Topic 9: Optimal Social Insurance: The Case of UI

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Social Insurance

- The government is a major provider of social insurance
  - Unemployment Insurance
  - Disability Insurance
  - Long-term care insurance
  - Social Security
  - Health Insurance

- Why does the government (instead of private market) provide this insurance?
Today: Focus on unemployment insurance

Why does this market not exist and what should the government do about it?

Discussed Landais et al. (2021 AER) last class – documents presence of adverse selection in private (subsidized) UI
Figure 4. Price Variation: Evolution of Premia $p$ and of the Fraction of Workers Buying the Comprehensive Coverage around the 2007 Reform

Notes: The figure reports the evolution of monthly premium for the supplemental UI coverage over time. As explained in Section IA, there are no sources of premium differentiation up to 2008, apart from small rebates for union members and for unemployed individuals. Here, we report the value of the premium for employed union...
Panel A. Total unemployment duration in 2008

Days spent unemployed in 2008

- Group 1 under comprehensive in 2006 & 2007
- Marginals under comprehensive in 2006 only
- Group 0 under basic in 2006 & 2007
Adverse Selection in Social Insurance

- Alternative approach: use subjective probability elicitation to identify asymmetric information (Hendren 2017 AER)

Use data from Health and Retirement Study (1993-2013)
Survey asks subjective probability elicitation, Z

"What is percent chance (0-100) that you will lose your job in the next 12 months?"

Do the elicitations predict future job loss conditional on observables? Why does this market not exist and what should the government do about it?
Alternative approach: use subjective probability elicitations to identify asymmetric information (Hendren 2017 AER)

Use data from Health and Retirement Study (1993-2013)
  - Survey asks subjective probability elicitations, $Z$
    - “What is percent chance (0-100) that you will lose your job in the next 12 months?”

Do the elicitations predict future job loss conditional on observables? Why does this market not exist and what should the government do about it?
Elicitations versus Future Unemployment

Coefficients on Z categories in Pr\{UIZ,X\}
# Regression of Job Loss on Elicitation

<table>
<thead>
<tr>
<th>Specification</th>
<th>Baseline</th>
<th>Demo Only</th>
<th>Demo, Job, Health</th>
<th>Ind FE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Elicitation</strong></td>
<td>0.0836***</td>
<td>0.0956***</td>
<td>0.0822***</td>
<td>0.0715***</td>
</tr>
<tr>
<td>s.e.</td>
<td>(0.00675)</td>
<td>(0.00685)</td>
<td>(0.00736)</td>
<td>(0.0107)</td>
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<tr>
<td><strong>Controls</strong></td>
<td></td>
<td></td>
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<tr>
<td>Year Dummies</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Demographics</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Job Characteristics</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Health Characteristics</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
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<tr>
<td>Individual FE</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

| Num of Obs. | 26640 | 26640 | 22831 | 26640 |
| Num of HHs | 3467 | 3467 | 3180 | 3467 |
Impact of Unemployment on Consumption Growth

Employed in t-2 and t-1 Sample

Coefficient on Unemployment Indicator

-0.08 -0.06 -0.04 -0.02 0 0.02

Lead/Lag Relative to Unemployment Measurement

-4 -3 -2 -1 0 1 2 3 4

Coefficient on Unemployment Indicator

5%/95% CI

Employed in t-2 and t-1 Sample

Impact of Unemployment on Consumption Growth
# Minimum Pooled Price Ratio

<table>
<thead>
<tr>
<th>Specification</th>
<th>Baseline (1)</th>
<th>Alternative Controls (2)</th>
<th>Alternative Controls (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Inf T(p) - 1</td>
<td></td>
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<tr>
<td>s.e.</td>
<td></td>
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<tr>
<td></td>
<td>3.360</td>
<td>5.301</td>
<td>3.228</td>
</tr>
<tr>
<td></td>
<td>(0.203)</td>
<td>(0.655)</td>
<td>(0.268)</td>
</tr>
<tr>
<td>Controls</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demographics</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Job Characteristics</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Health Characteristics</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Num of Obs.</td>
<td>26,640</td>
<td>26,640</td>
<td>22,831</td>
</tr>
<tr>
<td>Num of HHs</td>
<td>3,467</td>
<td>3,467</td>
<td>3,180</td>
</tr>
</tbody>
</table>
The private market can’t provide UI because of adverse selection.

How should the government intervene?

Baily 78 + Chetty 06 provide classic model motivating optimal social insurance literature.

Translate optimality results into 'sufficient statistics' that can be estimated.
Setup (Baily 1978; Chetty 2006; Chetty and Finkelstein 2012 Handbook Chapter)

- Two states of the world: Employed and Unemployed
  - Consumption $c^u$ and $c^e$
- Individuals exert effort $p$ (= probability of unemployed or fraction of life in unemployed state)
- Utility $U(p, c^e, c^u)$ assumed to have a particular structure:

\[
(1 - p)v(c^e) + pu(c^u) - \psi(1 - p)
\]

where $\psi(\circ)$ is the cost of effort
Consumption has constraints

\[ c^u \leq A + b \]

\[ c^e \leq A + w - \tau \]

where \( \tau \) are taxes and \( b \) are unemployment benefits; \( A \) is assets.

Indirect utility

\[ V(\tau, b) = \max_p pu(A + b) + (1 - p) v(A + w - \tau) - \Psi(1 - p) \]

Budget / resource constraint

\[ (1 - p) \tau = pb \]
Goal: What value of $\tau$ and $b$ maximize representative agent’s utility?

Maximization program

$$\max_{\tau, b} V(\tau, b) \; s.t. \; pb \leq (1 - p) \tau$$

or

$$\max_b V(\tau(b), b)$$

Or

$$\frac{\partial V}{\partial \tau} \frac{d\tau}{db} + \frac{\partial V}{\partial b} = 0$$

or

$$\frac{\partial V}{\partial b} = -\frac{d\tau}{db}$$

where $\frac{d\tau}{db}$ captures the budget impact
Budget Impact

- Budget impact

\[ \tau = \frac{p}{1 - p} b \]

- So

\[
\frac{d\tau}{db} = \frac{p}{1 - p} + b \frac{dp}{db} \frac{1 - p}{(1 - p)^2} + p \frac{dp}{db} \frac{1 - p}{(1 - p)^2} b \\
= \frac{p}{1 - p} + \frac{1}{(1 - p)^2} b \frac{dp}{db} \\
= \frac{p}{1 - p} \left( 1 + \frac{1}{1 - p} \frac{b}{p} \frac{de}{db} \right) = \frac{p}{1 - p} \left( 1 + \frac{\epsilon_{p,b}}{1 - p} \right)
\]
Envelope Theorem

- Envelope theorem implies

\[
\frac{\partial V}{\partial \tau} = - (1 - p) \nu' (c^e)
\]

\[
\frac{\partial V}{\partial b} = p u' (c^u)
\]

- Optimality condition requires:

\[
\frac{\partial V}{\partial b} \frac{\partial V}{\partial \tau} = - \frac{d\tau}{db}
\]

which implies

\[
\frac{p}{1 - p} \frac{u' (c^u)}{\nu' (c^e)} = \frac{p}{1 - p} \left( 1 + \frac{\epsilon_{p,b}}{1 - p} \right)
\]
Dividing, yields the “Baily-Chetty” condition:

\[
\frac{u'(c^u) - v'(c^e)}{v'(c^e)} = \frac{\epsilon_{p,b}}{1 - p}
\]

where

\[
\epsilon_{p,b} = \frac{dp}{db} \frac{b}{p}
\]

- Baily (1978); Chetty (2006)
Empirical Quantities

- What is $\frac{\epsilon_{p,b}}{1-p}$?
  - Causal impact of simultaneous increase in benefits financed by increase in taxes on the cost of unemployment
    - Fiscal externality
  - Generally assumed to be from increased unemployment duration
But there could be other factors that generate fiscal externalities

- Increased wages
- Increased entry into unemployment
- Impact of taxes on labor supply
- Impact on “job creation”

Other factors that generate WTP:

- Search Externalities
<table>
<thead>
<tr>
<th>Country / States</th>
<th>Study</th>
<th>Design</th>
<th>Source of Variation</th>
<th>$\frac{d\theta}{dP}$</th>
<th>$\theta \text{ constant}$</th>
<th>$\frac{d\theta}{dP}$</th>
<th>$\frac{d\theta}{dP}$</th>
<th>Behavioral cost per 1 USD increase in transfer - tax = 3%</th>
<th>Behavioral cost per 1 USD increase in transfer - tax wedge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>Lalive, van Ours, Zweimueler, 2006</td>
<td>DiD</td>
<td>Regional variation, increase from 30 to 39 weeks</td>
<td>0.05</td>
<td>0.10</td>
<td>0.24</td>
<td>0.55</td>
<td>1.29</td>
<td>1.54</td>
</tr>
<tr>
<td>Austria</td>
<td>Lalive, 2007</td>
<td>RD</td>
<td>Regional variation, increase from 30 to 52 weeks</td>
<td>-0.03</td>
<td>-0.09</td>
<td>0.58</td>
<td>1.30</td>
<td>-1.54</td>
<td>-3.05</td>
</tr>
<tr>
<td>Austria</td>
<td>Card, Chetty, Weber, 2007</td>
<td>RD</td>
<td>Cutoff at 36 months UI contributions in prev. 5 years, increase from 20 to 30 weeks of PBD.</td>
<td>0.10</td>
<td>0.11</td>
<td>0.11</td>
<td>0.37</td>
<td>32.95</td>
<td>59.66</td>
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<tr>
<td>Austria</td>
<td>Lalive, 2008</td>
<td>RD</td>
<td>Border RD; increase 30 to 209 weeks; men</td>
<td>0.08</td>
<td>0.37</td>
<td>1.30</td>
<td>2.13</td>
<td>4.58</td>
<td>5.36</td>
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<tr>
<td>Slovakia</td>
<td>van Ours and Vodopivec, 2008</td>
<td>DiD</td>
<td>Policy change in 1998, decrease 9 to 6 months</td>
<td>0.43</td>
<td>0.63</td>
<td>0.94</td>
<td>2.36</td>
<td>3.50</td>
<td>1.87</td>
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<td>Portugal</td>
<td>Centeno and Novo, 2009</td>
<td>RD</td>
<td>Policy change in 1998, decrease 12 to 6 months</td>
<td>0.30</td>
<td>0.43</td>
<td>0.67</td>
<td>1.67</td>
<td>3.44</td>
<td>7.10</td>
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<tr>
<td>Germany</td>
<td>Schmieder, von Wachter, Bender, 2012</td>
<td>RD</td>
<td>Age 30 / 40 Disc, increase from 12 to 18 months</td>
<td>0.40</td>
<td>0.72</td>
<td>1.54</td>
<td>3.44</td>
<td>2.16</td>
<td>4.32</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Age 42 discontinuity - increase 12 to 18 months</td>
<td>0.22</td>
<td>0.45</td>
<td>1.15</td>
<td>2.16</td>
<td>3.44</td>
<td>6.88</td>
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<td>Portugal</td>
<td></td>
<td></td>
<td>Age 44 discontinuity - increase 18 to 22 months</td>
<td>0.13</td>
<td>0.14</td>
<td>0.30</td>
<td>0.58</td>
<td>0.12</td>
<td>0.41</td>
</tr>
<tr>
<td>Portugal</td>
<td></td>
<td></td>
<td>Age 49 discontinuity - increase 22 to 26 months</td>
<td>0.10</td>
<td>0.12</td>
<td>0.26</td>
<td>0.54</td>
<td>0.13</td>
<td>0.38</td>
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<tr>
<td>France</td>
<td>Le Barbanchon, 2016</td>
<td>RD</td>
<td>Threshold in past experience at 8 months, increase from 7 to 15 months of PBD</td>
<td>0.31</td>
<td>0.40</td>
<td>0.52</td>
<td>1.35</td>
<td>3.50</td>
<td>7.00</td>
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</tbody>
</table>

**Panel B: Studies from the United States**

<table>
<thead>
<tr>
<th>Country</th>
<th>Study</th>
<th>Design</th>
<th>Source of Variation</th>
<th>$\frac{d\theta}{dP}$</th>
<th>$\theta \text{ constant}$</th>
<th>$\frac{d\theta}{dP}$</th>
<th>$\frac{d\theta}{dP}$</th>
<th>Behavioral cost per 1 USD increase in transfer - tax = 3%</th>
<th>Behavioral cost per 1 USD increase in transfer - tax wedge</th>
</tr>
</thead>
<tbody>
<tr>
<td>CWHB, 13 states</td>
<td>Moffit, 1985</td>
<td></td>
<td></td>
<td>0.15</td>
<td>0.34</td>
<td>0.15</td>
<td>0.34</td>
<td>1.05</td>
<td>1.89</td>
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<tr>
<td>CWHB, all states</td>
<td>Katz and Meyer, 1990</td>
<td>Di D</td>
<td></td>
<td>0.20</td>
<td>0.41</td>
<td>0.23</td>
<td>0.52</td>
<td>0.37</td>
<td>0.69</td>
</tr>
<tr>
<td>New Jersey</td>
<td>Card and Levine, 2000</td>
<td>Di D</td>
<td>Extended Benefit program, increased benefits by 13 weeks</td>
<td>0.45</td>
<td>0.1</td>
<td>0.08</td>
<td>0.16</td>
<td>0.35</td>
<td>0.69</td>
</tr>
<tr>
<td>Missouri</td>
<td>Johnston and Mas, 2015</td>
<td>RD</td>
<td>Temporal Benefit cut from 73 to 57 weeks for some cohorts</td>
<td>0.30</td>
<td>0.54</td>
<td>0.36</td>
<td>0.69</td>
<td>0.30</td>
<td>0.54</td>
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<td>CWHB, Louisiana/Washington</td>
<td>Landais, 2015</td>
<td>RKD</td>
<td>Maximum potential duration cap</td>
<td>0.33</td>
<td>1.35</td>
<td>0.33</td>
<td>1.35</td>
<td>0.33</td>
<td>1.35</td>
</tr>
</tbody>
</table>

**Notes:** All calculated behavioral cost terms use the constant hazard approximation described in Section 4.2. The behavioral cost in the last column represents the extra cost (in dollars) to the government budget of increasing the mechanical transfer (that is the transfer in the absence of behavioral responses) to the unemployed by 1 dollar. For example, a behavioral cost of $0.55 suggests that to finance a $1 transfer from a benefit extension one has to raise $1.55 to cover the mechanical cost ($1) and behavioral cost ($0.55). The last two columns differ in whether the budget shortfall is measured using the employee's UI contribution rate (at 3
Table 2: Estimates of the Effects of Benefit Increases on Unemployment Durations

<table>
<thead>
<tr>
<th>Country / States</th>
<th>Study</th>
<th>Design</th>
<th>Source of Variation</th>
<th>$\frac{dD}{db}$</th>
<th>$\frac{dB}{dt}$</th>
<th>Behavioral cost per 1 USD increase in transfer - $\tau = 0.03$</th>
<th>Behavioral cost per 1 USD increase in transfer - tax wedge</th>
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</thead>
<tbody>
<tr>
<td><strong>Panel A: Studies from Europe</strong></td>
<td></td>
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<tr>
<td>Sweden</td>
<td>Carling et al., 2001</td>
<td>DiD</td>
<td>Replacement rate change from 80% to 75%</td>
<td>1.60</td>
<td>0.60</td>
<td>2.36</td>
<td></td>
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<tr>
<td>Norway</td>
<td>Roed and Zhang, 2003</td>
<td>DiD</td>
<td>Timing of UI Start - Male</td>
<td>0.95</td>
<td>0.87</td>
<td>1.41</td>
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<td>Austria</td>
<td>Lalive et al., 2006</td>
<td>DiD</td>
<td>Female</td>
<td>0.35</td>
<td>0.35</td>
<td>0.55</td>
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<td>Spain</td>
<td>Arranz et al, 2009</td>
<td>Pre-Post</td>
<td>Replacement rate change for target income range from 41% to 47%</td>
<td>0.15</td>
<td>0.06</td>
<td>0.47</td>
<td></td>
</tr>
<tr>
<td>Austria</td>
<td>Card, Lee, Pei, Weber, 2015</td>
<td>RKD</td>
<td>Reduction in benefits and duration</td>
<td>0.80</td>
<td>0.29</td>
<td>1.24</td>
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<td><strong>Panel B: Studies from the United States</strong></td>
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<tr>
<td>CWBH - 13 states</td>
<td>Moffitt, 1985</td>
<td>Cross-Sectional</td>
<td>Tax policy change (non-taxable to taxable benefits)</td>
<td>0.36</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>US - Georgia</td>
<td>Solon, 1985</td>
<td>DiD</td>
<td>State-by-year</td>
<td>0.10</td>
<td>0.07</td>
<td>0.08</td>
<td>0.14</td>
</tr>
<tr>
<td>CWBH - all states</td>
<td>Katz and Meyer, 1990</td>
<td>Pre-post</td>
<td>Increase in maximum weekly benefit level from 180 to 245</td>
<td>0.80</td>
<td>0.29</td>
<td>1.74</td>
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<tr>
<td>US - New York</td>
<td>Meyer and Mok, 2007</td>
<td>Pre-post</td>
<td>Kinks formed by minimum and maximum benefit levels - Low Income</td>
<td>0.60</td>
<td>0.30</td>
<td>0.41</td>
<td>0.81</td>
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<tr>
<td>US</td>
<td>Chetty, 2008</td>
<td>DiD</td>
<td>Kinks formed by minimum and maximum benefit levels - High Income</td>
<td>0.12</td>
<td>0.30</td>
<td>0.08</td>
<td>0.16</td>
</tr>
<tr>
<td>US - ID, LA, MO,</td>
<td>Landais, 2015</td>
<td>RKD</td>
<td>cross-state maximum benefit level</td>
<td>0.53</td>
<td>0.30</td>
<td>0.16</td>
<td>0.31</td>
</tr>
<tr>
<td>NM, WA</td>
<td>Kroft and Notowidigo, 2015</td>
<td>DiD</td>
<td>Increase in maximum weekly benefit level</td>
<td>0.23</td>
<td>0.30</td>
<td>0.16</td>
<td>0.31</td>
</tr>
<tr>
<td>US</td>
<td>Card, Johnston, Leung, Mas, Pei, 2015</td>
<td>RKD</td>
<td>Missouri,kink at maximum level of UI benefits - pre recession / Boom</td>
<td>0.63</td>
<td>0.30</td>
<td>0.16</td>
<td>0.31</td>
</tr>
<tr>
<td>US</td>
<td>Missouri</td>
<td>RKD</td>
<td>Missouri,kink at maximum level of UI benefits - during-recession - Recession</td>
<td>1.21</td>
<td>0.78</td>
<td>0.95</td>
<td>1.68</td>
</tr>
</tbody>
</table>
| Notes: See notes to Table 1.
Value of Insurance Benefits

- How much of a markup are individuals willing to pay, $\frac{u'(c_u)}{v'(c_e)}$?

- Five approaches:
  - Approach #1: Exploit impact of unemployment on consumption (Gruber 1997)
  - Approach #2: Exploit ex-ante impact of learning about unemployment on consumption (Hendren 2016)
  - Approach #3: Exploit liquidity vs. moral hazard benefit response (Chetty 2008)
  - Approach #4: Reservation wages (Shimer and Werning 2010)
  - Approach #5: Measure WTP directly (Nekoei et al. 2017; Landais and Spinnewijn 2021 RESTUD)
  - Approach #6: Heterogeneity in MPCs (Landais and Spinnewijn 2021 RESTUD)
Approach #1 (Baily 1978, Chetty 2006,...): Assume state dependence: $u = v$

This implies:

$$\frac{u'(c_u)}{v'(c_e)} \approx 1 + \sigma \frac{\Delta c}{c}$$

where

$$\frac{\Delta c}{c} = \frac{c_e - c_u}{c_e} \approx \log(c_e) - \log(c_u)$$

$\sigma = \frac{u''}{u'}$ is relative risk aversion [Chetty 2006 has 3rd order adj.]

Generally implemented using first difference as proxy for $\frac{\Delta c}{c}$
Gruber (1997) estimates $\frac{\Delta c}{c}$ using first difference impact of unemployment on consumption expenditure (food expenditure) in PSID.

- Studies how it varies heterogeneously with benefit level.
- Uses this to solve for optimal benefits, $b^*$.
- Problem: ex-ante responses bias first difference estimates (Hendren, 2016).
Willingness to Pay for $1 of UI
First Difference Approach (Gruber 1997, Baily 1978)

Coefficient on Unemployment Indicator

Lead/Lag Relative to Unemployment Measurement

Willingness to Pay for $1 of UI
First Difference Approach (Gruber 1997, Baily 1978)

7.23%
Willingness to Pay for $1 of UI
First Difference Approach (Gruber 1997, Baily 1978)

\[
\frac{u'(c_u)}{v'(c_e)} = 1 + \sigma \times 7.23\%
\]
Problem: Some information about $U_t$ is revealed at $t-1$
Solution: Scale by amount of information about $U_t$ that is revealed between $t-1$ and $t$.
Hendren (2016): Scale By Information Revealed

Proposition 1: Causal Effect
given by:

\[
\frac{\Delta c}{c} = \frac{\Delta^{FD}}{1 - (E[P|U_t=1]-E[P|U_t=0])}
\]
Proposition 1: Causal Effect
given by:
\[
\frac{\Delta c}{c} = \frac{\Delta^{FD}}{1 - (E[P|U_{t}=1] - E[P|U_{t}=0])}
\]

Regress Z on U for \(E[P|U_{t}=1] - E[P|U_{t}=0]\)
Proposition 1: Causal Effect given by:

\[
\frac{\Delta c}{c} = \frac{\Delta^{FD}}{1 - (E[P|U_{t}=1]-E[P|U_{t}=0])}
\]

\[E[P|U_{t}=1]-E[P|U_{t}=0] \approx 20\%\]
Proposition 1: Causal Effect given by:
\[ \frac{\Delta c}{c} = \frac{\Delta^{FD}}{80\%} = 1.25 \Delta^{FD} \]
Proposition 1: Causal Effect
given by:

\[
\frac{\Delta c}{c} = \frac{\Delta^{FD}}{80\%} = 1.25 \times \Delta^{FD}
\]

\[
= 1.25 \times 7.23\%
\]

\[
= 9\%
\]
Hendren (2016): Scale By Information Revealed

\[
\frac{u'(c_u)}{v'(c_e)} = 1 + 0.09 \times \sigma
\]
Hendren (2016): Scale By Information Revealed

\[
\frac{u'(c_u)}{v'(c_e)} = 1 + .09 \times \sigma \\
= 1 + 18\% \text{ for } \sigma = 2
\]
Hendren (2016): Scale By Information Revealed

\[
\frac{u'(c_u)}{v'(c_e)} = 1 + 0.09 \cdot \sigma
\]

= 1 + 18% for \( \sigma = 2 \)

= 1 + 27% for \( \sigma = 3 \)
Aguiar and Hurst (2005) Critique

- Large literature using consumption changes to proxy for marginal utilities
  - e.g. literature on impact of retirement on consumption
  - Suggests people ‘under save’ for retirement
- Aguiar and Hurst (2005) critique this by noting that those who retire have more time to shop and find lower prices
  - Suggests that even if $u = v$ we would expect those with more time to have higher consumption for the same level of expenditure
- More generally, many reasons not to like the state independence assumption
  - Maybe you value money more when unemployed because you have search expenditures that arise?
- Bias could go either way...
  - Approaches 2-3 deal with this...
Approach #2: Exploit Ex-Ante Responses

- Approach #1 compares consumption across states of the world
  - Most common approach (e.g. Gruber (1997))
- Alternative approach: Compare ex-ante consumption within states of the world
- Euler Equation:

\[
 v'(c_{\text{today}}(p)) = p u'(c_u) + (1 - p) v'(c_e)
\]

Implies

\[
 \left( \frac{v''}{v'} \right) \left( \frac{1}{c_{\text{today}}} \right) \frac{dc_{\text{today}}}{dp} = \frac{u'(c_u) - v'(c_e)}{v'}
\]
Hendren (2016): Exploit Ex-ante Responses

Coefficient on Unemployment Indicator

Lead/Lag Relative to Unemployment Measurement

Coef 5%/95% CI

Hendren (2016): Exploit Ex-ante Responses
Proposition 2: WTP given by:

\[
\frac{u'(c_u)}{v'(c_e)} = 1 + \sigma \times \frac{d\log(c_{pre})}{dp}
\]
Hendren (2016): Exploit Ex-ante Responses

Proposition 2: WTP given by:

\[
\frac{u'(c_u)}{v'(c_e)} = 1 + \sigma \frac{d\log(c_{\text{pre}})}{dp} = 1 + \sigma \frac{\Delta_{-1}^{FD}}{\Delta_{-1}^{\text{Beliefs}}}
\]

\[
\Delta_{-1}^{\text{Beliefs}} = E[P_{t-1} | U_t=1] - E[P_{t-2} | U_t=1] - (E[P_{t-1} | U_t=0] - E[P_{t-2} | U_t=0])
\]
Hendren (2016): Exploit Ex-ante Responses

**Proposition 2:** WTP given by:

\[
\frac{u'(c_u)}{v'(c_e)} = 1 + \sigma^* \frac{d\log(c_{pre})}{dp} = 1 + \sigma^* \frac{2.7\%}{9.4\%}
\]

\[\Delta_{1}^{FD} = 2.7\%\]
Hendren (2016): Exploit Ex-ante Responses

Proposition 2: WTP given by:
\[
\frac{u'(c_u)}{v'(c_e)} = 1 + \sigma \cdot \frac{d\log(c_{pre})}{dp} = 1 + \sigma \cdot \frac{2.7\%}{9.4\%} = 1 + 58\% \text{ for } \sigma = 2
\]
Hendren (2016): Exploit Ex-ante Responses

Proposition 2: WTP given by:

\[
\frac{u'(c_u)}{v'(c_e)} = 1 + \sigma \frac{d\log(c_{pre})}{dp}
\]

\[
= 1 + \sigma \frac{2.7\%}{9.4}\%
\]

\[
= 1 + 58\% \text{ for } \sigma = 2
\]

\[
= 1 + 87\% \text{ for } \sigma = 3
\]

\[\Delta_{1}^{FD} = 2.7\%\]
Hendren (2017): Can also use spousal labor supply

Assume disutility of labor additively separable:

\[
\frac{u'(c_u)}{v'(c_e)} \approx 1 + \frac{1}{\epsilon^{semi}} \frac{d[LFP^{Spouse}]}{dp}
\]

Scale labor supply responses by semi-elasticity of spousal labor supply to wages.
Hendren (2017): Can also use spousal labor supply

Assume disutility of labor additively separable:

$$\frac{u'(c_u)}{v'(c_e)} \approx 1 + \frac{1}{\epsilon_{semi}} \frac{d[LFP^{Spouse}]}{dp}$$

Scale labor supply responses by semi-elasticity of spousal labor supply to wages

Need to estimate $\frac{dLFP^{Spouse}}{dp}$

Recall: $\frac{dLFP}{dZ} = 0.025$

Scale by signal-to-noise ratio, $\frac{\text{var}(Z)}{\text{var}(P)} = \frac{\text{var}(Z)}{\text{cov}(U,Z)} = 11$

Roughly 10% of variance is signal

Suggests WTP of 60% for semi-elasticity of 0.5.
Chetty 2008 provides another method to get around state dependence issues

Assume separable effort function for employment

Implies FOC

\[ v(c^e) - u(c^u) = \Psi'(e) \]

where \( e = 1 - p \) (sorry for the notation change! If only papers were consistent :-)).

Note that the difference in levels of utility between employed and unemployed states is equated to the marginal disutility of effort

- Relates levels of utility to 1st derivative of utility

Key idea: take another derivative and relate 1st derivatives (WTP) to 2nd derivatives (elasticities)
Consider two comparative statics:
- Change assets, $A$, which increases consumption in both state of the world
- Change benefits, $b$, which increases consumption only when unemployed

**FOC for Assets**

$$\left[ u'(c^e) - u'(c^u) \right] = \Psi''(e) \frac{de}{dA}$$

**FOC for benefits**

$$-u'(c^u) = \Psi''(e) \frac{de}{db}$$

So:

$$u'(c^e) = \Psi''(e) \left[ \frac{de}{dA} - \frac{de}{db} \right]$$

Or

$$\frac{u'(c^u) - u'(c^e)}{u'(c^e)} = \frac{de}{dA} - \frac{de}{db}$$
So:

\[ u' (c^e) = \Psi'' (e) \left[ \frac{de}{dA} - \frac{de}{db} \right] \]

Therefore, WTP For UI is given by:

\[
\frac{u' (c^u) - u' (c^e)}{u' (c^e)} = \frac{\frac{de}{dA}}{\frac{de}{dA} - \frac{de}{db}} = \frac{-R}{R - 1}
\]

where

\[ R = \frac{\frac{de}{dA}}{\frac{de}{db}} \]

is the “fraction of the moral hazard effect, \( \frac{de}{db} \), that is due to a liquidity effect, \( \frac{de}{dA} \)”
Chetty (2008) provides evidence from the SIPP that most of the duration response to benefits is driven by those who are liquidity constrained.

- Evidence from the SIPP
Second Quartile of Net Wealth (Chetty 2008)

Wilcoxon Test for Equality: p = 0.04

Mean rep. rate = .48
Mean rep. rate = .53

Avg. UI benefit below mean
Avg. UI benefit above mean
Third Quartile of Net Wealth (Chetty 2008)

Wilcoxon Test for Equality: $p = 0.69$

Mean rep. rate = 0.52

Mean rep. rate = 0.46
Highest Quartile of Net Wealth (Chetty 2008)

Wilcoxon Test for Equality: $p = 0.43$

Mean rep. rate = 0.52
Mean rep. rate = 0.43

Avg. UI benefit below mean
Avg. UI benefit above mean
This suggests that \( \frac{de}{db} \) is higher for those with low assets (i.e. \( \frac{d}{dA} \frac{de}{db} > 0 \))

But, it doesn’t provide an estimate of \( \frac{de}{dA} \)!

For this, look at impact of severance payments

- Causes increase in unemployment duration
- Despite the fact that benefits are paid regardless of duration
Severance (Chetty 2008)

A graph showing the fraction of unemployed individuals over weeks, comparing those who received severance and those who did not.

- **Y-axis:** Fraction Unemployed
- **X-axis:** Weeks Unemployed

Lines represent:
- No Severance
- Received Severance

Legend:
- No Severance
- Received Severance

Graph illustrates a downward trend, indicating a decrease in the fraction of unemployed individuals over weeks.
Calibrating $\frac{de}{dA}$, finds that:

$$R = 0.6$$

Suggests that

$$\frac{u'(c^u) - u'(c^e)}{u'(c^e)} = \frac{0.6}{0.4} = 1.5$$

Suggests individuals are willing to pay a 150% markup for UI

Problems?

- Separability assumption valid?

Nathan’s take: relies heavily on additive separability

- Not a general result of being able to turn behavioral responses (2nd derivatives) into willingness to pay estimates (1st derivatives)
Table 3: Estimates of Consumption Loss at Unemployment and Ratio of Liquidity to Moral Hazard Effect of UI

<table>
<thead>
<tr>
<th>Study</th>
<th>Range of Years</th>
<th>Country</th>
<th>Data Source</th>
<th>Consumption Loss at Unemployment</th>
<th>Implied Welfare Effect, CRRA coefficient $\gamma = 2$</th>
<th>Implied Welfare Effect, CRRA coefficient $\gamma = 5$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Panel A: Consumption Loss Estimates</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cochrane, 1991</td>
<td>1980-1983</td>
<td>USA</td>
<td>PSID</td>
<td>24.27%</td>
<td>0.51</td>
<td>1.275</td>
</tr>
<tr>
<td>Gruber, 1997</td>
<td>1968-1987</td>
<td>USA</td>
<td>PSID, Food only</td>
<td>6.8%</td>
<td>0.136</td>
<td>0.34</td>
</tr>
<tr>
<td>Browning and Crossley, 2001</td>
<td>1995</td>
<td>Canada</td>
<td>COEP Canada</td>
<td>14.0%</td>
<td>0.28</td>
<td>0.7</td>
</tr>
<tr>
<td>Stephens, 2001</td>
<td>1968-1992</td>
<td>USA</td>
<td>PSID</td>
<td>9.0%</td>
<td>0.18</td>
<td>0.45</td>
</tr>
<tr>
<td>Chetty and Looney, 2006</td>
<td>1980-1993</td>
<td>USA</td>
<td>PSID</td>
<td>10.6%</td>
<td>0.212</td>
<td>0.53</td>
</tr>
<tr>
<td>Chetty and Szeidl, 2006</td>
<td>1968-1997</td>
<td>USA</td>
<td>PSID</td>
<td>10.0-15%</td>
<td>0.25</td>
<td>0.625</td>
</tr>
<tr>
<td>Rothstein and Valletta, 2014</td>
<td>2001 panel</td>
<td>USA</td>
<td>SIPP</td>
<td>10.0%</td>
<td>0.2</td>
<td>0.5</td>
</tr>
<tr>
<td>Kroft and Notowididgo, 2015</td>
<td>1968-1997</td>
<td>USA</td>
<td>PSID</td>
<td>6.9%</td>
<td>0.138</td>
<td>0.345</td>
</tr>
<tr>
<td>Ganong, 2015</td>
<td>2012-2015</td>
<td>USA</td>
<td>JPMCI Checking account data</td>
<td>6.1%</td>
<td>0.122</td>
<td>0.305</td>
</tr>
<tr>
<td>Kolsrud et al., 2015</td>
<td>1999-2007</td>
<td>Sweden</td>
<td>Tax Records</td>
<td>19.0%</td>
<td>0.38</td>
<td>0.95</td>
</tr>
</tbody>
</table>

**Panel B: Estimates of Liquidity to Moral Hazard Ratio**

<table>
<thead>
<tr>
<th>Study</th>
<th>Range of Years</th>
<th>Country</th>
<th>Data Source</th>
<th>Design to Estimate Liquidity / Moral Hazard Effect</th>
<th>Liquidity to Moral Hazard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chetty, 2008</td>
<td>1985 - 2000</td>
<td>USA</td>
<td>SIPP</td>
<td>Response to Severance Pay, OLS</td>
<td>1.5</td>
</tr>
<tr>
<td>Landais, 2015</td>
<td>1970s to 1984</td>
<td>USA</td>
<td>CWBH (5 States)</td>
<td>Regression Kink Design</td>
<td>0.88</td>
</tr>
</tbody>
</table>

**Notes:** The implied welfare effect is calculated by multiplying the consumption loss at unemployment by the CRRA coefficient, see text. To calculate implied welfare effect for studies giving range of estimates the midpoint of the interval is taken.
Approach #4: Reservation Wages

- Large empirical literature documenting how UI increases reservation wages
  - Often interpreted as “moral hazard”
  - People don’t take jobs because they have UI

- Shimer and Werning (2006) deliver a surprising result:
  - Optimal UI should maximize after-tax reservation wages

- Logic is quite straightforward (but math is not...)
Utility given by

$$E \int_0^\infty e^{-\rho t} U(c(t)) \, dt$$

where $\rho$ is a discount rate and $c(t)$ is consumption at time $t$

- Note: no disutility of search or effort – utility is fully summarized by consumption
- Employed worker obtains wages $w$ and pays tax $t$.
- Unemployed worker obtains benefits $b$ and receives job offers at Poisson arrival rate with wages drawn from distribution $F(w)$
  - If accepted, she becomes employed; otherwise waits for next offer

Define $V_u$ to be the expected future lifetime utility for an unemployed worker

- Main Result:

$$V_u \propto U(\bar{w} - \tau)$$

where $\bar{w} - \tau$ is the after-tax reservation wage.
Maximizing after tax reservation wage is equivalent to maximizing welfare

If benefits cause people to forego good jobs, this is:
- Good because they can get even better future jobs
- Bad because it might increase taxes

After-tax reservation wage is the right balance between these two forces

Issues:
- No disutility of effort
- Jobs are more than wages
- Little data on reservation wages
Approach #5: Measure WTP Directly

- Sweden has option to purchase UI through one’s union
- Exploited by A. Nekoei, Peter Nilsson, David Seim, & Johannes Spinnewijn
  - “Risk-based Selection in Unemployment Insurance: Evidence and Implications”
- 2007 reform changed prices
2007 Reform in Sweden

[Graph showing the number of UI members/eligible population (age 18-60) and average monthly UI premium (SEK) from 2004 to 2009.]

- Share members
- UI-premium

Nathaniel Hendren (Harvard)
Approach #5: Measure WTP Directly

- Use estimates to back-out implied WTP
- Find large UI subsidies are optimal
- But full mandate is not optimal
  - Some people don’t want insurance and no need to force them to buy
- Very nice paper because it speaks to optimal social insurance using choice variation
Approach #6: Heterogeneity in MPCs

- Landais and Spinnewijn (2021 RESTUD)
- Provide formula for WTP for UI using difference in MPCs in employed vs. unemployed state
- Suggests large WTP for UI
Six approaches yield different estimates

e.g. Approach #1 suggests smaller WTP than other approaches

Potential explanations:
- Correlated shocks
- \( u \neq v \)
- Others?

Suggests higher benefits increase welfare if willing to pay 55% markup for UI
- But still haven’t solved for optimal benefits
UI papers often go one step further: what is the optimal benefit level, $b^*$?

Write:

$$\sigma \frac{\Delta c}{c} (b^*) = \frac{\epsilon_{p,b}}{1 - p}$$

Assume $\epsilon$ is constant with respect to $b$ (good assumption)
Need to estimate $\frac{\Delta c}{c} (b)$: how does consumption impact vary with benefit level?

$$\frac{\Delta c}{c} (b) = \beta_1 + \beta_2 b$$

Implies

$$\sigma [\beta_1 + \beta_2 b] = \frac{\epsilon_{p,b}}{1 - p}$$

or

$$b^* = \frac{\beta_1 + \frac{1}{\sigma} \frac{\epsilon_{p,b}}{1 - p}}{\beta_2}$$
Gruber (1997) uses simulated instruments to generate variation in benefit levels, $b$

- Isolate variation in benefits due to policy variation across states

**Estimates:**

\[
\Delta c = a + \gamma X_i + \beta_1 \text{Unemp} + \beta_2 \times b_i \times \text{Unemp} + \epsilon_i
\]

where $X_i$ are individual characteristics and $b_i$ is the replacement rate (benefits / wages) for which an individual is ELIGIBLE

- 67% of people take up UI (Blank and Card 1991)
- Why not use observed UI replacement rate = benefits received / wage?

**Finds $\beta_3 > 0$** so that UI reduces impact of unemployment on expenditure

- But suggests optimal $b^* = 0$ (problematic with $\epsilon$ constant?)
So far, talked about “benefits”

But, benefits has multiple dimensions:
- Duration of UI
- Generosity / replacement rate of UI

Key ingredients: need to know
- Differential behavioral response to changes in these two dimensions
- WTP for changing these two margins
Ganong and Noel (2016) estimates consumption path throughout UI spell

Use data from linked account information from major US financial institution

Define spell from UI deposits
  Concerns?

Plot time path of expenditures through UI spell
  Look at both onset of unemployment and impact of benefit exhaustion
Spending by Months Unemployed

Spending: Ratio to $t = -3$

1 month

Source: Ganong and Noel (2016)
Spending by Months Unemployed

Spending: Ratio to $t = -3$

Source: Ganong and Noel (2016)
Spending by Months Unemployed

Source: Ganong and Noel (2016)
Spending by Months Unemployed

Spending: Ratio to $t = -3$

Source: Ganong and Noel (2016)
Spending by Months Unemployed

Source: Ganong and Noel (2016)
Spending by Months Unemployed

Source: Ganong and Noel (2016)
Expenditure patterns follow duration of unemployment spell

Strong evidence though of consumption impact at benefit exhaustion
Income at Benefit Exhaustion

Source: Ganong and Noel (2016)
Income and Spending at Benefit Exhaustion

Source: Ganong and Noel (2016)
Consumption drops 11% at benefit exhaustion
  Should be a known!

Paper goes on to show traditional models do not do a good job of fitting the data
  Permanent income model would suggest no drop at exhaustion
  Hand-to-mouth consumption would suggest greater consumption fluctuations
  Buffer-stock model doesn’t fit because people should accumulate more assets to help smooth the shock

Question: does consumption drop at exhaustion suggest greater welfare benefit of extending benefits versus higher replacement rate?
Nekoei and Weber study impact of UI duration on job quality

Exploit age-based discontinuity in UI rules in Austria

Identification: Discontinuity at age 40

Laid-off workers eligible for 39 instead of 30 weeks of UI as age crosses from 40 to 41
  - Implemented on August 1, 1989
UI Extension Effect on Non–Employment Duration

Non–employment duration (days)

Age at layoff

Nekoei and Weber (Forthcoming)
UI Extension Effect on Non-Employment Duration

Prob. of finding job within 39 weeks

Age at layoff

Nekoei and Weber (Forthcoming)
UI Extension Effect on Wages

Wage change between jobs

Age at layoff

Nekoei and Weber (Forthcoming)
Prob(New wage > 0.5 old wage)

Age at layoff

UI Extension Effect on Wages

Nekoei and Weber (Forthcoming)
### Effect of UI Extension from 30 to 39 Weeks

**Discontinuity at age 40**

<table>
<thead>
<tr>
<th>Covariates</th>
<th>Dependent variable</th>
<th>(1) Non-employment duration</th>
<th>(2) Find job within 39 weeks</th>
<th>(3) Wage change between jobs</th>
<th>(4) New wage &gt; UI benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td></td>
<td>1.932***</td>
<td>-0.0131***</td>
<td>0.00449***</td>
<td>0.00388***</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.526)</td>
<td>(0.00164)</td>
<td>(0.00170)</td>
<td>(0.00105)</td>
</tr>
<tr>
<td>Yes</td>
<td></td>
<td>1.898***</td>
<td>-0.0119***</td>
<td>0.00459***</td>
<td>0.00386***</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.466)</td>
<td>(0.00146)</td>
<td>(0.00146)</td>
<td>(0.00102)</td>
</tr>
<tr>
<td>Mean dep. var.</td>
<td></td>
<td>114.7</td>
<td>0.842</td>
<td>-0.0440</td>
<td>0.962</td>
</tr>
<tr>
<td>Observations</td>
<td></td>
<td>1,589,178</td>
<td>1,738,787</td>
<td>1,187,476</td>
<td>1,187,476</td>
</tr>
</tbody>
</table>

Nekoei and Weber (Forthcoming)
Additional UI duration causes significant increase in future wages
- One of only papers finding that UI helps job match quality
- Nice use of regression discontinuity design

Two implications:
- Benefits of UI?
- Costs of UI?
  - Significantly changes the FE associated with UI?
Macro versus Micro

- Literature generally focused on micro impact of UI on durations

- But, UI can generate search externalities
  - Allowing some workers to remain unemployed helps other workers find jobs

- Lalive, Landais, and Zweimuller (2013) exploit large UI expansion in Austria
  - Provided 209 weeks instead of 52 weeks as long as:
    - Age above 50
    - At least 15 years of continuous work history in past 25 years
    - Reside in particular subsets of regions
    - Unemployment spell began between June 1988 and Aug 1993
Figure 5: Difference in U duration between REBP and non REBP regions: male 50-54 with more than 15 years of experience

Lalive, Landais, and Zweimuller (2013)
Figure 6: Difference in U duration between REBP and non-REBP regions: male 50-54 with less than 15 years of experience.

Lalive, Landais, and Zweimuller (2013)
Figure 7: Relationship between previous work experience and unemployment duration: male 50-54, **Before and after REBP**

Lalive, Landais, and Zweimuller (2013)
Figure 7: Relationship between previous work experience and unemployment duration: male 50-54, during REBP

Lalive, Landais, and Zweimuller (2013)
Figure 7: Relationship between previous work experience and unemployment duration: male 50-54, during REBP

Lalive, Landais, and Zweimuller (2013)
Figure 7: Relationship between previous work experience and unemployment duration: male 50-54, during REBP

Lalive, Landais, and Zweimuller (2013)
Figure 7: Relationship between previous work experience and unemployment duration: male 50-54, during REBP

Lalive, Landais, and Zweimuller (2013)
Macro versus Micro

- Macro effects provide additional rationale for UI
- UI affects non-beneficiaries through search externalities
- Affects optimal UI calculations
Until recently, very limited evidence on this (see Feldstein 1976)

Jager, Shoefer, and Zweimuller (2020 QJE) exploit variation REBP context to look at worker separations

Are workers who have higher UI benefits less likely to stay at their firm?
Figure 4: Benefit Extensions and Separations – Share of Workers With Same Job in 1988 and 1993

(a) REBP and Control Region
(b) Difference (REBP - Control Region)
Large literature studying optimal UI

Development of “sufficient statistic” approach for welfare analysis
  - Compare costs to benefits

Evidence suggests
  - consumption expenditure drops upon unemployment (permanently)
  - UI increases duration of unemployment

Open questions:
  - Role of UI versus curvature in income tax schedule
    - UI for uber drivers?
    - Verifiability of unemployment
  - Others?