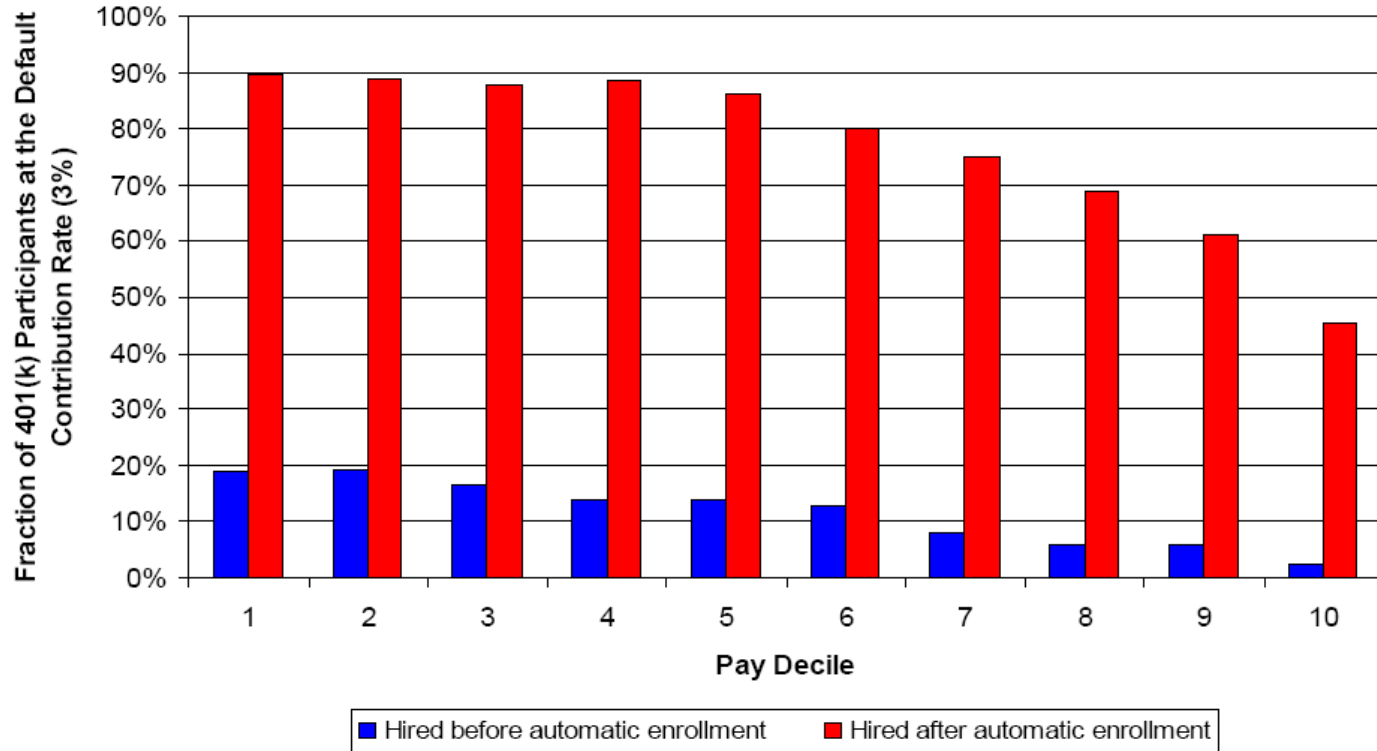Y-axis: Fraction of employees ever participated

Employees enrolled under automatic enrollment cluster at the default contribution rate.

Distribution of contribution rates

Default contribution rate under automatic enrollment

Legend:
- ■ Hired before automatic enrollment (green)
- ■ Hired during automatic enrollment (2% default) (orange)
- ■ Hired after automatic enrollment ended (blue)

Data values by contribution rate:

Contribution rate	Hired before	Hired during (2% default)	Hired after
1%	3	1	6
2%	20	67	9
3-5%	17	7	26
6%	37	14	31
7-10%	14	6	18
11-16%	9	4	10

Y-axis: Fraction of participants (0% to 80%)
X-axis: Contribution rate

Default contribution Rate

Source: Choi, Laibson, Madrian, Metrick (2002)

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Participants stay at the automatic enrollment defaults for a long time.

Fraction of participants hired during automatic enrollment
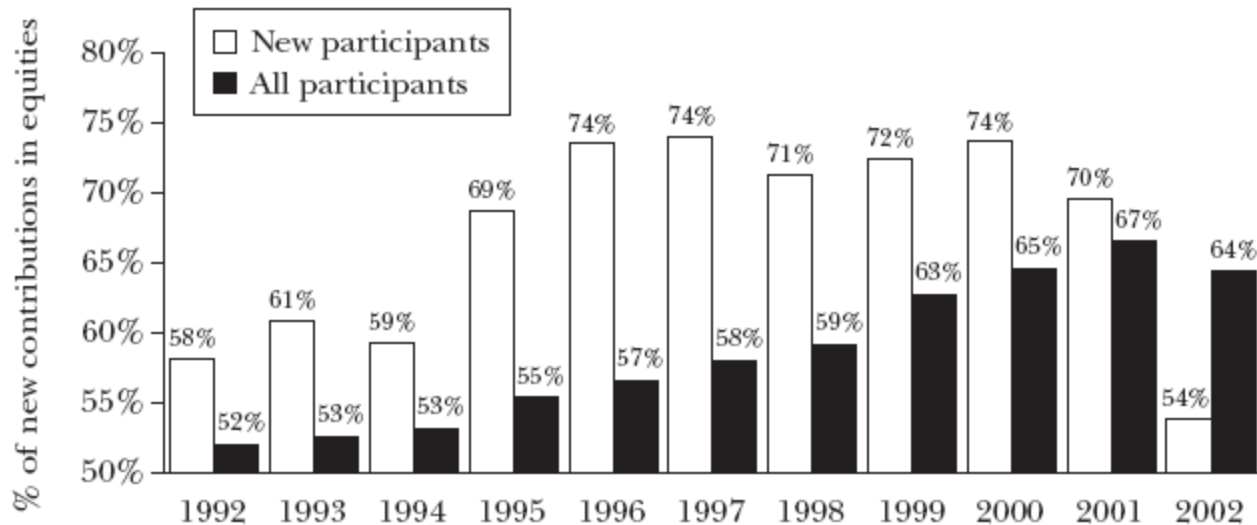at both default contribution rate and asset allocation
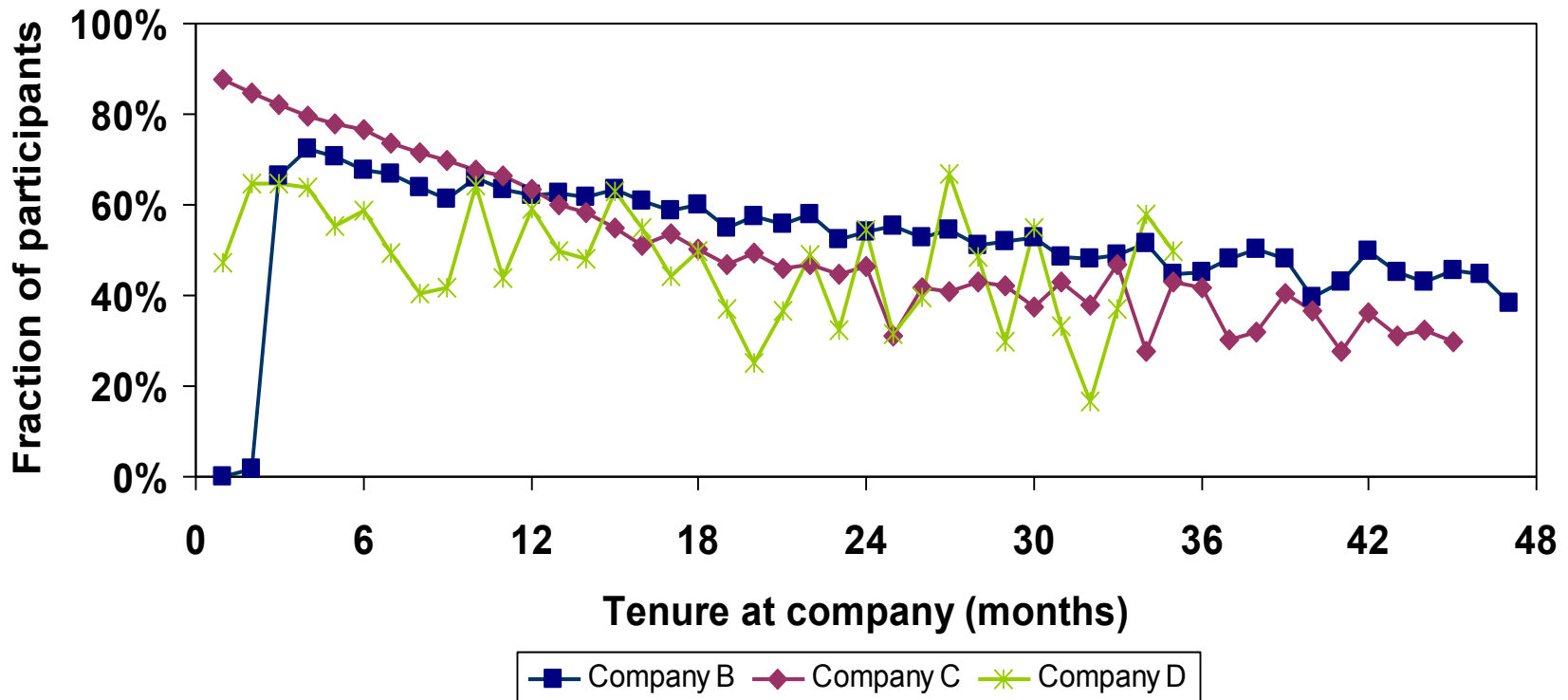
Infrequent Reallocation

Figure 2

Choices of Equities by New Plan Participants

Panel A: The Equity Allocation of New versus All Plan Participants

Automatic enrollment: Conclusions

- Automatic enrollment dramatically increases 401(k) participation
- Participants hired under automatic enrollment tend to stay at the automatic enrollment defaults
- Similar default effects are observed for
  - cash distributions at termination
  - company stock asset allocations
  - saving rates at match thresholds

Takeaways

- Even if a choice is beneficial to an economic actor, he or she may not take it.

- People are subject to:
  - Hyperbolic discounting
  - Inertia
  - Procrastination
  - Failure to engage in lifecycle pricing
  - Inability to commit

- Behavioral Change is more likely when these obstacles can be overcome.
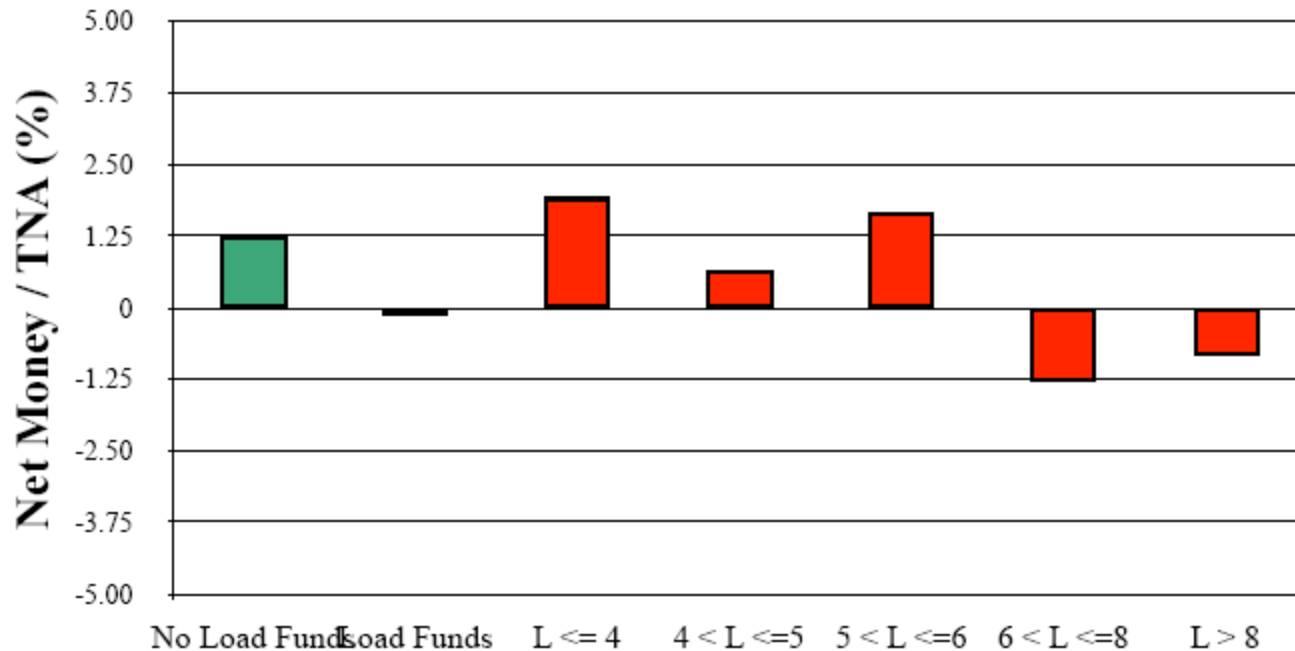
Commitment Strategies

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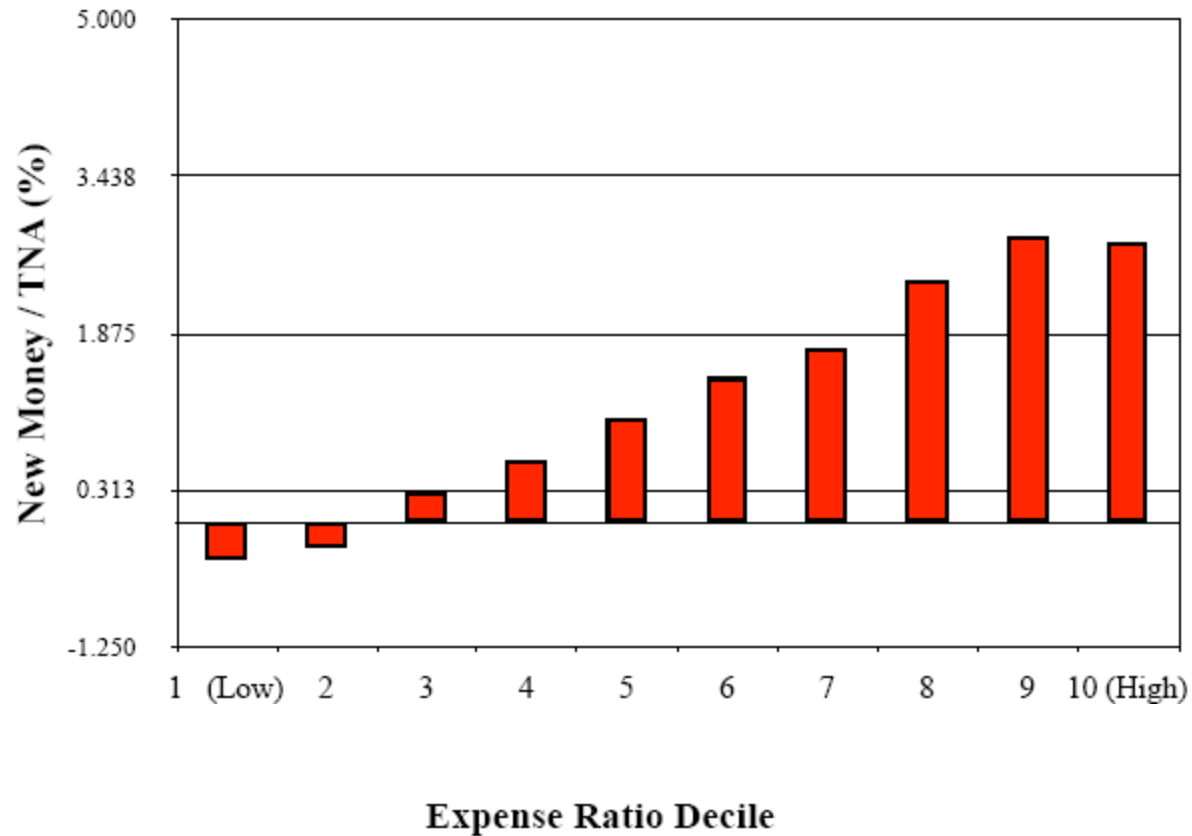# Other Interesting Lessons from 401K plans

- Inattention Blindness
- Choice Paralysis
- Naïve Diversification
- Home Bias

Fund Investors Pay Attention to Load Fees

Source: Barber, Odean, & Zheng, 2004,
Journal of Business, "Out of sight,
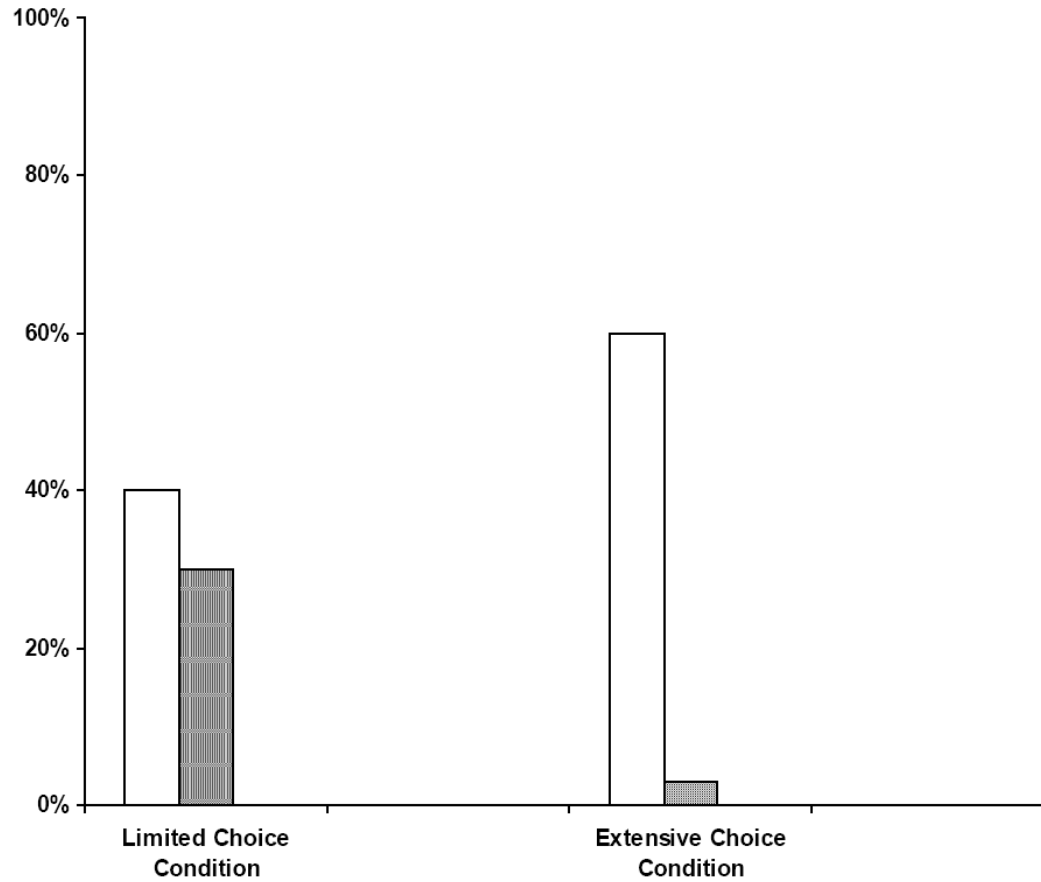out of mind: The effects of expenses on
mutual fund flows."

But Ignore Operating Expenses

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Choice Paralysis

Paradox of Choice

Paradox of Choice
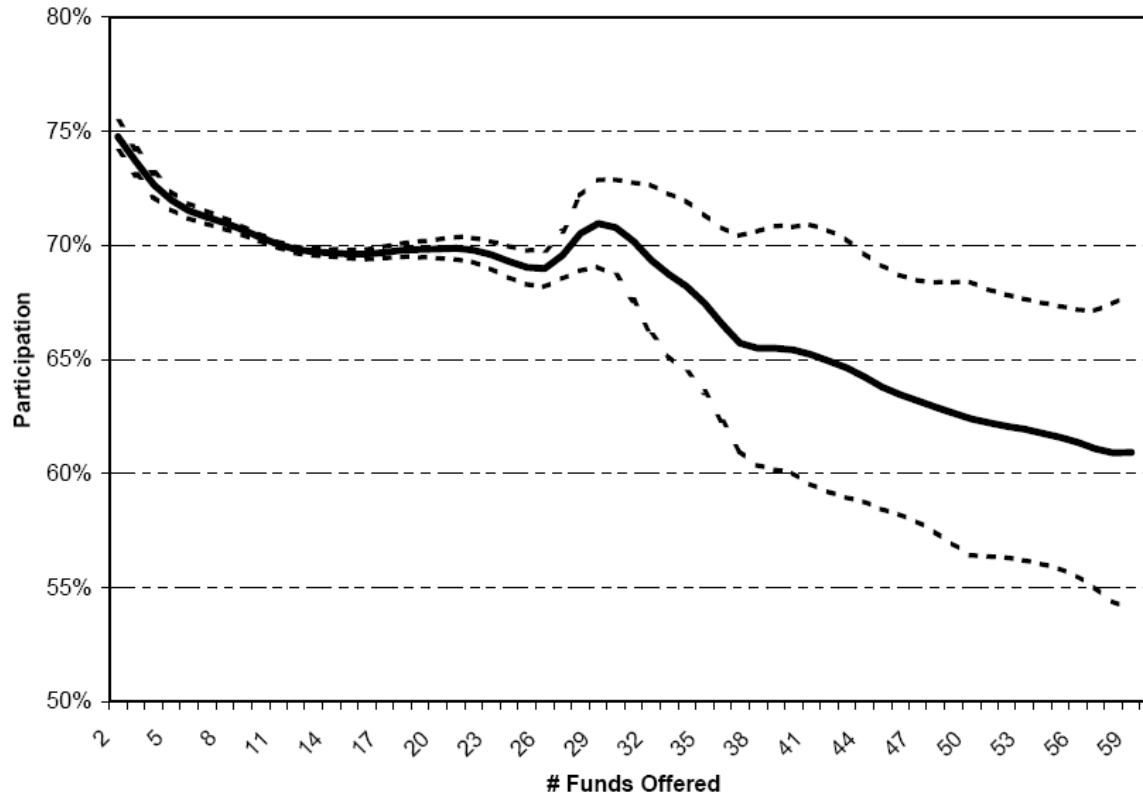# Iyengar, Jiang, Huberman

Figure 2. The Relation between Participation and Number of Funds Offered

Naïve Diversification

Naïve Diversification

- Investors tend to follow the 1/N rule
- If offered one equity and one debt fund, they will invest 50-50
- If offered three equity funds and one debt fund, they will allocate 75% to equity an 35% to debt.

Home Bias