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

Stefano DellaVigna

January 23, 2019
Introduction

Psychology and Economics: The Topics

Psychology and Economics by Field

Methodology: Reading the Psychology Journals

Defaults and Retirement Savings: The Facts

Comparison to Effect of Financial Education
Section 1

Introduction
Who am I?

- Stefano DellaVigna (call me Stefano)
- Professor, Department of Economics
- Bocconi (Italy) undergraduate (Econ.), Harvard PhD (Econ.)
- Psych and Econ (aka Behavioral Economics), Applied Microeconomics, Media Economics, Political Economy, Behavioral Finance
- Evans 515 – OH schedule by email
Who are you?

- PhD student. Graduate courses in
  - Micro Theory
  - Econometrics
  - Psychology and Economics – Theory (219A)

- Interest in
  - Psychology and Economics
  - Applied, empirical microeconomics (io, labor, public finance, finance)
What is this class?

Reading list:

- No textbook, but read “Psychology and Economics: Evidence from the Field” (Journal of Economic Literature 2009)
- Also read “Structural Behavioral Economics” (for 1st Handbook of Behavioral Economics, 2018)
- Updated reading list on course webpage
- Methodological Topics
- Please email me (sdellavi@econ.berkeley.edu) for any issue with class and to schedule a meeting
What is this class?

- Grade:
  - 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 write a paper
- Information Sheet
Section 2

Psychology and Economics: The Topics
Prototypical Economist Conception of Human Behavior

From Rabin (2002a) and DellaVigna (2009):

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

- $X_i$ 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 $s$
Step 1. Non-Standard Preferences

1. Present-Biased Preferences: time inconsistency $(\beta, \delta)$
2. Reference Dependence: $U(x_i|r, s)$ with $r$ reference point
3. Social Preferences: $U(x_i, x_{-i}|s)$ where $x_{-i}$ is allocation of others
Step 2. Non-Standard Beliefs

Beliefs $\hat{p}(s) \neq p(s)$

1. Overconfidence: wrong $E(p)$ or wrong $Var(p)$
2. Projection Bias: wrong forecast of utility: $\hat{u}(\cdot, s)$
3. Law of Small Numbers: wrong forecast of $p(s_{t+1}|s_t)$
4. Experience Effects: excessive updating of $p(s_t|s_{t-1})$
Step 3. Non-Standard Decision-Making

1. Limited Attention: maximization set ≠ \( X_i \) (neglect less salient alternatives)
2. Framing: = max problem leads to ≠ solutions
3. Menu effects: do not max \( U \)
4. Persuasion
5. Mental Accounting
6. Emotions
7. Happiness
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. ...

[Note: The number count appears to be out of sequence or incorrectly formatted, possibly indicating a placeholder or an error in the transcription.]
Section 3

Psychology and Economics by Field
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
- Can still give an idea field by field of key applications
Psychology and Economics by Field

1 Public Finance
   1 Present-bias (addiction, sin taxes, retirement savings)
   2 Limited attention (incidence of taxes, low take-up of benefits)
   3 Social preferences (charitable contributions)

2 Development Economics
   1 Present-bias (commitment devices in savings, choice of crops, insurance)
   2 Social preferences (group savings, trust, ethnic hatred)
   3 Risk preferences (crop insurance)
3 Asset pricing
   1 Overconfidence (overtrading)
   2 Limited attention (footnotes in accounting, demographics, large events)
   3 Extrapolation (overinference)
   4 Market Reaction (noise traders)

4 Corporate finance
   1 Overconfidence (investment, mergers, options)
   2 Reference dependence (mergers)
   3 Limited attention (media)
Psychology and Economics by Field

5 Labor Economics
1. Present Bias (job search, effort)
2. Reference dependence (labor supply, wage setting, job search)
3. Social preferences (wage setting, effort)
4. Overconfidence (job search)
5. Money Illusion (wage setting)
6. Limited Attention (job vacancies, migration)

6 Health Economics
1. Present-Bias (default effects; obesity; commitment devices)
2. Limited Attention (plan choice)
3. Menu choice and confusion (health plan choices)
Psychology and Economics by Field

7 Education Economics
   1 Limited attention (major choice, FAFSA form)
   2 Present-Bias (returns to education)
   3 Social norms (acting white)

8 Economics of Crime
   1 Arousal (violent crime)
   2 Present-bias (disregard for future)
Industrial organization

1. Present-bias (Credit cards)
2. Reference dependence (sales)
3. Demand estimation + Profit maximization
4. Behavioral firms

Marketing

1. Menu effects (Strategic pricing of products)
2. Present-bias (Placement of tempting products)
Psychology and Economics by Field

11 Environmental Economics
   1 Social comparisons (energy savings)
   2 Limited Attention (energy savings)
   3 Reference dependence (WTA/WTP)
   4 Framing effects (value of a life)

12 Law and Economics
   1 Present-bias (Cooling off period)
   2 Emotions (litigation)
   3 Order Effects and mood (judicial decisions)
Political Economy
1. Reference Dependence (status quo in policies)
2. Social Preference (voting, vote buying, protests)
3. Market Reaction (manipulation of hatred or inattention)
4. Welfare Enhancement (SMRT plan)

Macro – Consumption/Savings
1. Present-bias (low saving + mostly illiquid wealth)
2. Reference dependence (nominal wage rigidity)
3. Limited attention (menu costs)
4. Experience effects (inflation expectations)
Section 4

Methodology: Reading Psychology Journals
One Strategy

- 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
- Attend a graduate (or undergraduate) class in social or cognitive psychology. Check listing in Psychology, GSPP (Jack Glazer), and Haas (OB/Marketing)
- Recommended: Podcasts by Robb Willer, even on iTunes
Step 3. Continuing Education – Choosing 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, extremely successful
     - Publishes short articles, like *Science*
     - Recently led charge in raising publication standards (thank you Uri Simonsohn!)
  3. *Psychological Bulletin*
     - Publishes mostly reviews
  4. *Psychological Review*
     - Publishes ‘theoretical’ contributions, i.e., attempts to summarize existing experimental evidence. No Greek letters!
Step 3. Continuing Education – Choosing journals

- Top marketing journals can be useful too
  1. *Journal of Consumer Research*. Generally the most psychology-based
  2. *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 too small?
  - Effect too large?
  - Are outcome variables interesting to economists?
  - Deception?
Step 4. Reading a Psychology Article

- 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
- Also, check out recent debate on replication in psychology (and other social sciences): http://datacolada.org/
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
Section 5

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: Default Effects
Fact 1. Close to 50% of Investors Follow Default Plan

- Single most important piece of field evidence on P&E
  - Health Care company
  - Paper-and-pencil 401(k) choice
  - Can enroll any day
  - 50 percent match up to 6% contribution

- Design (Table 1)
  - Discontinuity of 401(k) plan defaults depending on date of hire
  - After 4/1/1998 investment by default
# Design

## TABLE I

401(k) Plan Features by Plan Date

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Eligibility</strong></td>
<td>All except union and temporary employees</td>
<td>All except union and temporary employees</td>
</tr>
<tr>
<td>Eligible employees</td>
<td></td>
<td></td>
</tr>
<tr>
<td>First eligible</td>
<td>After one year of employment</td>
<td>Immediately upon hire</td>
</tr>
<tr>
<td>Employer match eligible</td>
<td>After one year of employment</td>
<td>After one year of employment</td>
</tr>
<tr>
<td><strong>Contributions</strong></td>
<td>1 percent to 15 percent of compensation&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1 percent to 15 percent of compensation&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Employee contributions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employer match</td>
<td>50 percent of employee contribution up to 6 percent of compensation&lt;sup&gt;a&lt;/sup&gt;</td>
<td>50 percent of employee contribution up to 6 percent of compensation&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td><strong>Vesting</strong></td>
<td>Immediate</td>
<td>Immediate</td>
</tr>
<tr>
<td>Vesting of employee contributions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vesting of employer contributions</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Participation</strong></td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Default participation decision</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Default contribution rate</td>
<td>None</td>
<td>3 percent of compensation</td>
</tr>
<tr>
<td>Default fund allocation</td>
<td>None</td>
<td>Money market fund</td>
</tr>
</tbody>
</table>
Design

- 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>
<thead>
<tr>
<th></th>
<th>OLD</th>
<th>WINDOW</th>
<th>NEW</th>
</tr>
</thead>
<tbody>
<tr>
<td>First eligible to participate in 401(k) plan</td>
<td>One year after date of hire</td>
<td>4/1/1998</td>
<td>Date of hire</td>
</tr>
<tr>
<td>First eligible for employer match</td>
<td>One year after date of hire</td>
<td>One year after date of hire</td>
<td>One year after date of hire</td>
</tr>
<tr>
<td>Automatically enrolled in 401(k) plan</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Default contribution rate</td>
<td>None</td>
<td>None</td>
<td>3 percent</td>
</tr>
<tr>
<td>Default fund allocation</td>
<td>None</td>
<td>None</td>
<td>Money market fund</td>
</tr>
</tbody>
</table>

<sup>a</sup> Date of hire is the date when an employee is hired by the company.
### Step 1. Check Design (endogeneity issues)

- **Compare different cohorts: No large differences**

#### TABLE III
**Comparison of Worker Characteristics**

<table>
<thead>
<tr>
<th></th>
<th>OLD cohort</th>
<th>WINDOW cohort</th>
<th>NEW cohort</th>
<th>All workers</th>
<th>U. S. workforce</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Average age (years)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>25.4%</td>
<td>23.9%</td>
<td>22.0%</td>
<td>22.1%</td>
<td>53.1%</td>
</tr>
<tr>
<td>Female</td>
<td>74.6%</td>
<td>76.1%</td>
<td>78.0%</td>
<td>77.9%</td>
<td>46.9%</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Ethnicity</strong>^a</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>77.1%</td>
<td>71.7%</td>
<td>68.8%</td>
<td>75.1%</td>
<td>74.6%</td>
</tr>
<tr>
<td>Black</td>
<td>12.5%</td>
<td>16.8%</td>
<td>18.9%</td>
<td>14.1%</td>
<td>11.3%</td>
</tr>
<tr>
<td>Hispanic</td>
<td>7.1%</td>
<td>8.2%</td>
<td>6.7%</td>
<td>6.6%</td>
<td>9.5%</td>
</tr>
<tr>
<td>Other</td>
<td>3.3%</td>
<td>3.4%</td>
<td>5.6%</td>
<td>4.2%</td>
<td>4.6%</td>
</tr>
<tr>
<td><strong>Hours</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full-time</td>
<td>96.7%</td>
<td>95.6%</td>
<td>95.8%</td>
<td>94.6%</td>
<td>78.8%</td>
</tr>
<tr>
<td>Part-time</td>
<td>3.3%</td>
<td>4.4%</td>
<td>4.2%</td>
<td>5.4%</td>
<td>21.2%</td>
</tr>
<tr>
<td><strong>Compensation</strong>^b</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>$41,970</td>
<td>$38,424</td>
<td>$34,264</td>
<td>$40,180</td>
<td>$28,248</td>
</tr>
<tr>
<td>Median</td>
<td>$33,470</td>
<td>$30,530</td>
<td>$26,519</td>
<td>$31,333</td>
<td>$20,400</td>
</tr>
</tbody>
</table>
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%
Step 2. Compare plan choices

<table>
<thead>
<tr>
<th>TABLE IV</th>
<th>THE EFFECTS OF AUTOMATIC ENROLLMENT AND IMMEDIATE ELIGIBILITY ON 401(k) PARTICIPATION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Automatic enrollment</td>
</tr>
<tr>
<td></td>
<td>Participation rate of Window cohort on 6/30/98</td>
</tr>
<tr>
<td>Overall</td>
<td>37.4%</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>42.3%</td>
</tr>
<tr>
<td>Female</td>
<td>35.9%</td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>42.7%</td>
</tr>
<tr>
<td>Black</td>
<td>21.7%</td>
</tr>
<tr>
<td>Hispanic</td>
<td>19.0%</td>
</tr>
<tr>
<td>Other</td>
<td>46.2%</td>
</tr>
<tr>
<td>Age</td>
<td></td>
</tr>
<tr>
<td>Age &lt;20</td>
<td>—</td>
</tr>
<tr>
<td>Age 20–29</td>
<td>25.3%</td>
</tr>
<tr>
<td>Age 30–39</td>
<td>37.2%</td>
</tr>
<tr>
<td>Age 40–49</td>
<td>47.3%</td>
</tr>
<tr>
<td>Age 50–59</td>
<td>51.8%</td>
</tr>
<tr>
<td>Age 60–64</td>
<td>60.0%</td>
</tr>
<tr>
<td>Compensation</td>
<td></td>
</tr>
<tr>
<td>&lt;$20K</td>
<td>12.5%</td>
</tr>
<tr>
<td>$20–$29K</td>
<td>24.5%</td>
</tr>
<tr>
<td>$30–$39K</td>
<td>42.2%</td>
</tr>
<tr>
<td>$40–$49K</td>
<td>51.0%</td>
</tr>
<tr>
<td>$50–$59K</td>
<td>61.6%</td>
</tr>
<tr>
<td>$60–$69K</td>
<td>59.7%</td>
</tr>
<tr>
<td>$70–$79K</td>
<td>57.9%</td>
</tr>
<tr>
<td>$80K+</td>
<td>68.3%</td>
</tr>
<tr>
<td>Sample size</td>
<td>N = 4249</td>
</tr>
</tbody>
</table>
Step 2. Compare plan choices

**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
Step 2. Compare plan choices

1. **Allocation** of funds in stocks (Figure III):
   - OLD: 75%, WINDOW: 73%, NEW: 16%

![Figure III](image-url)
Step 2. Compare plan choices

- Results equally strong with controls (Table VI)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Raw difference</td>
<td>48.5%*</td>
<td>0.6%</td>
</tr>
<tr>
<td>Regression-adjusted difference</td>
<td>50.4%*</td>
<td>4.1%*</td>
</tr>
<tr>
<td>401(k) Contribution rate</td>
<td>Raw difference</td>
<td>-2.9%*</td>
</tr>
<tr>
<td></td>
<td>Regression-adjusted difference</td>
<td>-2.2%*</td>
</tr>
</tbody>
</table>
Results very robust: Choi et al. (2004) Survey paper

- Company B switches from OLD to NEW to OLD

![Graph showing 401(k) Participation by Tenure: Company B](image_url)

- Figure 1A. 401(k) Participation by Tenure: Company B

- Graph shows participation rates over tenure for different hiring periods:
  - Hired before automatic enrollment
  - Hired during automatic enrollment
  - Hired after automatic enrollment ended
Design

- Company C switches from OLD to NEW to NEW2

**Figure 1B. 401(k) Participation by Tenure: Company C**

- **Hired before automatic enrollment**
- **Hired during automatic enrollment (3% Default)**
- **Hired during automatic enrollment (3% Initial Default, 6% at 1 Year)**
Design

- Company D switches from OLD to NEW to NEW2

Figure 1C. 401(k) Participation by Tenure for Employees
Aged 40+ at Hire: Company D
Design

- Company H switches from OLD to NEW

Figure 1D. 401(k) Participation by Tenure: Company H

- Hired before automatic enrollment
- Hired during automatic enrollment
Summary

- OLD and NEW cohorts invest very differently one year after initial hire
  - Fact 1. **Fact 1. 40% 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
Summary

- BUT: Default effects not informative of optimal saving plans.
  - Is OLD cohort under-saving?
  - Or is NEW cohort over-saving?
- Introduction of Active Choice (Carroll et al., QJE 2009) – Large Fortune-500 Company, Financial sector
- Comparison between Active Choice (before) and No Enrollment (after)
Active Choice

Fact 3. Active Choice resembles Default Investment

<table>
<thead>
<tr>
<th>Eligibility</th>
<th>Effective January 1, 1997</th>
<th>Effective November 23, 1997</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eligible employees</td>
<td>U.S. employees, age 18+</td>
<td>U.S. employees, age 18+</td>
</tr>
<tr>
<td>First eligible</td>
<td>Immediately upon hire</td>
<td>Immediately upon hire</td>
</tr>
<tr>
<td>Employer match eligible</td>
<td>Immediately upon hire</td>
<td>Immediately upon hire</td>
</tr>
<tr>
<td>Enrollment</td>
<td>First 30 days of employment or January 1 of succeeding calendar years</td>
<td>Daily</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contributions</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Employee contributions</td>
<td>Up to 17% of compensation</td>
<td>Up to 17% of compensation</td>
</tr>
<tr>
<td>Non-discretionary employer match</td>
<td>50% of employee contribution up to 5% of compensation</td>
<td>50% of employee contribution up to 5% of compensation</td>
</tr>
<tr>
<td>Discretionary employer match</td>
<td>Up to 100% of employee contribution depending on company profitability (50% for bonus-eligible employees); 100% in 1997.</td>
<td>Up to 100% of employee contribution depending on company profitability (50% for bonus-eligible employees); varied from 0% to 100% for 1997-2000.</td>
</tr>
<tr>
<td>Vesting</td>
<td>Immediate</td>
<td>Immediate</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Loans</td>
<td>Not available</td>
<td>Available; 2 maximum</td>
</tr>
<tr>
<td>Hardship withdrawals</td>
<td>Available</td>
<td>Available</td>
</tr>
<tr>
<td>Investment choices</td>
<td>6 options. Employer stock also available, but only for after-tax contributions.</td>
<td>8 options + employer stock (available for before- and after-tax contributions)</td>
</tr>
</tbody>
</table>
Active Choice

- **ACTIVE Cohort, hired 1/1/97-7/31/97**
  - 30 days to return 401(k) form with legal packet/
  - Next enrollment period: January 1998
  - Paper-and-pencil form

- **OLD2 Cohort, hired 1/1/98-7/31/98**
  - Standard, no-saving-default (like OLD)
  - Can enroll any time
  - Telephone-based enrollment, 24/7
Step 1. Check Design

- Summary Stats (Table 2)–No substantial difference across cohorts

<table>
<thead>
<tr>
<th></th>
<th>Study company</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Active decision cohort</td>
</tr>
<tr>
<td><strong>Average age (years)</strong></td>
<td>34.1</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>45.4%</td>
</tr>
<tr>
<td>Female</td>
<td>54.6%</td>
</tr>
<tr>
<td><strong>Marital Status</strong></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>42.8%</td>
</tr>
<tr>
<td>Married</td>
<td>57.2%</td>
</tr>
<tr>
<td><strong>Compensation</strong></td>
<td></td>
</tr>
<tr>
<td>Avg. monthly base pay</td>
<td>$2,994</td>
</tr>
<tr>
<td>Median monthly base pay</td>
<td>$2,648</td>
</tr>
<tr>
<td>Avg. annual income*</td>
<td>$34,656</td>
</tr>
<tr>
<td>Median annual income*</td>
<td>$30,530</td>
</tr>
</tbody>
</table>
Step 2. Compare Plan Choices

Figures 1 and 2

- **Participation** rates in 401(k) using cross-sectional data (Figure 1):
  - ACTIVE: 69% – OLD2: 41% (at month 3)
  - Compare to NEW (86%) and OLD (57%) in MS01 after >6 months
  - Does not depend on month of hire (see below)

![Graph showing participation rates at third month of tenure for different months of hire.](image-url)
Step 2. Compare Plan Choices

*Contribution* rates (including zeros) (Figure 3)
- ACTIVE: 4.8% – OLD2: 3.5% (at month 9, when longitudinal date becomes available)
Step 2. Compare Plan Choices

*Contribution* rates (excluding zeros) (Figure 4)

- ACTIVE: 6.8% – OLD2: 7.5% (at month 9)
- Selection effect: Marginal individuals are lower savers
Step 2. Compare Plan Choices

- Differences between ACTIVE and OLD2 disappear by year 3 (Figure 2)
- Still: Important because no catch-up in levels, and because of frequent changes in employers
Results

- ACTIVE is close to NEW and differs from OLD and OLD2
  - Fact 3. Active Choice resembles Default Investment
    - Fact 3b. Month of Hire does not matter
  - Fact 4. Effect of default mostly disappears after three years
- Prevalence of OLD Default can (at least in part) explain under-saving for retirement
Other evidence on default effects in choice of savings: Cronqvist and Thaler (2004, AER P&P)

- Privatization of Social Security in Sweden in 2000
- 456 funds, 1 default fund (chosen by government)
- Year 2000:
  - Choice of default is discouraged with massive marketing campaign.
  - Among new participants, 43.3 percent chooses default
- Year 2003:
  - End of marketing campaign.
  - Among new participants, 91.6 percent chooses default
Portfolio Choice

- Side point for us (but key point in paper): Portfolio actively chosen in year 2000 does much worse than default

<table>
<thead>
<tr>
<th>Table 1—Comparison of the Default Fund and the Mean Actively Chosen Portfolio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Portfolio characteristic</td>
</tr>
<tr>
<td>---------------------------</td>
</tr>
<tr>
<td>Asset allocation</td>
</tr>
<tr>
<td>Equities</td>
</tr>
<tr>
<td>Sweden</td>
</tr>
<tr>
<td>Americas</td>
</tr>
<tr>
<td>Europe</td>
</tr>
<tr>
<td>Asia</td>
</tr>
<tr>
<td>Fixed-income securities</td>
</tr>
<tr>
<td>Hedge funds</td>
</tr>
<tr>
<td>Private equity</td>
</tr>
<tr>
<td>Indexed</td>
</tr>
<tr>
<td>Fee</td>
</tr>
<tr>
<td>Beta</td>
</tr>
<tr>
<td>Ex post performance</td>
</tr>
</tbody>
</table>
Important remaining issue however: **Substitution of Assets**

- Individuals follow defaults
- But what if they compensate changing savings through other assets? Savings in bank accounts, stock participation, etc.
- Need access to comprehensive asset information
- For papers above, no access to such information

**Chetty, Friedman, Leth-Peterson, Nielsen, and Olsen.** (QJE 2014):
Access to comprehensive data in Denmark

- Employer-contributed pension
- Individual-chosen pension contribution
- Other savings
Chetty et al. (QJE 2014)

- Event-Study Design:
  - Employers vary in required employer-provided pension
  - Examine workers that switch employers

![Graph showing changes in contributions and savings over time following a firm switch](image-url)
No evidence of decline of savings

- What if bunching at zero savings? Restrict to positive savings
Substitution?

- How many individuals switch their individual pensions in year to fully offset employer pension change? Zero!
Substitution?

- Other graphical evidence: Scatterplots by change in employer pension
- Pass-through of employer pensions nearly complete on pension savings
Substitution?

- Pass-through on all savings still very high
- No evidence of larger adjustment when bigger change (optimal inattention)
Persistence

- How persistent is the effect? Persists at least over a decade
Section 6

Comparison to Effect of Financial Education
Studies of the effect of financial education:

- Cross-Sectional surveys (Bernheim and Garrett, 2003; Bayer, Bernheim, and Scholz, 1996)
  - Sizeable impact
  - BUT: Strong Biases (Reverse Causation + Omitted Vars)
- Time-series Design (McCarthy and McWhirter 2000; Jacobius 2000)
  - Sizeable impact
  - BUT: Use self-reported desired saving
- Need for plausible design
Choi et al. (2005)

- Financial education class (one hour) in Company D in 2000
- Participation rate: 17 percent
- People are asked: "After attending today’s presentation, what, if any, action do you plan on taking toward your personal financial affairs?"
- Administrative data on Dec. 1999 (before) and June 2000 (after)
- Examine effect:
  - participants (self-selected) – 12% of them were not saving before → Demand for financial education comes from people who already save!
  - non-participants
- Effect likely biased upwards
Results

**TABLE 5. Financial Education and Actual vs. Planned Savings Changes (Company C)**

<table>
<thead>
<tr>
<th>Planned Action</th>
<th>Seminar Attendees</th>
<th>Non-Attendees</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Planned Change</td>
<td>Actual Change</td>
</tr>
<tr>
<td><strong>Non-participants</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enroll in 401(k) plan</td>
<td>100%</td>
<td>14%</td>
</tr>
<tr>
<td><strong>401(k) participants</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increase contribution rate</td>
<td>28%</td>
<td>8%</td>
</tr>
<tr>
<td>Change fund selection</td>
<td>47%</td>
<td>15%</td>
</tr>
<tr>
<td>Change fund allocation</td>
<td>36%</td>
<td>10%</td>
</tr>
</tbody>
</table>

The sample is active 401(k)-eligible employees at company locations that offered financial education seminars from January-June 2000. Actual changes in savings behavior are measured over the period from December 31, 1999 through June 30, 2000. Planned changes are those reported by seminar attendees in an evaluation of the financial education seminars at the conclusion of the seminar. The planned changes from surveys responses of attendees have been scaled to reflect the 401(k) participation rate of seminar attendees.

- Result: Very little impact on changes in savings, compared to non-attendees or to control time period
Duflo and Saez (QJE 2003)

- Target staff in prestigious university (Harvard? MIT?)
- Randomized Experiment in a university:
  - 1/3 of 330 Departments control group
  - 2/3 of 330 Departments treatment group:
    - 1/2 not-enrolled staff: letter with $20 reward for attending a fair
    - 1/2 not-enrolled staff: no reward
- Measure attendance to the fair and effect on retirement savings
### Descriptive Statistics

#### TABLE 1
**DESCRIPTIVE STATISTICS, BY GROUPS**

<table>
<thead>
<tr>
<th>Treated departments</th>
<th>All (group $D = 1$)</th>
<th>Treated (group $L = 1$)</th>
<th>Untreated (group $D = 1, L = 0$)</th>
<th>Untreated departments (group $D = 0$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td></td>
</tr>
</tbody>
</table>

**PANEL A: BACKGROUND CHARACTERISTICS**

- **TDA participation before the fair (Sept. 2000)**
  - Obs: 4168, 2039, 2129, 2043
  - Mean: 0.010, 0.009, 0.011, 0.012
  - Std. Dev: 0.0015, 0.0021, 0.0022, 0.0024
- **Sex (fraction male)**
  - Obs: 4168, 2039, 2129, 2043
  - Mean: 0.398, 0.400, 0.396, 0.418
  - Std. Dev: 0.0076, 0.0109, 0.0107, 0.011
- **Years of service**
  - Obs: 4168, 2039, 2129, 2043
  - Mean: 5.898, 5.884, 5.930, 6.008
  - Std. Dev: 0.114, 0.161, 0.16, 0.157
- **Annual salary**
  - Obs: 4168, 2039, 2129, 2043
  - Mean: 38,547, 38,807, 38,297, 38,213
  - Std. Dev: 394, 438, 422, 416
- **Age**
  - Obs: 4168, 2039, 2129, 2043
  - Mean: 38.3, 38.4, 38.2, 38.7
  - Std. Dev: 0.17, 0.24, 0.24, 0.24

**PANEL B: FAIR ATTENDANCE (REGISTRATION DATA)**

- **Fair attendance rate among non-TDA enrollees**
  - Obs: 4168, 2039, 2129, 2043
  - Mean: 0.214, 0.280, 0.151, 0.049
  - Std. Dev: 0.0064, 0.01, 0.0078, 0.0048
- **Fair attendance rate for all staff employees**
  - Obs: 4168, 2039, 2129, 2043
  - Mean: 0.192, 0.063, 0.063, 0.0103
  - Std. Dev: 0.0132, 0.0132, 0.0132, 0.0132

**PANEL C: TDA PARTICIPATION (ADMINISTRATIVE DATA)**

- **TDA participation rate after 4.5 months**
  - Obs: 3726, 1832, 1894, 1861
  - Mean: 0.049, 0.045, 0.053, 0.040
  - Std. Dev: 0.0035, 0.0049, 0.0051, 0.0045
- **TDA participation rate after 11 months**
  - Obs: 3726, 1832, 1894, 1861
  - Mean: 0.088, 0.089, 0.088, 0.075
  - Std. Dev: 0.005, 0.0071, 0.007, 0.0065

**Stefano DellaVigna**

**Econ 219B: Applications (Lecture 1)**

**January 23, 2019**
Summary of effects

- Large effect of subsidy on attendance (including peer effect)
- Small effects of attendance on retirement savings

### TABLE II
**Reduced-Form Estimates (OLS)**

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>TDA enrollment after</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4.5 months</td>
</tr>
<tr>
<td>Fair attendance (1)</td>
<td>0.166</td>
</tr>
<tr>
<td>(0.013)</td>
<td>(0.0043)</td>
</tr>
<tr>
<td>Observations</td>
<td>6144</td>
</tr>
</tbody>
</table>

**PANEL A: Average effect of department treatment**

- Treated: 0.166, 0.0093, 0.0125
- Department dummy $D$: (0.013), (0.0043), (0.0065)
- Observations: 6144, 5587, 4879

**PANEL B: Effect of letter and department treatment**

- Letter dummy $L$: 0.129, −0.0066, 0.0005
- (0.0226), (0.0061), (0.0102)
- Treated: 0.102, 0.0125, 0.0123
- Department dummy $D$: (0.0139), (0.0054), (0.0086)
- Observations: 6144, 5587, 4879
Results:

- Results: Approximately: Of the people induced to attend the fair, 10% sign up
  Compare to Default effects: Change allocations for 40%-50% of employees

Summary:

- Just explaining retirement savings not very effective at getting people to save
- Effect of changing default much larger
- Interesting variation: Re-Do this study but give opportunity to sign up at fair
Section 7

Next Lecture
- Interpretation of default effects using present-biased preferences
- Problem set 1 due
- Present Bias and Consumption Choices
  - *Investment Goods*
  - *Leisure Goods*