Econ 219B
Psychology and Economics: Applications
(Lecture 1)

Stefano DellaVigna

January 18, 2012

Outline

1. Introduction / Prerequisites

2. Getting started!
   Psychology and Economics: The Topics

3. Psychology and Economics: Empirical Methods

4. Methodology: Reading the Psychology Journals

5. Psychology and Economics by Field

6. Defaults and 401(k)s: The Facts

1 Who am I?

Stefano DellaVigna

- Associate Professor, Department of Economics
- Bocconi (Italy) undergraduate (Econ.), Harvard PhD (Econ.)
- Psych and Econ, Applied Microeconomics, Media Economics, Political Economy, Behavioral Finance,
- Evans 515 – OH schedule by email

2 Who are you?

- PhD student 2nd year and higher. Graduate courses in
  - Econometrics
  - Micro Theory (Contract Theory, Game Theory)
  - Psychology and Economics – Theory (219A)
- Interest in
  - Psychology and Economics
  - Applied, empirical microeconomics (io, labor, public finance, finance)

3 What is this class?

- Reading list:
  - complete, updated list on course webpage
  - 'Textbook': "Psychology and Economics: Evidence from the Field" (*Journal of Economic Literature* 2009)
  - 11 Methodological Topics
  - Please email me (sdellavi@econ.berkeley.edu) for any issue with class and to schedule a meeting

- Grade:
  - 3 or 4 problem sets on models and empirics (30% weight)
  - Final exam (40% weight)
  - Your choice of:
    * 10-15 page paper that uses field evidence (30% weight)
    * An empirical problem set (30% weight)
- I encourage you to try to write a paper

- Deadlines for paper
  - Meet with me about your paper by 3/2
  - Brief summary of your research idea by 4/6 (2 pages, research question, data availability)
  - Paper due on 5/10
- Information Sheet

4 Psychology and Economics: The Topics

- Prototypical economist conception of human behavior (Rabin, 2002a):

$$\max_{x_i^t \in X_i} \sum_{t=0}^{\infty} \delta^t \sum_{s_t \in S_t} p\left(s_t\right) U\left(x_i^t | s_t\right).$$

- X_i is set of "life-time strategies", S_t is set of state spaces

- $p(s_t)$ are rational beliefs, $\delta \in (0,1)$ is time-consistent discount factor

- $u(\cdot, s, t)$ is true utility at time t in state s

- **Improving Psychological Realism**

- **Step 1. Non-Standard Preferences**

1. Present-Biased Preferences: time inconsistency (β, δ)

2. Reference Dependence: $U\left(x_i | r, s\right)$ with r reference point

3. Social Preferences: $U\left(x_i, x_{-i} | s\right)$ where x_{-i} is allocation of others

- Example 1. Reference Dependence – Sydnor (*AEJ: Applied*, forthcoming)

- Sydnor studies deductible choice in home insurance policies

- Menu: \$250, \$500, \$1,000. Higher deductible –> Lower premium

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Chosen Deductible	Number of claims per policy	Increase in out-of-pocket payments *per claim* with a \$1000 deductible	Increase in out-of-pocket payments *per policy* with a \$1000 deductible	Reduction in yearly premium per policy with \$1000 deductible	Savings per policy with \$1000 deductible
\$500	0.043	469.86	19.93	99.85	79.93
N=23,782 (47.6%)	(.0014)	(2.91)	(0.67)	(0.26)	(0.71)
\$250	0.049	651.61	31.98	158.93	126.95
N=17,536 (35.1%)	(.0018)	(6.59)	(1.20)	(0.45)	(1.28)
Average forgone expected savings for all low-deductible customers: \$99.88					

- Example 2. Social Preferences – Gneezy and List (*EMA*, 2006)

- Recruit workers to enter manually data on books for 6 hours for $12/hour

- Treatment (gift) group: After hiring, told pay increased to $20/hour

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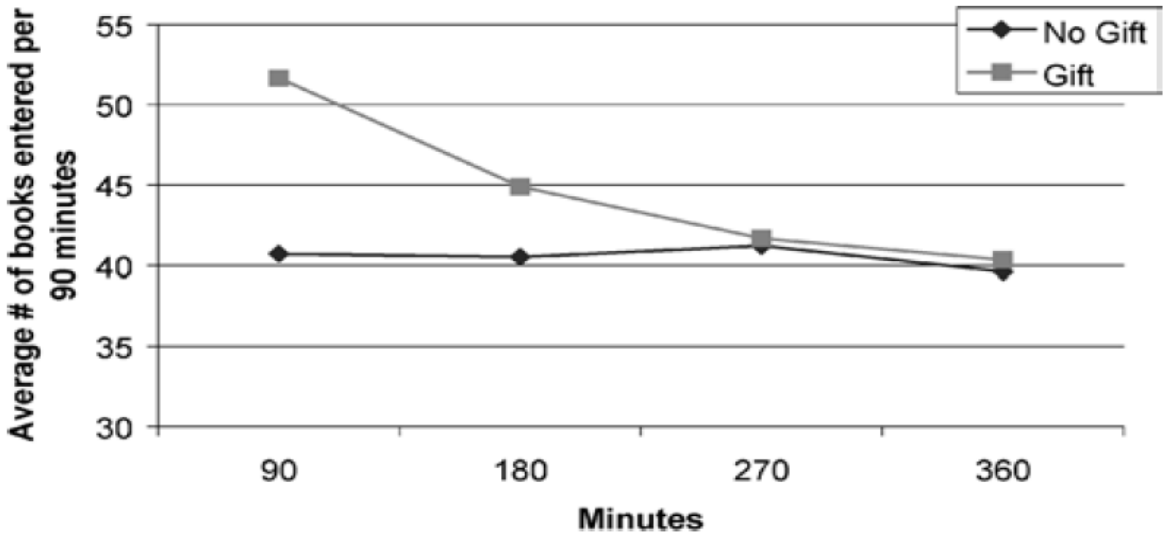

- **Step 2. Non-Standard Beliefs:** beliefs $\tilde{p}(s) \neq p(s)$

1. Overconfidence: wrong $E(p)$ or wrong $Var(p)$

2. Law of Small Numbers: Wrong forecast of $p(s_{t+1}|s_t)$

3. Projection Bias: wrong forecast of utility: $\hat{u}(\cdot, s)$

- Example 3 – Conlin, O'Donoghue and Vogelsang (*AER*, 2007)
- Examine mail orders of cold-weather apparel
- Relate temperature on order date to *return* probability
- Standard model: No relation or positive relation (the colder it is now, the more you will need it in 5 days)

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TABLE 2

Probit Regression Measuring the Effect of Temperature on the Probability Cold Weather Clothing is Returned

Dependent Variable is Whether Item is Returned (=1 if item returned and 0 otherwise)

	Gloves & Mittens	Winter Boots	Hats	Sports Equipment	Parkas & Coats	Vests	Jackets
Temperature on Day Item was Order	-0.00014** (0.00005)	-0.00021** (0.00008)	-0.00017** (0.00005)	-0.00009 (0.00007)	-0.00007 (0.00007)	-0.00043** (0.00010)	-0.00019 (0.00013)

- Correlation consistent with projection bias

- Current state s', future state s. Predicted future utility

$$\hat{u}(c, s) = (1 - \alpha) u(c, s) + \alpha u\left(c, s'\right)$$

- Structural estimation of projection bias parameter α

- Correlation consistent with projection bias

- Current state s', future state s. Predicted future utility

$$\hat{u}(c,s) = (1-\alpha)\,u(c,s) + \alpha u\left(c,s'\right)$$

- Structural estimation of projection bias parameter α

TABLE 7
Structural Estimation

	Winter Boots	Hats	Parkas & Coats	Vests	Jackets
α	0.48** (0.0599)	0.64** (0.0390)	0.33** (0.0790)	0.012 (0.0107)	0.41** (0.0488)

- **Step 3. Non-Standard Decision-Making**

1. Limited Attention: maximization set $\neq X_i$ (neglect less salient alternatives)

2. Menu Effects: Do not $\max U$

3. Persuasion and Social Pressure

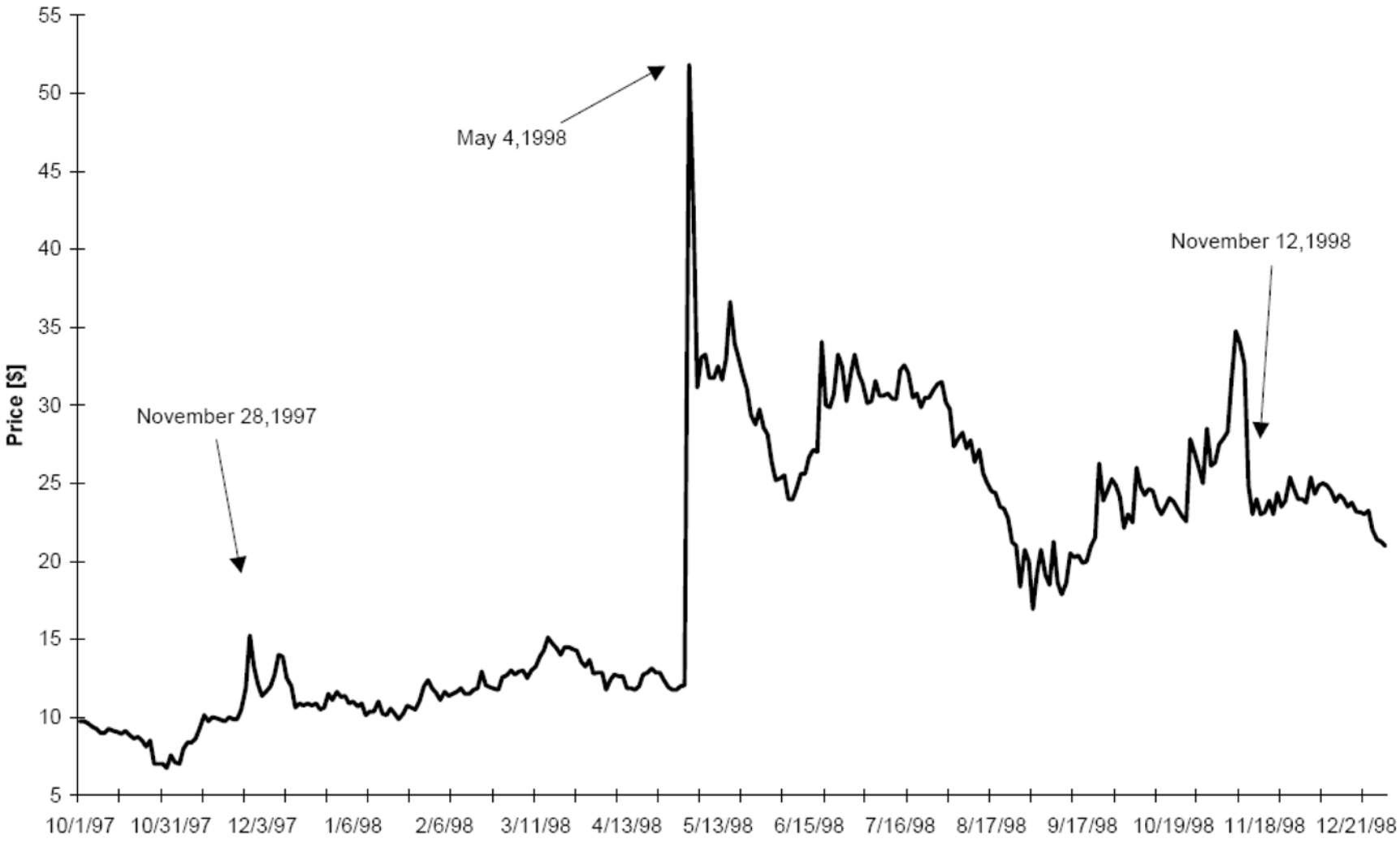
4. Emotions

- Example 4. Limited Attention – Huberman and Regev (*JF* 2002)

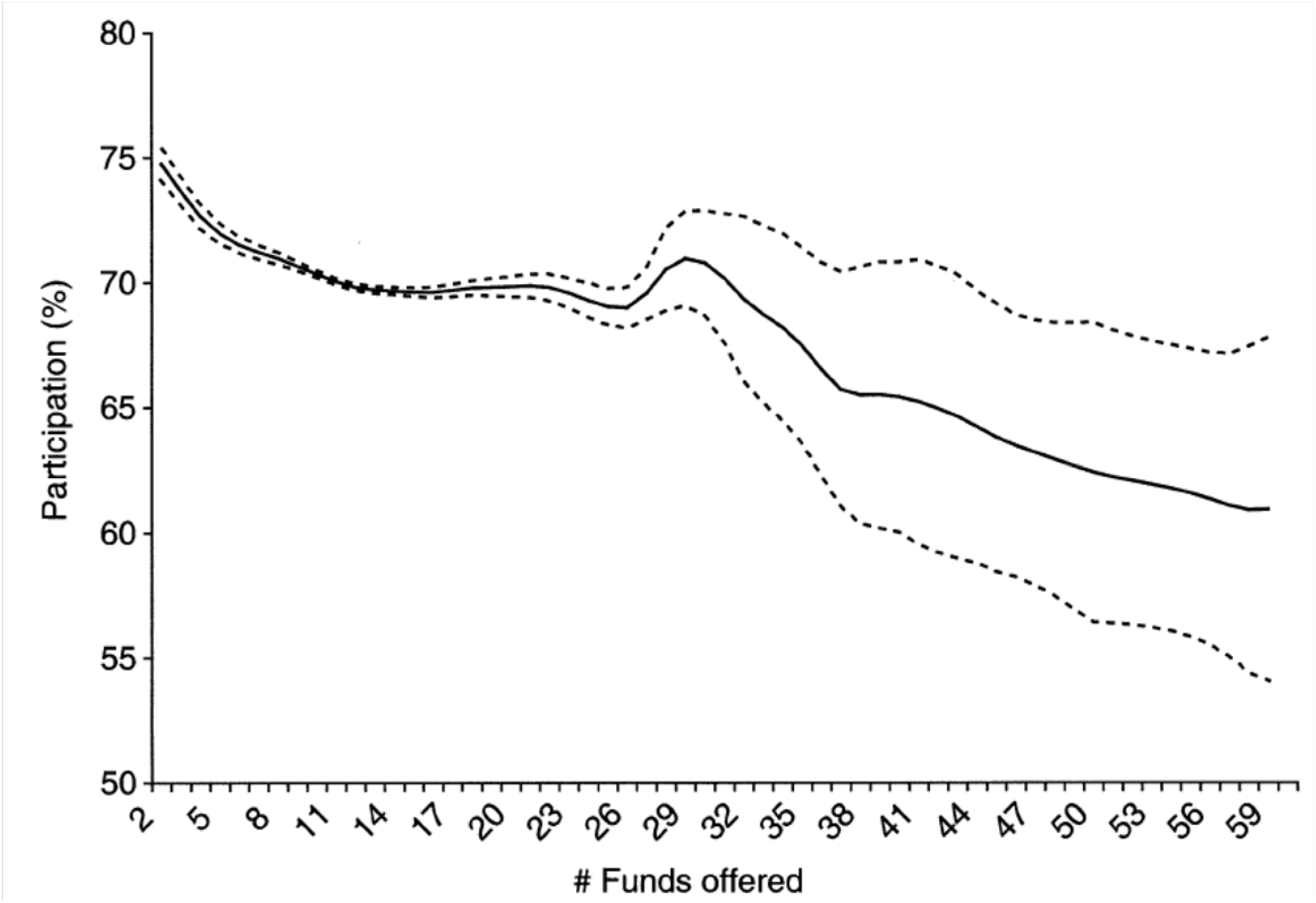
- November 28, 1997: EntreMed company (biotech) discovers cure for cancer – Articles on Science, Nature, NYT (page 23)

- May 3, 1998: NYT repeats article on page 1

Figure 5: ENMD Closing Prices and Trading Volume 10/1/97-12/30/98



- Example 5. Menu Effects – Iyengar, Huberman, and Lepper (2006)
- Data set on choice of 401(k) plans
- Comparison of plans with few options and plans with many options
- Focus on participation rate – Fractions of employees that invest


80
75
70
65
60
55
50
Participation (%)
2
5
8
11
14
17
20
23
26
29
32
35
38
41
44
47
50
53
56
59
Funds offered

- **Step 4. Market Response to Biases**

- Integrate these findings into a market

  1. Firms (Behavioral IO)
  2. Employers (Behavioral Labor)
  3. Investors (Behavioral Finance)
  4. Managers (Behavioral Corporate Finance)
  5. Politicians (Behavioral Political Economy)
  6. ...

- Example 6 – DellaVigna and Malmendier (*QJE*, 2004) (applied theory paper)

- Credit card customers are:
  - tempted to over-consume (self-control problems)
  - naive about self-control problems

- How should credit-card companies price cards?

- Offer no yearly fee + bonuses (cash back, airline miles)...

- ...AND charge high interest rates

TABLE II

CREDIT CARD INDUSTRY—REPRESENTATIVE CONTRACTS†

	Type of credit card offer (1)	Regular interst rate (APR) (2)	Annual fee in $ (3)	Benefits (4)	Introductory interest rate (APR) (5)	Length of introductory offer (6)
Citibank	Platinum Select Visa	Prime + 12.99%	0		2.90%*	9 months
MBNA	Platinum Plus Visa	12.99%	0		3.90%*	6 months
First USA	Platinum Visa	Prime + 6.50%	0		9.90%*	9 months
Chase Manhattan	Wal-Mart Mastercard	Prime + 3.98% to Prime + 11.98%	0		0%	6 months
Bank of America	Visa Gold	Prime + 7.99% to Prime + 12.99%	0		3.90%	6 months
Household Bank	GM Mastercard	Prime + 9.99%	0	5% toward GM	2.90%	6 months
Providian	Visa Platinum	Prime + 3.24%	0		0%	3 months
	Visa Gold Prestige	Prime + 10.24%	0		0%	2 months
	Visa Gold Preferred	Prime + 13.24%	0		0%	2 months
	Visa Classic	Prime + 17.24%	0-59-89		0%	2 months
Capital One	Platinum Visa	9.90%	0		N/A	N/A
	Gold Visa	14.90%	0		2.90%*	6 months
	Classic Visa	19.80%	49		N/A	N/A
Discover	Platinum Card	13.99%	0	1% Cashback	1.70%*	6 months
American Express	Blue Credit Card	9.99%	0		0%	6 months
	Optima Credit Card	Prime + 7.99%	0		7.90%	6 months
	(Gold) Charge Card	N/A	55-75		N/A	N/A

5 Psychology and Economics: Empirical Methods

- Psychology and Economics is
  - Idea from Psychology (Self-control, Reference Dependence, Overconfidence, Inattention, Social Preferences, Persuasion,...)
  - Setting in Economics (Asset Pricing, Charitable Giving, Consumption and Savings, Job search, ...)
- Each setting has specific methodologies –> Variety of methodologies
- Defining feature for the field is idea, not technique or methodology

- However: Five main methodologies in Field P&E

1. **Menu choice**

   (a) Example 1. Sydnor (forthcoming) on small-scale risk aversion

   (b) Compare behavior in a menu (Ex.: deductibles)

   (c) Given a model, make inferences about preferences, beliefs, etc. (Ex.: Risk aversion)

2. **Natural Experiments**

   (a) Example 4. Huberman and Regev (*JF*, 2002) on limited attention

   (b) Treatment vs. Control comparison

   (c) Quasi-random Naturally occurring events(Ex.: timing of article publication)

3. **Field experiment**

   (a) Example 2. Gneezy and List (*EMA*, 2006) on gift exchange

   (b) Treatment vs. Control comparison

   (c) Explicit randomization in a field setting (Ex.: Additional pay)

4. **Correlational studies**

   (a) Example 5. Iyengar, Huberman, and Lepper (2006) on choice overload

   (b) Test correlation of two variables (Ex.: No. options and participation)

   (c) Derive conclusion – Correlation, not causality here

5. **Structural Identification**

   (a) Example 3. Conlin, O'Donoghue and Vogelsang (*AER*, 2007) on projection bias

   (b) Write out model

   (c) Estimate the parameters of the model (Ex.: projection bias)

6 Methodology: Reading Psychology Journals

- One strategy for papers in Psychology and Economics:
  - Get idea from reading psychology literature
  - Think of economic setting to apply to
    - Model new phenomenon
    - Test with economic experiments
    - Apply using field data
- How to start with psychology literature?

- **Step 1.** Choosing your Psychology. Not all kinds of psychology are equally useful!
  - *Social Psychology* (attribution errors, emotions, discrimination). YES!
  - *Cognitive Psychology* (Kahneman and Tversky agenda). YES!
  - *Personality Psychology* (Big Four personality types). Not very optimistic (Michigan and NYU group more optimistic)
  - *Developmental Psychology* (Development of skills in children). Not much so far, may become important (see Bill Harbaugh's experiments)
  - *Comparative Psychology* (Example: Asians not overconfident). Difficult to test empirically, but promising

- **Step 2.** Where to start?
  - Read a good introductory book
    * On social psychology I strongly recommend L. Ross and R.E. Nisbett, *The Person and the Situation*, McGraw-Hill, 1991-2011.
    * On cognitive psychology a classic is Daniel Kahneman, Paul Slovic, and Amos Tversky. *Judgment Under Uncertainty: Heuristics and Biases*, Cambridge University Press, 1982
  - Attend a graduate (or undergraduate) class in social of cognitive psychology. Check listing in Psychology, Sociology (Robb Willer), GSPP (Jack Glazer), and Haas (OB/Marketing)

- **Step 3.** Continuing education – Choosing the psychology journals
  - Look for the top psychology journals:
    1. *Journal of Personality and Social Psychology* (*JPSP*)
       * Mostly very high-quality experiments
       * Go directly to design—Do not stop at summary
       * Skip the Section on personality psychology
    2. *Psychological Science*
       * Recent journal, exteremely successful
       * Publishes short articles, like *Science*

3. *Psychological Bulletin*

   * Publishes mostly reviews

4. *Psychological Review*

   * Publishes 'theoretical' contributions, i.e., attempts to summarize existing experimental evidence. No Greek letters!

– Top marketing journals can be useful too

1. *Journal of Consumer Research.* Generally the most psychology-based

2. Also *Journal of Marketing Research*

- **Step 4.** Reading a psychology article
  - Do not go for the newest finding.
    - Look for findings that have been replicated, preferably by different researchers
    - Use Google Scholar for that
  - Reading group: Reading the articles in a group of 2-3
  - Psych articles will contain typically 3-6 experiments. Focus on strongest one or two
  - Classical issues to look for:
    - Sample sizes small

    * Are outcome variables interesting?

    * Deception

- Psych authors tend to claim that they found a new effect – Look for unifying theme instead

- Read meta-analyses (summaries of experiments in an area) — But be wary that many bad experiments do not make a good one

- **Step 5.** Apply it to economics

  1. Criticize the findings

     - Are they relevant for economics?

     - Can existing economic models explain it? (information stories often successful)

  2. Find economic problem could apply to

     - Brainstorm: charitable giving, yes-men in companies, shopping behavior,...

  3. Look for related papers in economics (and psychology)

- It may not work, but you will learn much

7 Psychology and Economics by Field

1. Public Finance

   (a) Present-bias (addiction, sin taxes, retirement savings)

   (b) Social preferences (charitable contributions)

   (c) Limited attention (incidence of taxes, low take-up of benefits)

2. Environmental Economics

   (a) Reference dependence (WTA/WTP)

   (b) Framing effects (value of a life)

3. Labor Economics

   (a) Reference dependence (labor supply, wage setting)

   (b) Social preferences (wage setting)

   (c) Money Illusion (wage setting)

4. Development Economics

   (a) Present-bias (commitment devices in savings, choice of crops)

   (b) Social preferences (group savings, trust, ethnic hatred)

5. Industrial organization

   (a) Present-bias (Credit cards)

   (b) Reference dependence (sales)

   (c) Demand estimation + Profit maximization

6. Marketing

   (a) Menu effects (Strategic pricing of products)

   (b) Present-bias (Placement of tempting products)

7. Law and Economics

   (a) Present-bias (Cooling off period)

   (b) Emotions (litigation)

8. Political Economy

   (a) Market Reaction (manipulation of hatred or inattention)

   (b) Welfare Enhancement (SMRT plan)

9. Asset pricing

   (a) Overconfidence (overtrading)

   (b) Heterogeneity and Market Reaction (noise traders)

   (c) Limited attention (footnotes in accounting, demographics, large events)

10. Corporate finance

   (a) Overconfidence (investment, mergers, options)

   (b) Limited attention (media)

11. Macro – Consumption/Savings

    (a) Present-bias (low saving + mostly illiquid wealth)

    (b) Reference dependence (nominal wage rigidity)

    (c) Limited attention (menu costs)

8 Defaults and 401(k)s: The Facts

- 401(k) savings most common voluntary savings vehicle in the US
  - Set aside money for retirement
  - Choice of percent contribution, and stocks/bonds composition
  - Penalty for early withdrawal
  - Sometimes: Company matching of contribution up to a threshold

- Patterns of 401(k) investment (Highly recommended survey: Choi et al., 2006 – "*Saving for Retirement on the Path of Least Resistance*")

- Today: Focus on Default Effects

- **Fact 1. Close to 50% of investors follows Default Plan (at least initially)**

- Madrian and Shea (QJE, 2001): Single most important piece of field evidence on P&E

- Details:
  - Health Care company
  - Paper-and-pencil 401(k) choice

  - Can enroll any day

- Design (Table 1)
  - Discontinuity of 401(k) plan defaults depending on date of hire
  - After 4/1/1998 investment by default
  - 50 percent match up to 6% contribution
  - Observe effect on investment decisions

TABLE I

401(k) PLAN FEATURES BY PLAN DATE

	Before 4/1/1998	After 4/1/1998
Eligibility		
Eligible employees	All except union and temporary employees	All except union and temporary employees
First eligible	After one year of employment	Immediately upon hire
Employer match eligible	After one year of employment	After one year of employment
Contributions		
Employee contributions	1 percent to 15 percent of compensation[a]	1 percent to 15 percent of compensation[a]
Employer match	50 percent of employee contribution up to 6 percent of compensation[a]	50 percent of employee contribution up to 6 percent of compensation[a]
Vesting		
Vesting of employee contributions	Immediate	Immediate
Vesting of employer contributions	2-year cliff	2-year cliff
Participation		
Default participation decision	No	Yes
Default contribution rate	None	3 percent of compensation
Default fund allocation	None	Money market fund

- OLD Cohort hired 4/1/96-3/31/97:
  - default: no enrollment
  - 1-year wait period for eligibility

- WINDOW Cohort hired 4/1/97-3/31/98:
  - default: no enrollment
  - wait period for eligibility till 4/1/98

- NEW Cohort hired 4/1/98-3/31/99:
  - default: enrollment in 3 percent money market fund
  - immediate eligibility

TABLE II
EMPLOYEE COHORTS FOR COMPARATIVE ANALYSIS

	OLD	WINDOW	NEW
Dates of hire[a]	4/1/1996 to 3/31/1997	4/1/1997 to 3/31/1998	4/1/1998 to 3/31/1999
First eligible to participate in 401(k) plan	One year after date of hire	4/1/1998	Date of hire
First eligible for employer match	One year after date of hire	One year after date of hire	One year after date of hire
Automatically enrolled in 401(k) plan	No	No	Yes
Default contribution rate	None	None	3 percent
Default fund allocation	None	None	Money market fund

- Step 1. Check Design (endogeneity issues)
  - Compare different cohorts: No large differences

TABLE III
COMPARISON OF WORKER CHARACTERISTICS

	Study company				
	OLD cohort	WINDOW cohort	NEW cohort	All workers	U. S. workforce
Average age (years)	37.2	36.0	34.5	37.6	38.8
Gender					
Male	25.4%	23.9%	22.0%	22.1%	53.1%
Female	74.6	76.1	78.0	77.9	46.9
Ethnicity[a]					
White	77.1%	71.7%	68.8%	75.1%	74.6%
Black	12.5	16.8	18.9	14.1	11.3
Hispanic	7.1	8.2	6.7	6.6	9.5
Other	3.3	3.4	5.6	4.2	4.6
Hours					
Full-time (HPW $>$ 35)	96.7%	95.6%	95.8%	94.6%	78.8%
Part-time (HPW $<$ 35)	3.3	4.4	4.2	5.4	21.2
Compensation[b]					
Mean	$41,970	$38,424	$34,264	$40,180	$28,248
Median	$33,470	$30,530	$26,519	$31,333	$20,400

- Step 2. Compare plan choices:

1. *Participation* rates in 401(k) by June 30, 1999 (Figure I and Table IV):
   - OLD: 57%, WINDOW: 49%, NEW: 86%

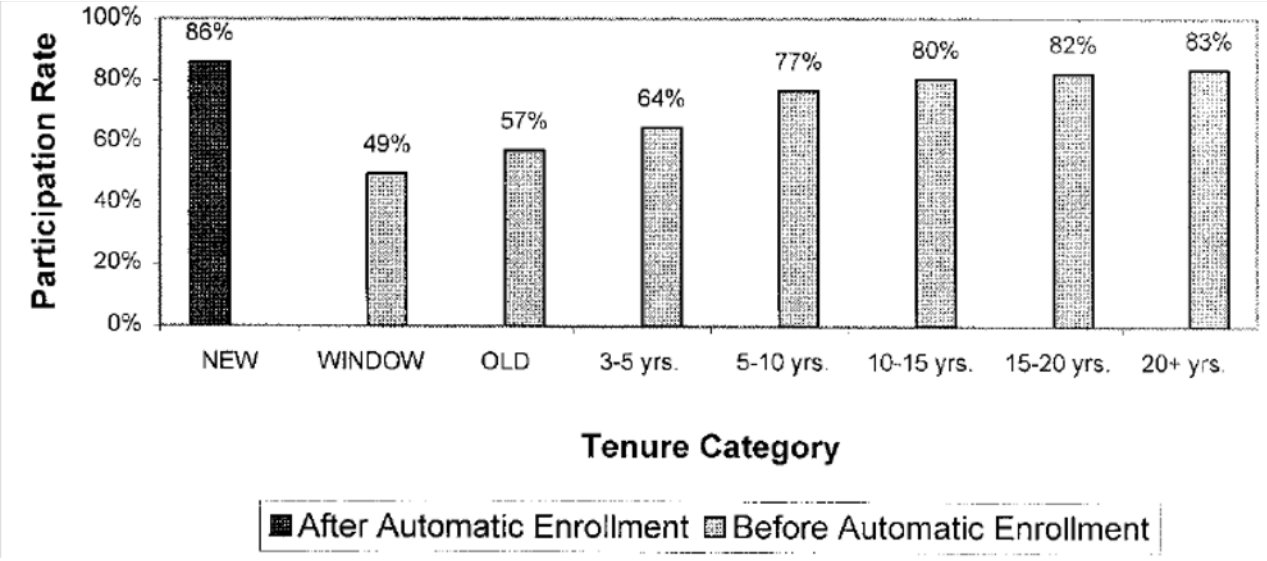


TABLE IV

THE EFFECTS OF AUTOMATIC ENROLLMENT AND IMMEDIATE ELIGIBILITY ON 401(k) PARTICIPATION

	Automatic enrollment		Immediate eligibility	
	Participation rate of Window cohort on 6/30/98	Participation rate of New cohort on 6/30/99	Participation rate of Old cohort on 6/30/98	Participation rate of Window cohort on 6/30/99
Overall	37.4%	85.9%	48.7%	49.4%
Gender				
Male	42.3	85.7	56.1	55.9
Female	35.9	86.0	46.3	47.4
Race/ethnicity				
White	42.7	88.2	53.4	54.4
Black	21.7	81.3	30.7	32.6
Hispanic	19.0	75.1	27.8	34.5
Other	46.2	85.2	55.0	62.9
Age				
Age <20	—	73.6	25.0	33.3
Age 20–29	25.3	82.7	36.7	36.9
Age 30–39	37.2	86.3	47.9	50.3
Age 40–49	47.3	90.1	54.9	58.0
Age 50–59	51.8	90.0	64.3	64.3
Age 60–64	60.0	86.0	60.6	70.0
Compensation				
<$20K	12.5	79.5	20.0	21.2
$20–$29K	24.5	82.8	31.7	35.3
$30–$39K	42.2	88.9	50.1	55.4
$40–$49K	51.0	91.8	61.6	64.5
$50–$59K	61.6	92.8	70.2	75.2
$60–$69K	59.7	94.7	79.2	75.1
$70–$79K	57.9	91.5	76.3	71.6
$80K+	68.3	94.2	76.3	82.6
Sample size	N = 4249	N = 5801	N = 3275	N = 4247

1. *Contribution* rates (Figures IIc):

   - WINDOW: 63% are at 0 percent, 4% at 3 percent
   - NEW: 65% are at 3 percent (Default)

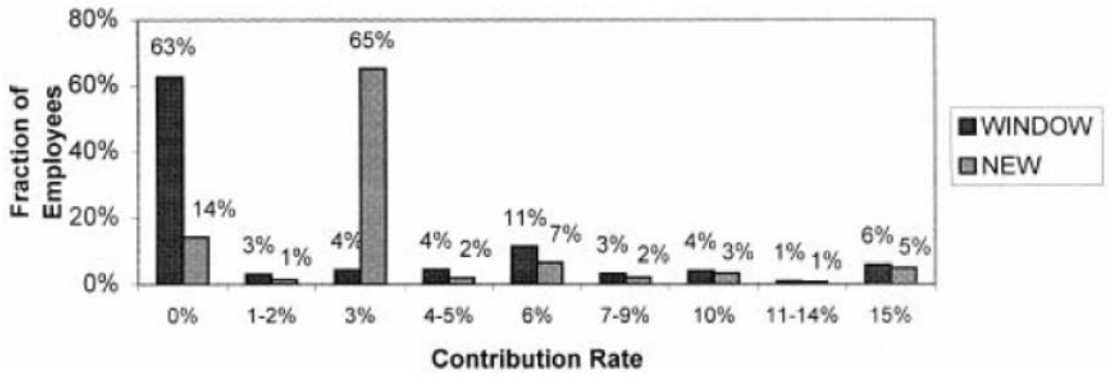


FIGURE IIc
Distribution of 401(k) Contribution Rates for the WINDOW and NEW Cohorts Including Nonparticipation

1. *Allocation* of funds in stocks (Figure III):

   - OLD: 75%, WINDOW: 73%, NEW: 16%

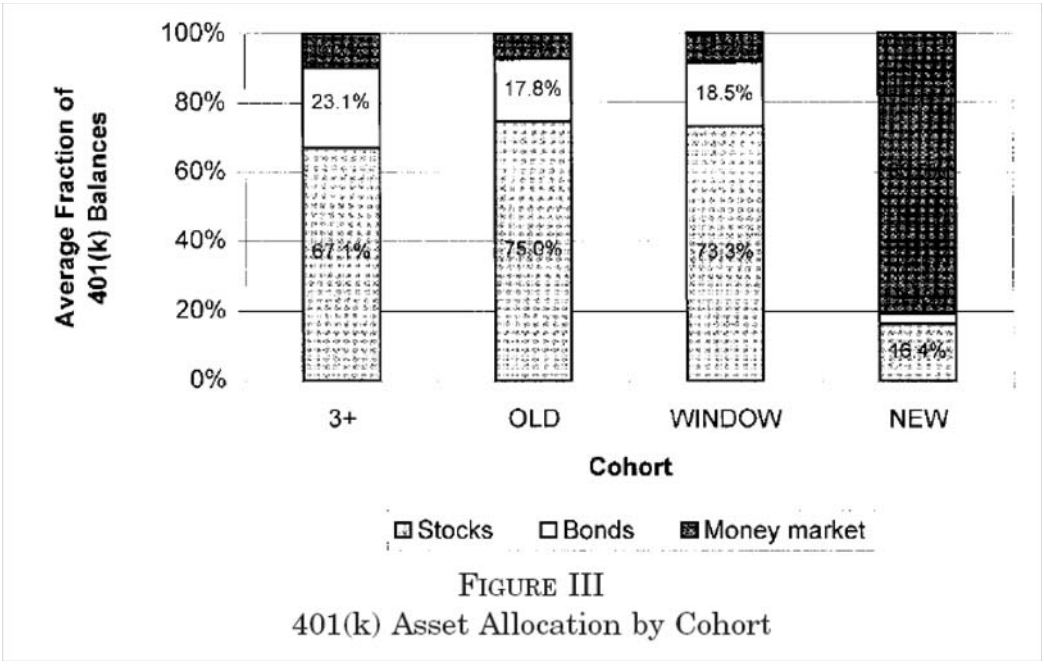


FIGURE III
401(k) Asset Allocation by Cohort

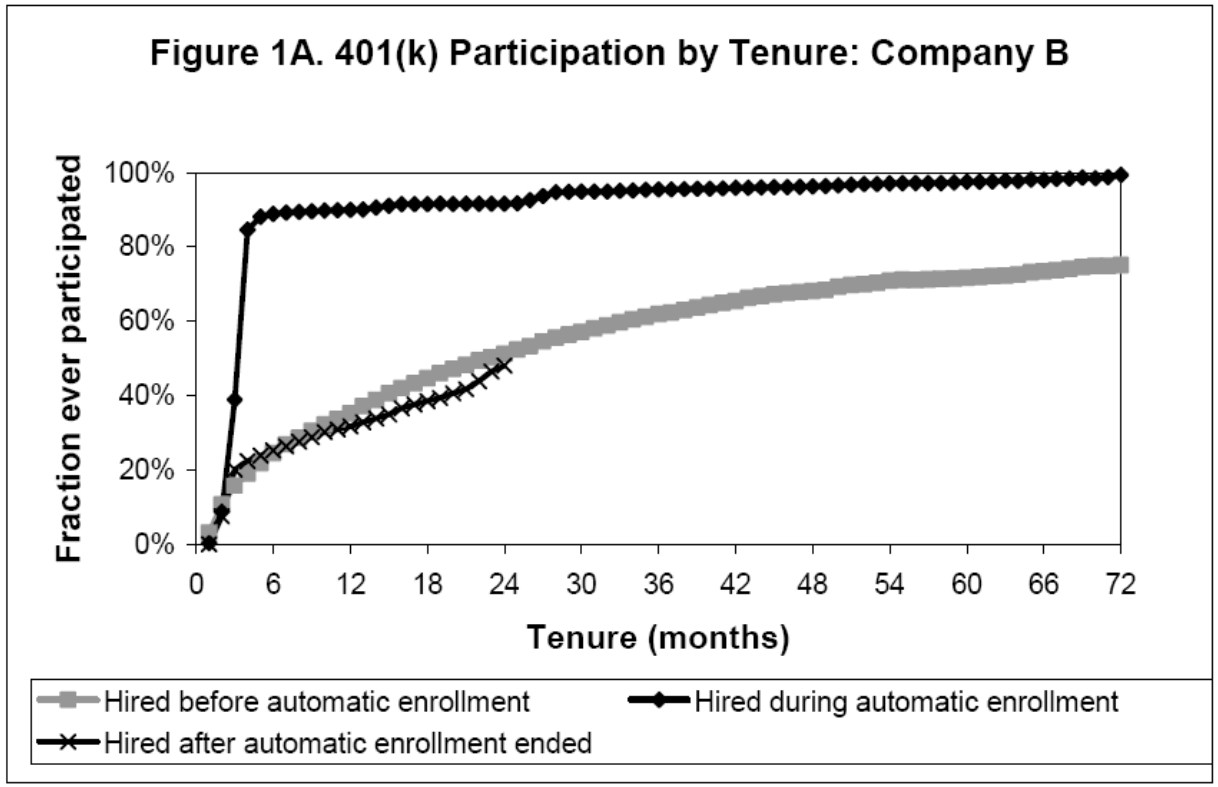
- Results equally strong with controls (Table VI)

TABLE VI
RAW AND REGRESSION-ADJUSTED EFFECTS OF AUTOMATIC ENROLLMENT AND IMMEDIATE ELIGIBILITY

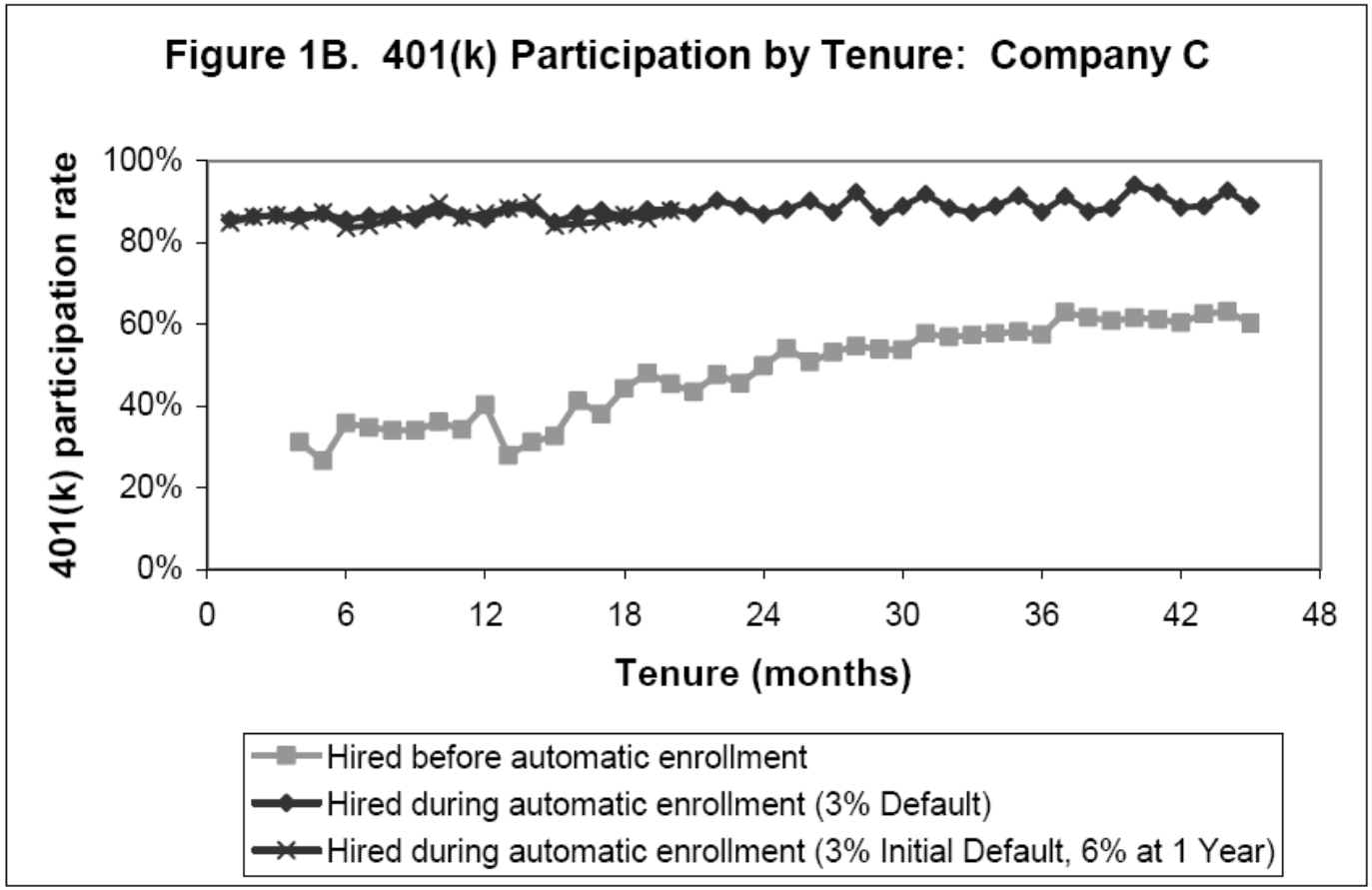
	Effect of Automatic enrollment: Window cohort on 6/30/98 vs. New cohort on 6/30/99	Effect of Immediate eligibility: Old cohort on 6/30/98 vs. Window cohort on 6/30/99
401(k) Participation rate		
Raw difference	48.5%*	0.6%
Regression-adjusted difference	50.4%*	4.1%*
401(k) Contribution rate		
Raw difference	−2.9%*	−0.1%
Regression-adjusted difference	−2.2%*	0.2%

- Results very robust. Choi et al. (2004) Survey paper:

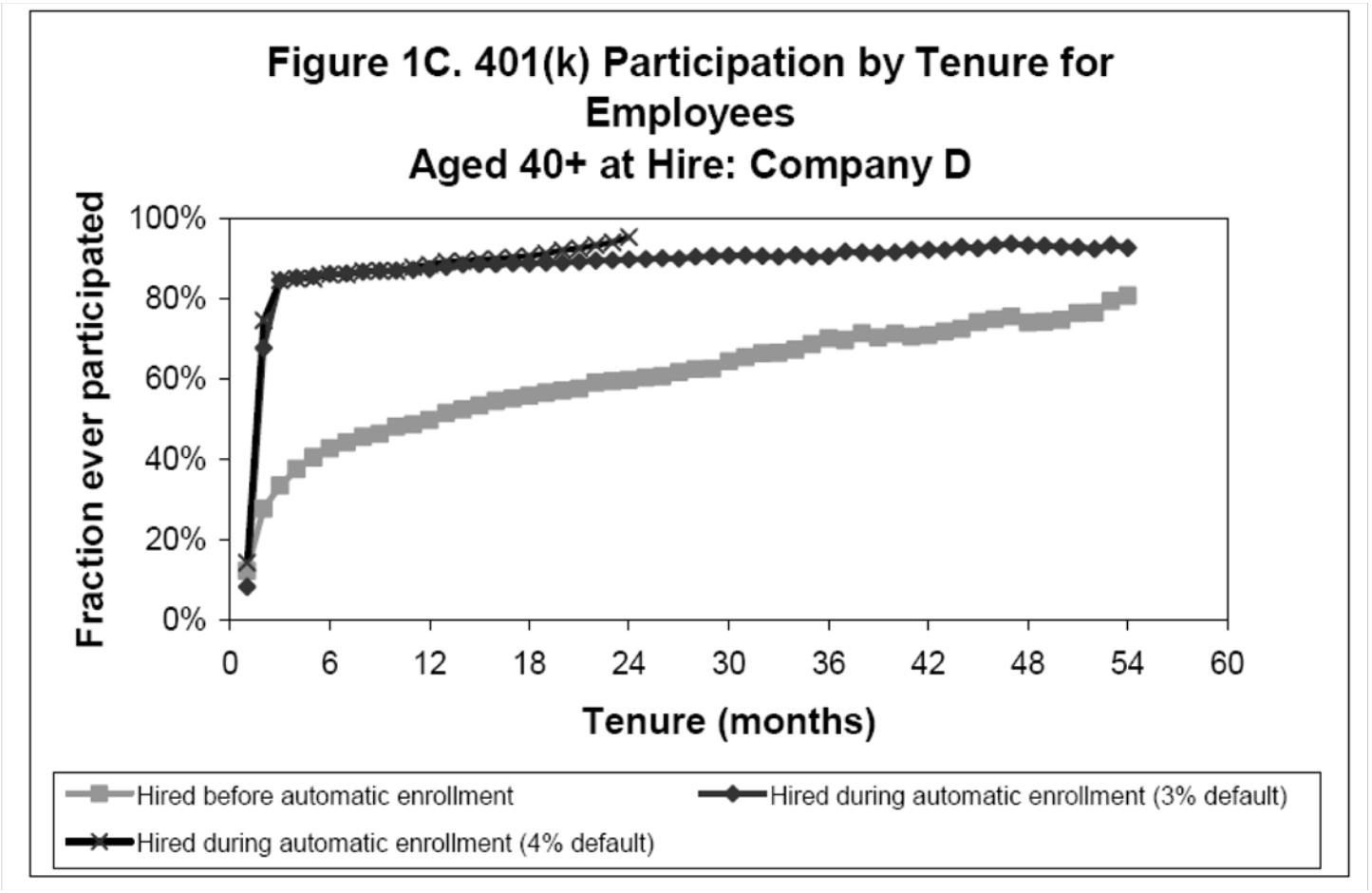
- Company B switches from OLD to NEW to OLD



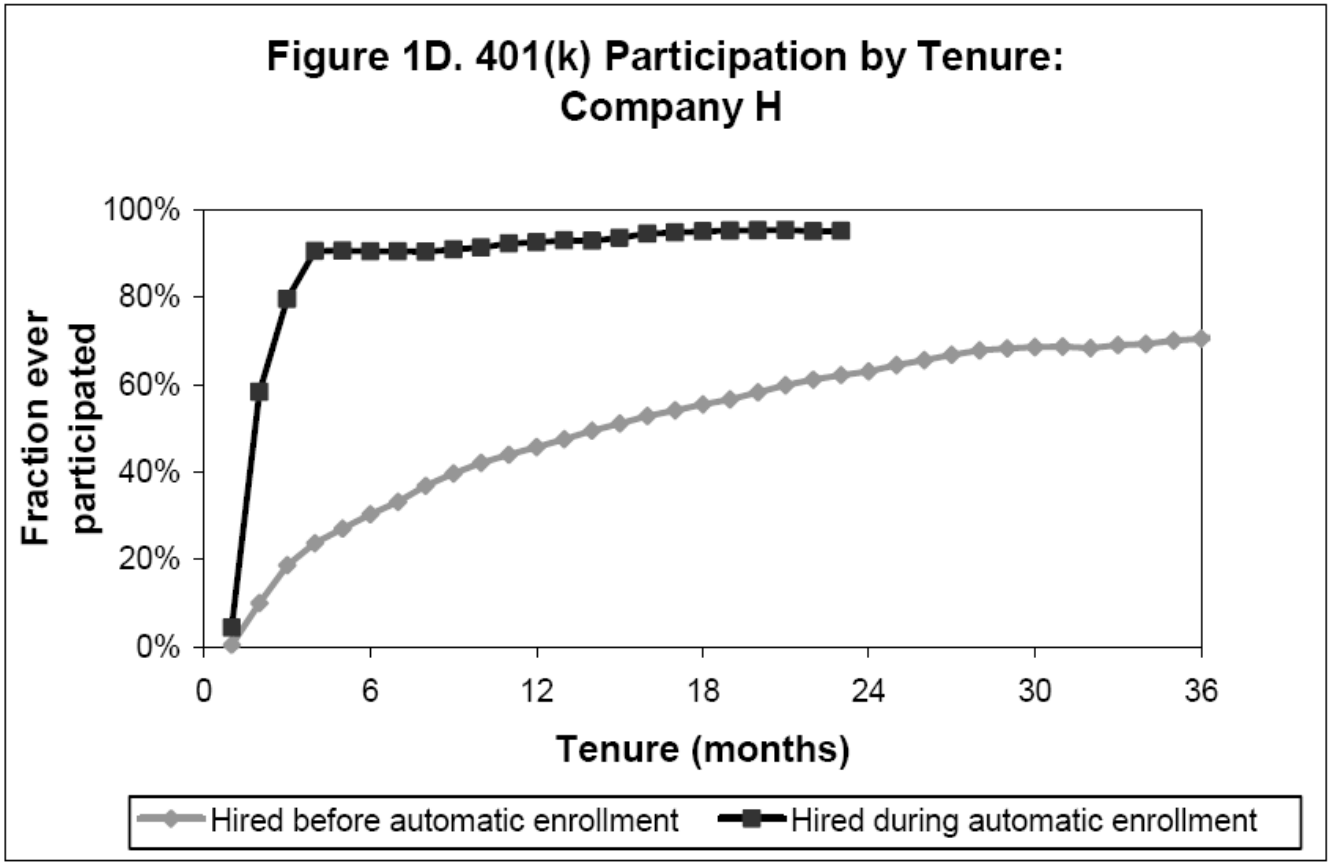
- Company C switches from OLD to NEW to NEW2



- Company D switches from OLD to NEW to NEW2



- Company H switches from OLD to NEW



- Summary.
  - OLD and NEW cohorts invest very differently one year after initial hire
    - Fact 1. **Fact 1. Close to 50% of investors follow Default Plan**
    - Fact 1a. Applies to participation (yes/no)
    - Fact 1b. Applies also to contribution level and allocation
  - (Less commonly cited) WINDOW cohort resembles OLD cohort
    - Fact 2. '**Suggested choice' not very attractive unless default**

9 Next Lecture

- More defaults effects in 401(k) savings
  - Present-biased preferences
  - Interpretation facts using present-biased preferences
- Consumption Choices
  - *Investment Good.* Homework
- Problem Set 1 is due next week