Topic 12: Behavioral Biases

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Behavioral Biases

- Evidence in a wide range of settings that behavior is not well-described by the canonical rational model

- This lecture: model of bias and welfare implications

- Then present evidence in several settings:
  - Take Up of Benefits and EITC
  - Inertia in Health Insurance
  - Unemployment and Job Search
  - Savings
  - Slutsky symmetry and consideration sets
1. General Model of Bias: Information versus Understanding

2. Imperfect Take Up of Benefits: The Case of EITC

3. Inertia in Health Insurance

4. Unemployment and Job Search

5. Savings

6. Unsolicited Thoughts on Open Questions (Behavioral and Beyond)
General Model of Bias

- Individuals make choices \( a \in \Omega(p) \), where \( \Omega(p) \) is some choice set that depends on some vector of policies, \( p \)
  - \( a \) can be labor supply, savings, consumption, etc.
  - \( p \) can be taxes, the ease-of-use of the Obamacare website, the frequency and use of IRS EITC eligibility notices, 401K default option settings, etc.

- Results in “experienced utility”, \( v(a) \)

- Individuals make decisions to maximize potentially different utility function, \( u(a) \)

\[
U(p) = \max_{a \in \Omega(p)} u(a) = u(a^*(p))
\]

where \( a^*(p) \) is the set of choices the individual makes under policy \( p \).
Consider marginal policy change, “$dp$”, that changes behavior, $\frac{da^*}{dp}$.

Do we care?

Envelope theorem: Welfare impact only depends on how $dp$ affects constraint set, $\Omega$, weighted by marginal utilities, $u_a$ (formally: $U'(p) = \partial_p \Omega \nabla_a u$)

- If increases budget by $1$, then policy is valued at $1$
- Irrespective of whether the policy causes a change in behavior, $\frac{da^*}{dp}$!
“Violation” of the Envelope Theorem

- When people are not maximizing their experienced utility, behavioral responses can have first order welfare impacts.

- Write experienced utility as

\[ V(p) = v(a^*(p)) = U(p) + v(a^*(p)) - u(a^*(p)) \]

so that

\[ V'(p) = U'(p) + \frac{da^*}{dp} [v_a - u_a] \]

- Additional welfare impact if the policy causes people to make better (or worse) decisions
  - Increasing \( a \) increases welfare if people’s decisions under-value their experienced utility, \( v_a > u_a \)
  - And vice-versa if \( v_a < u_a \)

- Like an externality with marginal damage valued at \( v_a - u_a \): “Internality”
Why might experienced and decision utility diverge?

- Inherent biases
  - Present biasedness
  - Difficulty with probability inference

- Cognitive constraints

- Lack of knowledge

- Lack of understanding of how actions today affect outcomes in future
Relation to Statistical Decision Theory (Blackwell 1951, 1953)

- **Nathan’s (“biased!”) view:** people can often be modeled as being rational but with imperfect information
  - Issue is information versus understanding

- Rational model says people maximize utility subject to their understanding of its implications for experienced utility
  - But, rationale model also allows people to be under-informed about these outcomes

- Can often re-cast behavioral biases as maximization with imperfect information about how decisions affect utility
Suppose experienced utility is given by \( v(a; \theta) \) but decision utility is made after learning signal \( s \) about \( \theta \), \( u(a; s) = E[v(a; \theta) | s] \).

Assume extreme case where government/policy-maker knows \( \theta \)

Then:

\[
V'(p) = U'(p) + \frac{da^*}{dp} \left[ v_a - E[v_a | s] \right] 
\]

Policies can generate welfare improvements if they help people understand important choices.

\( \frac{da^*}{dp} [v_a - E[v_a | s]] \) is related to the Blackwell (1951, 1953) value of information.

Value information by how much it helps people change their behavior and make better decisions, \( \frac{da^*}{dp} \)

Key Implication: Behavioral responses to better information/understanding increase utility!

Stark contrast from envelope theorem under perfect information.

It's a whole new world!
Note that $s$ need not incorporate all information in the world (as would be implied by “rational expectations” as defined by Robert Lucas)

- $E [\circ | s]$ can be a subjective expectation operator
- People made the best decisions given what they knew
- But, maybe they should have known better!
  - Additional role of policy: help people make better decisions
1. General Model of Bias: Information versus Understanding

2. Imperfect Take Up of Benefits: The Case of EITC

3. Inertia in Health Insurance

4. Unemployment and Job Search

5. Savings

6. Unsolicited Thoughts on Open Questions (Behavioral and Beyond)
Imperfect Take-Up of Benefits

- Large literature documenting how people do not take up benefits that they are seemingly eligible for
  - e.g. Deshpande paper for DI
- Here: focus on two studies analyzing the EITC
  - Information treatment: Bhargava and Manoli (2015, AER)
  - Geographic variation in take-up: Chetty, Friedman, Saez (2013)
Bhargava and Manoli (2015, AER)

- Study imperfect take up of EITC benefits
  - Roughly 25% of benefits are unclaimed
  - Average of $1K per person (roughly 1 month of earnings...)
- Two models of low take up:
  - 1 Confusion and lack of understanding
  - 2 Stigma
- In model 1, increasing take up improves welfare,
  - “\( u_a < v_a \)” as choosing to take up benefits increases utility
- In model 2, increasing take up is pure social waste because of envelope theorem
  - \( u_a = v_a \) as individuals were indifferent to taking up benefits because of the social stigma cost
To distinguish these theories, paper conducts randomized experiment with the IRS to increase knowledge of benefits.

Send mailers to all CA taxpayers who failed to claim 2009 EITC credit despite presumed eligibility given information on their return.

- Provided information about EITC and offered opportunity to re-file.

Informed people of roughly $26M in unclaimed benefits.

- Roughly $4M was paid as a result of the experiment.

Experimental conditions included:

- Simple and Complex Notices
- Variation in potential benefit advertising
- Stigma: include wording saying that money is from the result of hard work.
Panel A1. Simple notice (control)

Important Information about the Earned Income Credit
You may be eligible for a refund

Do not discard or overlook this notice because you may be entitled to some additional money.

Summary
Our records show that you may be eligible for a refund called the Earned Income Credit (EIC), which you did not claim on your 2009 tax form. The credit is for certain people who have worked and have earned income. You should complete the worksheet on Page 3 to determine if you are eligible for the credit.

What you need to do
Complete the Earned Income Credit Worksheet on Page 3.
If the worksheet confirms that you are eligible for the credit, sign and date the attached worksheet, and mail it to us in the enclosed envelope.
If the worksheet indicates that you are not eligible for the credit, please do not return the worksheet to us.

Next steps
If you are eligible for the credit, we will send you a refund check in 6 to 8 weeks. If you owe back taxes or other debts, such as child support which we are required to collect, we will use your credit to reduce or pay off those debts.
Next year, to receive your refund more quickly, write “EIC” on the EIC line of your form 1040. If you qualify for the credit, the IRS will calculate it for you and send you a check.

Additional information
If you need additional assistance, please call 1-800-829-1040, or visit online at www.irs.gov/EIC. For tax forms, call 1-800-TAX-FORM (1-800-829-3676).
You can also find tax forms and other helpful documents which explain the EIC program in greater detail (e.g., Publication 596) at www.irs.gov.

Panel A2. Complex notice (page 1 of 2)

You May Be Eligible for a Refund
If you Qualify for the Earned Income Credit

Why We Are Sending You this Notice
You may qualify for the earned income credit (EIC). The EIC is for certain people who work and have earned income. This tax credit usually means more money in your pocket. It reduces the amount of tax you owe, and may give you a refund. Our records show:
• Your income falls in the eligible range to receive the EIC.
• You have a dependent who may be an EIC qualifying child, and
• You did not claim the EIC on your 2009 Individual Income Tax Return.

What You Need to Do
Income is not the only condition that determines if you qualify for EIC. We need you to complete the enclosed EIC Eligibility Check-Sheet to see if you may qualify for the EIC. Take the following steps to complete the check-sheet:
• Check that you are eligible for the EIC in Step 1.
  • If your Social Security Number is not valid or if you are a qualifying dependent of another person, you do not qualify.
  • If your Social Security Number is valid and you are not a qualifying dependent of another person, you may qualify. Continue to Step 2 only if you did not check next to any of the eligibility criteria in Step 1.
• In Steps 2 and 3, fill in the name and Social Security number for each child who may qualify you for the EIC and check that each child meets the stated requirements.
  • Any NO answer for a child means that child is not your qualifying child for the EIC. Do not respond to this notice unless you have a qualifying child.
  • All YES answers mean a child is your qualifying child for the EIC. Sign and date the declaration on the last page of this notice. Mail the completed EIC Eligibility Worksheet to us in the enclosed envelope.

Note: Return the EIC Worksheet to us only if you determine you may qualify for the EIC.
High and Low Benefit Treatments

Panel C1. Benefit display (high)

Important information about the Earned Income Credit
You may be eligible for a refund of up to $5,657

Do not discard or overlook this notice because you may be entitled to some additional money. Depending on your earnings and eligibility, your benefit can be up to $5,657.

What you need to do
- Complete the Earned Income Credit Worksheet on Page 3.
- If the worksheet confirms that you are eligible for the credit, sign and date the attached worksheet, and mail it to us in the enclosed envelope.
- If the worksheet indicates that you are not eligible for the credit, do not return the worksheet to us.

Next steps
- If you are eligible for the credit, we will send you a refund check in 6 to 8 weeks. If you owe back taxes or other debts, such as child support which you are required to collect, we will use your credit to reduce or pay off those debts.
- Next year, receive your refund more quickly, write "EIC" on the EIC line of your W-4 form. If you qualify for the credit, the IRS will calculate it for you and send you a check.

Additional information
- If you need additional assistance, please call 1-800-829-1040, or visit online at www.irs.gov.
- You can also find tax forms and other helpful documents which explain the EIC program in greater detail (e.g., Publication 506) at www.irs.gov.

Panel C2. Benefit display (low)

Important information about the Earned Income Credit
You may be eligible for a refund of up to $457

Do not discard or overlook this notice because you may be entitled to some additional money. Depending on your earnings and eligibility, your benefit can be up to $457.

What you need to do
- Complete the Earned Income Credit Worksheet on Page 3.
- If the worksheet confirms that you are eligible for the credit, sign and date the attached worksheet, and mail it to us in the enclosed envelope.
- If the worksheet indicates that you are not eligible for the credit, please do not return the worksheet to us.

Next steps
- If you are eligible for the credit, we will send you a refund check in 6 to 8 weeks. If you owe back taxes or other debts, such as child support which we are required to collect, we will use your credit to reduce or pay off those debts.
- Next year, receive your refund more quickly, write "EIC" on the EIC line of your W-4 form. If you qualify for the credit, the IRS will calculate it for you and send you a check.

Additional information
- If you need additional assistance, please call 1-800-829-1040, or visit online at www.irs.gov. For tax forms, call 1-800-TAX-FORM (1-800-829-3676).
- You can also find tax forms and other helpful documents which explain the EIC program in greater detail (e.g., Publication 506) at www.irs.gov.
Figure 6. Heterogeneity in Response to Simplification by Earned Income (Expectations with Independents)
Results suggest:
- Imperfect information about benefits affects take up
- Displaying potential benefits increases take up
- Complicated forms reduce take up
- Increases take up at all eligible income levels

Does this suggest that increasing take up increases recipient welfare?
Previous literature documents bunching of EITC recipients at the revenue-maximizing kink point (Saez 2010)

Chetty Friedman and Saez (2013) study bunching of EITC claimants at the refund-maximizing kink point

Here: borrow slides discussing this paper from Chetty (2015, AER)

Taxable Income Distribution for EITC Claimants in Texas

<table>
<thead>
<tr>
<th>Taxable Income</th>
<th>Percent of Tax Filers</th>
</tr>
</thead>
<tbody>
<tr>
<td>$2,600</td>
<td>2%</td>
</tr>
<tr>
<td>$12,600</td>
<td>4%</td>
</tr>
<tr>
<td>$22,600</td>
<td>5%</td>
</tr>
<tr>
<td>$32,600</td>
<td>5%</td>
</tr>
</tbody>
</table>
Taxable Income Distribution for EITC Claimants in Texas

Percent of Tax Filers

<table>
<thead>
<tr>
<th>Taxable Income</th>
<th>Percent of Tax Filers</th>
</tr>
</thead>
<tbody>
<tr>
<td>$2,600</td>
<td>2%</td>
</tr>
<tr>
<td>$12,600</td>
<td>4%</td>
</tr>
<tr>
<td>$22,600</td>
<td>3%</td>
</tr>
<tr>
<td>$32,600</td>
<td>1%</td>
</tr>
</tbody>
</table>

Sharp “bunching” at refund-maximizing point [Saez 2010]
Taxable Income Distribution for EITC Claimants in Kansas

<table>
<thead>
<tr>
<th>Tax Filers</th>
<th>Taxable Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>2%</td>
<td>$2,600</td>
</tr>
<tr>
<td>3%</td>
<td>$12,600</td>
</tr>
<tr>
<td>4%</td>
<td>$22,600</td>
</tr>
<tr>
<td>5%</td>
<td>$32,600</td>
</tr>
<tr>
<td>1%</td>
<td></td>
</tr>
<tr>
<td>0%</td>
<td></td>
</tr>
</tbody>
</table>
Fraction of Tax Filers Who Report Income that Maximizes EITC Refund in 1996

Note: Darker Color = More EITC Sharp Bunching
Note: Darker Color = More EITC Sharp Bunching
Fraction of Tax Filers Who Report Income that Maximizes EITC Refund in 2002

Note: Darker Color = More EITC Sharp Bunching
Fraction of Tax Filers Who Report Income that Maximizes EITC Refund in 2005

Note: Darker Color = More EITC Sharp Bunching
Fraction of Tax Filers Who Report Income that Maximizes EITC Refund in 2008

Note: Darker Color = More EITC Sharp Bunching
Differences in Knowledge about the EITC?

- Why does impact of EITC on income vary so much across areas?
- Plausible behavioral model: differences in knowledge about EITC
- To test this explanation, consider individuals who move
- Knowledge model predicts asymmetric impact of moving:
  - Moving to a higher-bunching area should raise EITC refund
  - Moving to a lower-bunching area should not affect EITC refund
Effects of Moving to Higher vs. Lower Bunching Areas on EITC Refund Amounts

Change in ZIP-3 Sharp Bunching Rate Among Prior Residents
Change in EITC Refund for Movers ($)

β = 59.7 (5.7)

β = 6.0 (6.2)

p-value for diff. in slopes: p < 0.0001
Chetty, Friedman, and Saez (2013): Clear Bunching

- Paper documents clear evidence of heterogeneous bunching across areas
  - Driven mainly by self-employed (Saez 2010)
  - Easy to manipulate income
- Paper goes on to exploit bunching variation to ask a much deeper (more difficult) question:
  - How does EITC affect real labor supply?
Income Distribution For Single Wage Earners with One Child

Is the EITC having an effect on this distribution?

W-2 Wage Earnings

Percent of Wage-Earners

EITC Amount ($)

$0 $10K $20K $30K
Income Distribution For Single Wage Earners with One Child
High vs. Low Sharp Bunching Areas

Percent of Wage Earners Versus W-2 Wage Earnings

EITC Amount ($)

Lowest Information Decile

Highest Information Decile

$0 $5K $10K $15K $20K $25K $30K $35K

W-2 Wage Earnings

$0 $10K $20K $30K $40K

Lowest Information Decile

Highest Information Decile
Comparisons across areas could be biased by omitted variables.

Study changes in earnings around childbirth to address this concern.

- Individuals without children are essentially ineligible for the EITC.
- Birth of a child generates sharp variation in marginal incentives.
Earnings Distribution in the Year Before First Child Birth for Wage Earners

<table>
<thead>
<tr>
<th>W-2 Wage Earnings</th>
<th>Percent of Individuals</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0</td>
<td>2%</td>
</tr>
<tr>
<td>$10K</td>
<td>4%</td>
</tr>
<tr>
<td>$20K</td>
<td>0%</td>
</tr>
<tr>
<td>$30K</td>
<td>6%</td>
</tr>
<tr>
<td>$40K</td>
<td>0%</td>
</tr>
</tbody>
</table>

- Lowest Information Decile
- Highest Information Decile

Graph showing the distribution of earnings before first child birth for wage earners.
Paper goes on to document that EITC primarily increases earnings in the phase-in region as opposed to reductions in phase-out region.

- Suggests EITC increases labor supply and real earnings

Welfare implications?

- Depends on whether we think it is good to increase labor supply...
  - Externalities?
  - Or does the envelope theorem apply?
General Model of Bias: Information versus Understanding

Imperfect Take Up of Benefits: The Case of EITC

Inertia in Health Insurance

Unemployment and Job Search

Savings

Unsolicited Thoughts on Open Questions (Behavioral and Beyond)
Evidence people also make “sub-optimal” choices in health insurance contexts
- Plans are often difficult to understand

But, not clear privately inefficient choices lead to socially inefficient outcomes


Studies choice of two PPO contracts
- In year 0, tradeoff between greater coverage and price
  - PPO500 is better if have high expenses
- In year 1, PPO250 completely dominates PPO500
Inertia: Handel (2013)

Panel A. PPO health insurance plan characteristics, $t_0$ low-income family

$PPO_{500}$ out-of-pocket maximum

$PPO_{250}$ out-of-pocket maximum

Coinsurance

Deductible

Premium

$t_0$ in-network total medical expenses*

Total employee expenses

0 1500 3000 4500 6000 7500 9000 10500 12000 13500 15000 16500 18000 19500 21000 22500 24000 25500 27000 28500 30000

2000 3000 4000 5000 6000 7000 8000

* Including premiums
Panel B. PPO health insurance plan characteristics, $t_1$, low-income family

- $PPO_{250}$ out-of-pocket maximum
- $PPO_{500}$ out-of-pocket maximum

Total employee expenses vs. $t_1$, in-network total medical expenses*
How Many People Switched?

### Table 3—Dominated Plan Choice Analysis

<table>
<thead>
<tr>
<th>Dominated plan analysis</th>
<th>( t_1 ) dominated stay</th>
<th>( t_1 ) dominated switch</th>
<th>( t_2 ) dominated stay</th>
<th>( t_2 ) dominated switch</th>
</tr>
</thead>
<tbody>
<tr>
<td>( N )</td>
<td>498</td>
<td>61</td>
<td>378</td>
<td>126</td>
</tr>
<tr>
<td>Minimum money lost(^a)</td>
<td>$374</td>
<td>$453</td>
<td>$396</td>
<td>$306</td>
</tr>
<tr>
<td>( PPO_{250} )</td>
<td>—</td>
<td>44 (72%)</td>
<td>—</td>
<td>103 (81%)</td>
</tr>
<tr>
<td>( PPO_{1250} )</td>
<td>—</td>
<td>4 (7%)</td>
<td>—</td>
<td>6 (5%)</td>
</tr>
<tr>
<td>Any ( HMO )</td>
<td>—</td>
<td>13 (21%)</td>
<td>—</td>
<td>17 (14%)</td>
</tr>
<tr>
<td>FSA ( t_1 )</td>
<td>25.4%</td>
<td>32.1%</td>
<td>27.2%</td>
<td>28.6%</td>
</tr>
<tr>
<td>FSA ( t_2 )</td>
<td>—</td>
<td>28.1%</td>
<td>—</td>
<td>30.9%</td>
</tr>
<tr>
<td>Dental switch ( t_1 )</td>
<td>4.3%</td>
<td>14.1%</td>
<td>3.5%</td>
<td>10.9%</td>
</tr>
<tr>
<td>Dental switch ( t_2 )</td>
<td>—</td>
<td>6.9%</td>
<td>—</td>
<td>17.2%</td>
</tr>
<tr>
<td>Age (mean)</td>
<td>44.9</td>
<td>38.3</td>
<td>46.2</td>
<td>41.4</td>
</tr>
<tr>
<td>Income tier (mean)(^b)</td>
<td>1.6</td>
<td>1.4</td>
<td>1.6</td>
<td>1.7</td>
</tr>
<tr>
<td>Quant. manager</td>
<td>11%</td>
<td>8%</td>
<td>11%</td>
<td>11%</td>
</tr>
<tr>
<td>Single (percent)</td>
<td>40%</td>
<td>41%</td>
<td>40%</td>
<td>33%</td>
</tr>
<tr>
<td>Male (percent)</td>
<td>42%</td>
<td>46%</td>
<td>39%</td>
<td>55%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>All plan analysis</th>
<th>( PPO_{250} ) stay ( t_1 )</th>
<th>( PPO_{250} ) switch ( t_1 )</th>
<th>( PPO_{250} ) All plans stay</th>
<th>( PPO_{250} ) All plans switch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample size</td>
<td>1,626</td>
<td>174</td>
<td>2,786</td>
<td>384</td>
</tr>
<tr>
<td>FSA ( t_1 ) enrollee</td>
<td>31%</td>
<td>41%</td>
<td>25%</td>
<td>39%</td>
</tr>
<tr>
<td>Dental switch</td>
<td>3.2%</td>
<td>13.1%</td>
<td>3.8%</td>
<td>14.5%</td>
</tr>
<tr>
<td>Age (mean)</td>
<td>48.3</td>
<td>40.6</td>
<td>44.0</td>
<td>39.1</td>
</tr>
<tr>
<td>Income tier (mean)(^b)</td>
<td>2.5</td>
<td>2.2</td>
<td>2.3</td>
<td>2.1</td>
</tr>
<tr>
<td>Quant. manager</td>
<td>20%</td>
<td>17%</td>
<td>17%</td>
<td>14%</td>
</tr>
<tr>
<td>Single (percent)</td>
<td>50%</td>
<td>56%</td>
<td>53%</td>
<td>59%</td>
</tr>
<tr>
<td>Male (percent)</td>
<td>48%</td>
<td>42%</td>
<td>49%</td>
<td>40%</td>
</tr>
</tbody>
</table>

Notes: This top panel in this table profiles the choices and demographics of the employees enrolled in \( PPO_{250} \) at \( t_0 \) who (i) continue to enroll in a firm plan in \( t_1 \) and (ii) have \( PPO_{250} \) become dominated for them at \( t_2 \). The majority of these employees (498 out of 559 (89 percent)) remain in \( PPO_{250} \) even after it becomes dominated by \( PPO_{500} \) with 378 of 504 (75 percent) still remaining in this plan at \( t_2 \). People who do switch are more likely to exhibit a pattern of active choice behavior in general as evidenced by their higher FSA enrollments and level of dental plan switching. Apart from this, these populations are similar though switchers in this group are slightly younger. The bottom panel studies the profiles of those who switch at \( t_1 \) and those who don’t for the two groups of (i) \( PPO_{250} \) enrollees at \( t_0 \) and (ii) the entire universe of \( PPO \) plan enrollees present in \( t_0 \) and \( t_1 \). This reveals a similar pattern of active choice making as switchers in these populations are also more likely to enroll in FSAs and switch dental plans.
Health Insurance: Dominated Plan Choices

- Everyone has the option to switch to PPO250
- But, only 11% of those who chose PPO500 in year 0 switch to PPO250
- 89% remain in dominated plan!
- Leave at least $374 per family on the table
- Those who switched would have left more money on the table ($453)
  - Some evidence of rationality
- Is this inertia bad?
  - Significant evidence that PPO 250 had much higher cost enrollees
    - This was why they increased the price...
  - Inertia kept many healthy people enrolled in the more generous 250 deductible plan
    - Lowers prices of the more generous policy
Costs Went Up for PPO250

Table 4—Adverse Selection and Employee Costs

<table>
<thead>
<tr>
<th>Final sample total expenses</th>
<th>PPO_{t-1}</th>
<th>PPO_{250}</th>
<th>PPO_{500}</th>
<th>PPO_{1200}</th>
</tr>
</thead>
<tbody>
<tr>
<td>\textit{Family t-1 total expenses (}$\text{	extdollar}$)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>\textit{t}_{-1}</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>\textit{N} employees (mean family size)</td>
<td>2,022 (2.24)</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Mean (median)</td>
<td>13,331 (4,916)</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>25th percentile</td>
<td>1,257</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>75th percentile</td>
<td>13,022</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>\textit{t}_{0}</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>\textit{N} (mean family size)</td>
<td>—</td>
<td>1,328 (2.18)</td>
<td>414 (2.20)</td>
<td>280 (2.53)</td>
</tr>
<tr>
<td>Mean (median)</td>
<td>—</td>
<td>16,976 (6,628)</td>
<td>6,151 (2,244)</td>
<td>6,742 (2,958)</td>
</tr>
<tr>
<td>25th percentile</td>
<td>—</td>
<td>2,041</td>
<td>554</td>
<td>658</td>
</tr>
<tr>
<td>75th percentile</td>
<td>—</td>
<td>16,135</td>
<td>6,989</td>
<td>8,073</td>
</tr>
<tr>
<td>\textit{t}_{1}</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>\textit{N} (mean family size)</td>
<td>—</td>
<td>1,244 (2.19)</td>
<td>546 (2.19)</td>
<td>232 (2.57)</td>
</tr>
<tr>
<td>Mean (median)</td>
<td>—</td>
<td>17,270 (6,651)</td>
<td>7,759 (2,659)</td>
<td>6,008 (2,815)</td>
</tr>
<tr>
<td>25th percentile</td>
<td>—</td>
<td>2,041</td>
<td>708</td>
<td>589</td>
</tr>
<tr>
<td>75th percentile</td>
<td>—</td>
<td>16,707</td>
<td>8,588</td>
<td>7,191</td>
</tr>
<tr>
<td>\textit{Individual category expenses (dollars)}</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pharmacy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>973</td>
<td>1,420</td>
<td>586</td>
<td>388</td>
</tr>
<tr>
<td>Median</td>
<td>81</td>
<td>246</td>
<td>72</td>
<td>22</td>
</tr>
<tr>
<td>Mental health (&gt; 0)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>2,401</td>
<td>2,228</td>
<td>1,744</td>
<td>2,134</td>
</tr>
<tr>
<td>Median</td>
<td>1,260</td>
<td>1,211</td>
<td>1,243</td>
<td>924</td>
</tr>
<tr>
<td>Hospital/physician</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>4,588</td>
<td>5,772</td>
<td>2,537</td>
<td>2,722</td>
</tr>
<tr>
<td>Median</td>
<td>428</td>
<td>717</td>
<td>255</td>
<td>366</td>
</tr>
<tr>
<td>Physician OV</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>461</td>
<td>571</td>
<td>381</td>
<td>223</td>
</tr>
<tr>
<td>Median</td>
<td>278</td>
<td>356</td>
<td>226</td>
<td>120</td>
</tr>
</tbody>
</table>

Notes: This table investigates the extent of adverse selection across PPO options after the t₀ menu change for those in the final estimation sample. All individuals in this sample were enrolled in PPO_{t-1} in t_{-1} and continue to be enrolled in some plan at the firm for the following two years. The numbers in the table for all choices represent t_{-1} total claims in dollars so that these costs can proxy for health risk without being confounded by moral hazard (t₀ and t₁ cost differences could be the result of selection or moral hazard). The table reveals that those who choose PPO_{250} have much higher expenditures at t_{-1} than those who choose the other two plans, implying substantial selection on observables in the vein of Finkelstein and Poterba (2006). The bottom panel presents a breakdown of these costs.
Handel (2013): Nudging versus Adverse Selection

- Develops model with inertia (switching costs) to explain why only 11% switched
- Uses model to study impact of reducing inertia
- Results suggest adverse selection would increase
- Would overall reduce welfare despite improving individual choices
General Model of Bias: Information versus Understanding

Imperfect Take Up of Benefits: The Case of EITC

Inertia in Health Insurance

Unemployment and Job Search

Savings

Unsolicited Thoughts on Open Questions (Behavioral and Beyond)
Large literature documenting behavioral anomalies in job search and unemployment contexts

Discuss two papers here:


Spinnewijn (2015): Unemployment Duration Expectations

![Histogram of Actual Minus Expected Number of Weeks Unemployed]

- **Complete Spells**
- **Add Incomplete Spells**

**Axes:**
- **Y-axis:** Frequency
- **X-axis:** Actual Minus Expected Number of Weeks Unemployed

**Legend:**
- Gray bars: Complete Spells
- Dark gray bars: Add Incomplete Spells
Spinnnewijn (2015)

- On average, beliefs are 6.8 weeks less than actual experience

- Implications of biased beliefs:
  - People may under-search?
  - Under-save?
  - Deplete savings too quickly during unemployment?
    - Explain why consumption drops at benefit exhaustion in Ganong and Noel (2016)?

- Optimal policy implications:
  - Increase benefits during unemployment? Why?
Della Vigna et al. (2016)

- Provide evidence of reference-dependent job search

- Follow model of Koszegi and Rabin (2006) with loss aversion:
  \[ u(c|r) = v(c) + \eta_{gain} 1 \{ c \geq r \} [v(c) - v(r)] + \eta_{loss} 1 \{ c < r \} [v(c) - v(r)] - \psi(e) \]

  where \( e \) is search effort and

  \[ r = \frac{1}{N} \sum_{k=t-N}^{t-1} y_k \]

  is the average income in the past \( N \) periods
Della Vigna et al. (2016)

- **Model predicts:**
  - Upon unemployment onset, search hard because consumption falls below reference point
  - But, effort declines throughout the spell as the reference point adjusts
  - Search effort rises in anticipation of a future benefit cut or exhaustion

- **Exploit data from Hungary**
  - Change in benefit formula
  - Compare groups who entered just before vs. after the reform
Figure II: Institutional Setting: Change in Benefit Path and Sample Periods

Monthly UI Benefit

- 68,400 $342
- 44,460 $222
- 34,200 $171
- 22,800 $114

Number of days since UI claim

1st tier (UI)

Before Nov, 2005 schedule

After Nov, 2005 schedule

2nd tier (UA)

Social Assistance (HH income dependent)

(a) Benefit Path Change, Main Sample
Figure I: Model Simulations of the Standard and the Reference-Dependent model

Notes: Panel (a) shows two benefit regimes, both of them having a step-down benefit system. After the first step benefits are higher in the regime represented by the circled blue line than in the regime represented by the red dashed line. After the second step benefits drop to the same level. Panel (b) shows the hazard rates predicted by the standard model (with $k = 130$, $\gamma = 0.2$, $w = 555$, $\delta = 0.99$) while Panel (c) the prediction of the reference-dependent model (with $k = 130$, $\gamma = 0.2$, $w = 555$, $\delta = 0.99$, $\theta = 2$, $\eta = 19$ (559 by 1).
Figure III: Empirical Hazard and Survival Rates under the Old and the New Benefit Schedule

(a) Empirical hazard rates
Figure IX: Out-of-sample Performance of Models

(a) Out-of-sample predictions of models for unemployment system 2
Evidence that people are over-optimistic about unemployment duration

- Stated vs. true beliefs?

Evidence of spike in job search around drops in benefits

- Consistent with reference dependent preferences

Implications for optimal UI?
1. General Model of Bias: Information versus Understanding
2. Imperfect Take Up of Benefits: The Case of EITC
3. Inertia in Health Insurance
4. Unemployment and Job Search
5. Savings
6. Unsolicited Thoughts on Open Questions (Behavioral and Beyond)
Large debate about whether people are saving “enough” for retirement

  - Yes, argues structural model + savings suggests they are (or have been)
  - But, very sensitive to structural assumptions

General concern: growing switch from pensions to 401Ks
  - Require individuals to save on their own
  - Growing use of tax dollars: $100B per year on subsidies for 401Ks and IRAs (JCT, 2012)
Significant evidence that default options in 401K plans affect savings behavior

Significant evidence that providing tax incentives for 401K contributions increases investments in those assets
- Poterba, Venti, Wise (AER, 1994; JEP 1996)

Given behavioral biases, are tax incentives the best way to increase savings?
- Chetty, Friedman, Leth-Petersen, Nielsen, Olsen (2014)
  - Use administrative wealth data for all Danish households
  - Begin by studying policy that changed retirement savings subsidy

Note: Subsequent slides re-produced from Chetty (2015, AEA Ely Lecture)
Impact of 1999 Pension Subsidy Reduction On Pension Contributions

- **Treatment Group**: Retirement subsidy reduced by 12 cents per dollar in 1999
- **Control Group**: Subsidy unchanged

Note: $1 \equiv 6$ DKr
Impact of 1999 Pension Subsidy Reduction On Pension Contributions

Pension Contribution (DKr) vs. Income (DKr 1000s)

- 1996
- 1997
Impact of 1999 Pension Subsidy Reduction On Pension Contributions

- 1996
- 1997
- 1998

Pension Contribution (DKr)
Income (DKr 1000s)
Impact of 1999 Pension Subsidy Reduction On Pension Contributions

Graph showing the trend of pension contributions (DKr) against income (DKr 1000s) for the years 1996 to 1999.
Impact of 1999 Pension Subsidy Reduction On Pension Contributions

Pension Contribution (DKr) vs Income (DKr 1000s)

- 1996
- 1997
- 1998
- 1999
- 2000

Income (DKr 1000s):
- 175
- 200
- 225
- 250
- 275
- 300
- 325

Pension Contribution (DKr):
- 100
- 200
- 300
- 400
- 500
- 600
- 700
- 800
- 900
- 1000
- 1100
- 1200
- 1300
- 1400
- 1500
Impact of 1999 Pension Subsidy Reduction On Pension Contributions
Impact of 1999 Capital Pension Subsidy Reduction on Distribution of Capital Pension Contributions for Prior Contributors

Percent of Individuals

Percent Change in Capital Pension Contributions

1997 to 1998

Impact of 1999 Capital Pension Subsidy Reduction on Distribution of Capital Pension Contributions for Prior Contributors
Impact of 1999 Capital Pension Subsidy Reduction on Distribution of Capital Pension Contributions for Prior Contributors
Crowd-out: $\phi_L = 120\%$ (59%)
Aggregate reduction is driven by 19% of treated households who entirely stop contributing to pensions
- Remaining 81% do not change retirement contributions at all
- Consistent with inattention model (Carroll et al. (2009, QJE))

90% of the reduction in retirement contributions is offset by more saving in non-retirement accounts
- Crowd out -> smaller impact on total savings
- $1 of tax subsidy generates 1 cent increase in total savings
Compare to impact of change in defaults


Chetty et al (2013) study people switching firms with an opt-in versus an opt-out retirement savings program in the Danish data

Key question: do defaults increase total savings or just a shift in assets?

- Track savings around job changes, exploiting variation in employers’ retirement plans
- If you move to a firm where employers contribute more to retirement savings, do you offset this with decreased savings?
Event Study around Switches to Firm with >3% Increase in Employer Pension Rate

Individuals with Positive Pension Contributions or Savings Prior to Switch

Δ Employer Pensions = 5.64
Event Study around Switches to Firm with >3% Increase in Employer Pension Rate

Individuals with Positive Pension Contributions or Savings Prior to Switch

$\Delta$ Employer Pensions = 5.64

$\Delta$ Individual Pensions = -0.56
Event Study around Switches to Firm with >3% Increase in Employer Pension Rate

Individuals with Positive Pension Contributions or Savings Prior to Switch

\[ \Delta \text{Employer Pensions} = 5.64 \]
\[ \Delta \text{Taxable Savings} = 0.02 \]
Summary of Nudge Effect

- Approximately 85% of individuals respond passively to changes in employer contributions

- They simply increase their savings
  - Savings increase is permanent and leads to increased wealth at retirement

- Suggests default policies can significantly increase savings rates for larger share of the population

- And potentially cost less too...
Often, consumers don’t consider all relevant options when making decisions.

- E.g. Handel evidence on switching costs. Is this a true “cost” of switching or just an “inattention” to the price of the other good?

How can we identify what people consider? And their willingness to pay conditional on considering?

Abaluck and Adams: think about Slutsky symmetry

Slutsky: Compensated $100 increase in price of good 1 should be equivalent to compensated $100 decrease in price of all rival goods besides good 1

Abaluck and Adams: Not true if people didn’t consider good 1.
To illustrate, consider an insurance plan choice between 0 and 1. Suppose 0 is the default option and suppose individuals choose default unless it becomes sufficiently unattractive that it motivates attention on other goods. I.e. the attention on other goods is a function of the price of good 0. This implies that consumers only care about the price of good 0, not the price difference between good 0 and good 1. Paper shows one can identify the probability of considering good 1 conditional on price of good 0 separately from violations of Slutsky symmetry.
1. General Model of Bias: Information versus Understanding

2. Imperfect Take Up of Benefits: The Case of EITC

3. Inertia in Health Insurance

4. Unemployment and Job Search

5. Savings

6. Unsolicited Thoughts on Open Questions (Behavioral and Beyond)
So that’s the course...

- Hope you enjoyed it!

- Before you go, I wanted to provide my personal thoughts on “open questions” in PF and economics more generally

- So, here’s my list...
My Top 12 “Open” Questions

1. Why and how does childhood exposure to places impact children in adulthood?
2. Incidence of capital taxation
3. How should we respond to geographic shocks (e.g. China / robots/ etc?)
4. Desirability of place-based versus national policy
5. Political economy constraints (e.g. optimal decentralization)
6. Why don't people take up social benefits? (and should we incentivize them to?)
7. What other markets are missing because of private information and what are the welfare implications? (Credit? Reclassification risk? Income insurance?)
8. Distortionary costs of racial and gender bias on economic outcomes (look within firms at different career trajectories?) Impact of policies that reduce gender bias / anti-racism policies
9. Integrating social insurance with optimal tax: how much should we redistribute “in-kind” or through social programs versus through the income tax schedule?
10. Competition in insurance markets – what’s the equilibrium? What happens when insurers have asymmetric information between themselves (and know more than the applicant)?
11. Government versus markets - should the govt, e.g., provide schooling directly or fund charter schools?
12. Endogenous preferences and impact on PF / role of policy (MVPF of being a jerk? Altruism? Endogenous altruism? Endogenous reductions in gender bias or racism?)