14.472 Public Finance II


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Overview

- **Theory:** Optimal level of benefits: Baily (1978)/ Chetty (2006) formula
- **Empirics:** Are UI benefits above/below optimum
  - Drops in consumption (Gruber 1997 AER)
  - Liquidity vs moral hazard (Chetty (2008 JPE)
  - Reservation wages (Shimer and Werner, QJE 2007)
Outline (~3 lectures)

1. Background on UI
   - Institutional
   - Adverse selection

2. Theory
   - Optimal benefit level: Baily / Chetty
   - MVPF: Hendren 2016

3. Taking the Baily / Chetty formula to the data:
   - Impact of UI benefits on ue (brief comments on extensive literature)
   - Impact of UI bens on cons smoothing (Gruber 1997)

4. An alternative approach to estimating optimal UI benefits: Liquidity vs. Moral hazard
   - Chetty 2008 JPE
   - Policy application: UI accounts
Comment: Applications

- Optimal level of benefits or value of a given social insurance program is general question
- Most of the work has been in UI
  - Need for similar work in other applications
- Once again an emphasis on welfare:
  - Previous lectures on asymmetric information: from testing to welfare (or from applied contract theory to public finance)
  - Optimal UI: from program evaluation to welfare analysis
Welfare analysis is another key area where economic theory is an important complement to reduced form empirical analysis.

Welfare analysis of social insurance is particularly challenging because the good in question is typically not traded in a well-functioning market.

- So cannot use estimates of ex-ante willingness to pay derived from contract choices, as we have seen with either private health insurance analysis.
- Classic problem of valuing non-market good whose prices are not observed (Samuelson 1954).

Two views on welfare analysis (some truth to both):

- Important and defining feature of public economics.
- Very hard to get traction.
1. Background on UI

What is the risk to be insured?
- Risk of being temporarily out of work (not for permanently displaced workers)
- For workers with attachment to labor force

Why might private markets fail?
- Credit market failures (why not improve credit markets for ue directly? Will discuss ui accounts. . . )
- Behavioral factors: people don’t build up the requisite buffer stocks
- Moral hazard (no comparative advantage of government)
- Adverse selection (evidence?!)
Adverse selection in private UI?

- Large empirical literature on public unemployment insurance (costs and benefits)
  - Focus on questions of optimal design (will discuss)
- Until (very) recently... little analysis of existence of rationale for government intervention!
- Two recent papers
  - Landais et al. (2017 working paper) "Risk-based Selection in Unemployment Insurance: Evidence and Implications"
  - Hendren (AER forthcoming): Knowledge of Future Job Loss and Implications for Unemployment Insurance
Landais et al. (2017)

- Landais, Nekoei, Nilsson, Seim and Spinnewijn (2017)
- Study demand for (optional, public) supplemental UI in Sweden
  - All Swedish workers are entitled to a minimum benefit financed by payroll tax
  - Option to buy a more comprehensive policy (same duration etc, just higher payouts) at a (uniform) premium set by government
- Administrative data on worker choices and outcomes
- Implement a panoply of tests (positive correlation, uninsured observables, cost curve)
- Detect adverse selection into more comprehensive UI
  - Find that if (counterfactually) prices were set based on all current observables, would not eliminate selection
- Also use demand and cost curve estimates to compare welfare under mandated supplemental coverage vs current choice
  - Find mandate is welfare decreasing (question: why would that be?)
Paper has 3 main components

- Test for private information and potential adverse selection in unemployment insurance
  - tricky when market doesn’t exist!
- Estimate willingness to pay for additional UI (on top of government program)
  - again, tricky when market doesn’t exist!
- Ask whether adverse selection can explain lack of private supplemental UI market

Will discuss only the first part now, then return to the latter two parts after we develop some more of the theory and background on empirics
Testing for private information and adverse selection in UI

- Looks in HRS at whether subjective probabilities of future job loss predict future job loss conditional on observables that could be used in pricing (Yes)
- Look at whether private information about probability of job loss affects individual behavior (Yes)
  - Can’t look at insurance demand (a la Finkelstein and McGarry 2006) because private UI doesn’t exist
  - Looks at spousal labor supply (HRS) and consumption responses (PSID) to private information about job loss probabilities (prior to job loss)
    - Idea: if individuals use private information in these behavioral decisions, presumably might in selecting an insurance contract if offered
Self-reports of probability of job loss within 12 months

FIGURE I: Histogram of Subjective Probability Elicitations

Notes: This figure presents a histogram of responses to the question “What is the percent chance (0-100) that you will lose your job in the next 12 months?”. The figure reports the histogram of responses for the baseline sample (corresponding to Column (1) in Table 1)). As noted in previous literature, responses tend to concentrate on focal point values, especially $Z = 0$. 
Private information about probability of job loss

FIGURE II: Predictive Content of Subjective Probability Elicitations: Binned Scatterplot of $U$ versus $Z$, conditional on $X$

Notes: This figure reports mean unemployment rate in each elicitation category controlling for demographics, job characteristics, and year controls. To construct this figure, I run the regression in Equation (1). The figure plots the coefficients on bins of the elicitations. I omit the lowest bin (corresponding to $Z = 0$) and add back the mean job loss of 1.9% to all coefficients. The 5 / 95% confidence intervals are constructed using the standard errors of the regression coefficients, clustering by household.
Notes: The figure presents coefficients from a regression of an indicator for a spouse entering the labor force, defined as an indicator for not working in the previous wave and working in the current wave, on category indicators for the subjective probability elicitation, $Z$, controlling for demographics, job characteristics, and year controls. Figure reports 5/95% confidence intervals for each category indicator which are computed by clustering standard errors by household.
Private information predicts behavior (con’t)

- If report higher subjective probability of job loss, spouse is more likely to enter workforce

- Concern I: maybe this is just the added worker effect
  - People who have higher subjective probability of job loss more likely to lose job, and job loss induces spousal labor market entry
  - But finds result holds even if restrict to those who (ex post) didn’t lose their job

- Concern II: Could this be selection / OVB?
  - The types of people who are more likely to lose their job are also more likely to have spouses moving in/out of labor force
  - But finds that beliefs two years ago don’t predict change in spousal current labor market activity, just current beliefs
In PSID can look at changes in consumption relative to time of job loss

Do not have subjective probabilities in PSID

Rather, using changes in behavior to reveal ex-ante information (anticipatory behavior)
Private information predicts behavior (con’t)

FIGURE IV: Impact of Unemployment on Consumption Growth

Notes: These figures present coefficients from separate regressions of leads and lags of the log change in food expenditure on an indicator of unemployment, along with controls for year indicators and a cubic in age. Data is from the PSID with one observation per household per year. Unemployment is defined as an indicator for the household head being unemployed. Following Gruber (1997) and Chetty et al. (2005), food expenditure is the sum of food in the home, food outside the home, and food stamps. The horizontal axis presents the years of the lead/lag for the consumption expenditure growth measurement (i.e. 0 corresponds to consumption growth in the year of the unemployment measurement relative to the year prior to the unemployment measurement). The sample is restricted to household heads who are employed in \( t - 1 \) or \( t - 2 \).
Changes in consumption observed prior to event suggests event anticipated

- Pre-trends as friend instead of foe!
- Concern: perhaps declines in consumption prior to unemployment reflect declining income
  - But results robust to controlling for cubic in changes in income

Summary: beliefs (conditional on what could be priced) predict unemployment and behavior (spousal labor supply, consumption) prior to unemployment

- Suggests private information exists and would create adverse selection in a private UI market
- Hendren then asks: Is private market "large enough" to explain lack of existence of private UI market? Will come back to later in this unit...
For more detail see Gruber text book
Federally mandated, administered by states

<table>
<thead>
<tr>
<th>State</th>
<th>Base Period Earnings Required</th>
<th>Replacement Rate</th>
<th>Minimum Weekly Benefit</th>
<th>Maximum Weekly Benefit</th>
<th>Quarters of Work Required for 26 Weeks of Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>California</td>
<td>$1,125</td>
<td>39-57%</td>
<td>$40</td>
<td>$230</td>
<td>1.56-2.28</td>
</tr>
<tr>
<td>Florida</td>
<td>3,400</td>
<td>50</td>
<td>32</td>
<td>275</td>
<td>4</td>
</tr>
<tr>
<td>Illinois</td>
<td>1,600</td>
<td>49.5 (2)</td>
<td>51</td>
<td>296-392</td>
<td>1.38</td>
</tr>
<tr>
<td>Massachusetts</td>
<td>2,400</td>
<td>50-61.9 (2)</td>
<td>24-36</td>
<td>431-646</td>
<td>2.77-3.44</td>
</tr>
<tr>
<td>Michigan</td>
<td>3,090</td>
<td>67 (2)</td>
<td>88</td>
<td>300</td>
<td>2.67</td>
</tr>
<tr>
<td>Missouri</td>
<td>1,200</td>
<td>50</td>
<td>30</td>
<td>190</td>
<td>3</td>
</tr>
<tr>
<td>Missouri</td>
<td>1,500</td>
<td>52</td>
<td>40</td>
<td>220</td>
<td>3.12</td>
</tr>
<tr>
<td>Nebraska</td>
<td>1,600</td>
<td>52-65</td>
<td>36</td>
<td>214</td>
<td>3-3.9</td>
</tr>
<tr>
<td>New Jersey</td>
<td>2,060</td>
<td>60 (2)</td>
<td>61</td>
<td>429</td>
<td>2.67</td>
</tr>
<tr>
<td>New York</td>
<td>2,400</td>
<td>50</td>
<td>40</td>
<td>365</td>
<td>1.5</td>
</tr>
<tr>
<td>Texas</td>
<td>1,776</td>
<td>52</td>
<td>48</td>
<td>294</td>
<td>3.85</td>
</tr>
<tr>
<td>Median State</td>
<td>1,576</td>
<td>52</td>
<td>39</td>
<td>292</td>
<td>3.12</td>
</tr>
</tbody>
</table>


Notes: (1) Where a range is given, a benefit schedule is used in which the replacement rate is higher for lower paid workers. (2) Illinois, Massachusetts, and New Jersey have dependent allowances. (3) Of average after tax weekly wage.
Eligibility and takeup

Eligibility requirements

- Monetary: minimum earnings and employment in year prior to spell
- Non monetary
  - Can’t quit or be fired for cause
  - Have to be looking for work

Take up

- Enrollment not automatic (why? Will discuss when discuss screening in next topic)
  - Have to go to office and sign up
  - Have to show looking for work

- Approx 44% of ue workers receive UI
Benefits

- Depend on work experience and prior earnings
- Replacement rate (RR): net benefits / net wage
  - A form of coinsurance
  - “Optimal benefits” discussion is about optimal RR
- Minimum and maximum benefits → redistributive element of benefit formula (see next slide)
  - Average RR ~50%
  - About 35% of claimants get max benefit (so lower RR)
- Time limits to benefits:
  - typically 26 weeks
  - Emergency benefit extensions (up to 13 addl weeks) for states w local unemployment rate above threshold
  - Congress can also vote further extensions… recessions… e.g. out to 99 weeks in “great recession”)

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PF Slides
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Unemployment Benefit Schedule for Michigan

In the state of Michigan, no unemployment benefits are paid to those earning less than $152 per week in the highest quarter of the past year. Once the $152 level has been reached, unemployment benefits rise with the weekly wage in the highest quarter of the past year, with a maximum benefit of $362.
Financing

- Financed by payroll tax on firms
- Partially experience rated: more claims by prior workers $\rightarrow$ higher tax rate to firm but less than 1 for 1. Firms does not pay full mc of laying off worker in terms of higher UI claims.
  - Max tax rates $\rightarrow$ subsidies to industries with large seasonal variation in employment (e.g. construction)
- Why experience rate?
  - Experience rating reduces moral hazard. (w full experience rating firm pays full mc of laying off worker $\rightarrow$ reducing firm worker collusion)
  - However full experience rating also reduces insurance to firm (and implicitly to worker if incidence is on work)
  - Optimal level of experience rating involves tradeoff between incentives and insurance.
    - Not a lot of recent empirical work...
Experience-Rating Schedule for Vermont • In Vermont, as in most states, the unemployment insurance tax rate paid by employers rises as past layoffs rise, as measured by the benefit ratio, which is the ratio of unemployment insurance benefits paid to the firm’s workers relative to the firm’s payroll. This rise is not on the one-for-one basis, however, that would follow the perfect experience rating line. As a result, high-layoff (high-benefit ratio) employers are relatively subsidized by the system.
General comment

- Note that there are many policy instruments
  - Monetary eligibility
  - Non monetary eligibility requirements
  - What you have to do to take up
  - Benefits
  - Benefit path / Duration
  - Financing / level of experience rating

- Most of empirical work has focused on benefit level
  - Some theory on time path of benefits as well...
1. Background on UI [Done]
   - Institutional
   - Adverse selection

2. Theory [Up next]
   - Optimal benefit level: Baily / Chetty

3. Taking the Baily / Chetty formula to the data:

4. An alternative approach to estimating optimal UI benefits: Liquidity vs. Moral hazard
2. Baily-Chetty optimal SI benefit level: Overview

- First best problem: set benefit rates to maximize utility subject to government break even constraint (benefits financed by tax)
  - Set benefits to equate MU of consumption across states (employed vs not)

- Constrained efficient problem:
  - Consumers choose search effort based on ue benefits (moral hazard)
  - Social planner chooses ue benefits to max utility subject to
    - Government breaks even (benefits financed by tax)
    - Consumers choose search given benefits
  - Generates first order condition for optimal level of benefits
Simplified model

- Simplified, static model (see Chetty (2006) for richer model(s))
- Key point: moral hazard
- The model
  - utility from consumption: additively separable and risk averse: \( u(c) \)
  - immediately: probability \( p \) of becoming unemployed
  - regains employment with probability \( q \) at cost \( h(q) \)
- simplify: assumed taxes paid only by employed, not by reemployed
- government budget constraint requires:

\[
p(1 - q)b = (1 - p)\tau
\]
Suppose can control $q$ (e.g. monitor perfectly).

Set benefits and taxes to maximize utility subject to the government break even constraint (benefits financed by tax)

Solve:

$$\max_{q,b,t} \{(1 - p)u(w - \tau) + p[(1 - q)u(b) + qu(w) - h(q)]\}$$

subject to

$$p(1 - q)b \leq (1 - p)\tau$$

First order conditions:

$$\{\tau\}: (1 - p)u'(w - \tau) = \lambda(1 - p)$$
$$\{b\}: p(1 - q)u'(b) = \lambda p(1 - q)$$
$$\{q\}: h'(q) = u(w) - u(b) + \lambda(b)$$
Interpretation

• FOC for $q$ internalizes fiscal cost of benefit $b$. i.e. equates marginal cost of $q$ with marginal benefit which is the private benefit (difference in utility between re-employment and unemployment) and the public benefit (the fiscal cost of the benefit).

• We get full insurance (perfect consumption smoothing). MU equated across states:

\[ u'(w - \tau) = u'(b) \]  \hspace{1cm} (1)

\[ \rightarrow w - \tau = b \]

(note: here we can't do anything about the fact that consumption is not equalized with the reemployment state, due to our simplifying assumption)
Worker private optimization problem

- Key: social planner can’t choose \( q, b, t \). Can set parameters of social insurance \((b, t)\) but then worker privately optimizes / chooses \( q \)
- Worker optimization:

\[
V(b, \tau) = \max_q \left\{ (1 - p)u(w - \tau) + p(1 - q)u(b) + pqu(w) - ph(q) \right\}
\]

- optimum yields \( q^*(b) \) with first order condition

\[
h'(q) = u(w) - u(b)
\]

- Interpretation
  - Worker equates marginal cost of \( q \) with \( \text{private} \) marginal benefit (difference in utility between re-employment and unemployment).
  - Unlike in the social optimum, he does not take account of the public benefit (fiscal cost of the benefit)
  - Note: if reemployed paid taxes we would have \( q^*(b, \tau) \) [this is what we are buying in simplicity]
Second best (constrained efficient problem)

- Consumer chooses $q$ (effort) given ui benefits (moral hazard)
- Social planner chooses ue benefits to maximize utility subject to (1) government break even (benefits financed by tax) and (2) consumers choose re-employment probability given benefits
- Optimum solves

$$\max_{b,\tau} V(b, \tau)$$
subject to budget constraint:
$$0 \leq (1 - p)\tau - p(1 - q^*(b))b$$

- Define $\tau_B(b)$ from budget then want to maximize

$$V(b, \tau_B(b))$$

First order condition: $V_b(b, \tau_B(b)) + V_\tau(b, \tau_B(b)) \frac{\partial \tau_B}{\partial b} = 0$
Second best (constrained efficient problem)

- from budget constraint (differentiating wrt $b$):

\[
(1 - p) \frac{\partial \tau_B}{\partial b}(b) - p(1 - q^*(b)) + pb \frac{\partial q^*}{\partial b}(b) = 0
\]

- so that

\[
\frac{\partial \tau_B}{\partial b}(b) = \frac{p(1-q^*(b))}{1-p} + \frac{p(1-q)}{1-p} \frac{b}{1-q} \frac{-\partial q^*}{\partial b}(b)
\]

- note: elasticity of $q$ wrt $b$ comes from bc (see above). keep in mind...
Second best (constrained efficient problem)

- Use of envelope condition (bc worker is optimizing)

\[
\max_b V(b, \tau) = \\
\max_b \{(1 - p)u(w - \tau) + p(1 - q)u(b) + pqu(w) - ph(q)\}
\]

\[
V_b = p(1 - q^*(b))u'(b) + p\frac{\partial q^*}{\partial b}[-u(b) + u(w) - h'(q)]
\]

- Recall worker optimization problem (wrt q) gave worker foc

\[
h'(q) = u(w) - u(b)
\]

- Therefore we get:

\[
V_b(b, \tau) = p(1 - q^*(b))u'(b)
\]

- Key point: because at the margin worker indifferent between cost and benefit of additional unit of search effort, impact of benefit on search effort drops out (envelope theorem)
Envelope conditions:

\[ V_b(b, \tau) = p(1 - q^*(b))u'(b) \]
\[ V_\tau(b, t) = -(1 - p)u'(w - \tau) \]

Recall first order condition:

\[ V_b(b, \tau_B(b)) + V_\tau(b, \tau_B(b)) \frac{\partial \tau_B}{\partial b} = 0 \]

Substituting envelope conditions into first order condition we get Baily Chetty basic formula:

\[ \frac{u'(b) - u'(w - \tau)}{u'(w - \tau)} = -\frac{b}{1 - q} \frac{\partial q^*}{\partial b}(b) \equiv \varepsilon_{1-q,b} \quad (2) \]
Interpretation

\[ \frac{u'(b) - u'(w - \tau)}{u'(w - \tau)} = \varepsilon_{1-q,b} \] (3)

- LHS: difference in marginal utilities across state (i.e. MU(c) when unemployed minus MU(c) when employed) = wedge in full consumption smoothing
  - quantifies social gain from transferring additional $ to the ue state. (Gain comes from smoothing consumption)
- RHS: social cost of transferring a $ to the ue state due to behavioral response – due to moral hazard (elasticity of ue (i.e. no re-employment) wrt benefit level)
  - Note moral hazard elasticity comes in bc of the government budget constraint: have to finance increase in benefits with taxation
  - This is a social cost not taken into account in the worker’s optimization (choice of q) which introduces the wedge from the first best (i.e. full consumption smoothing)
  - If had zero elasticity, could equate mu (full insurance)
Use of envelope theorem: impact of benefits on “effort” \( (q) \) only enters formula through government balanced budget constraint because agent already optimizing. So other effects (e.g. on match quality /wages) similarly drop out by envelope argument.

- Don’t need to measure all effects - on margin worker is optimizing so can just measure summary effect on behavior through impact on government expenditures
- See Hendren (2016) on "policy elasticity" - analogous to Feldstein (1999) on elasticity of taxable income

\[
\frac{u'(b) - u'(w - \tau)}{u'(w - \tau)} = \varepsilon_{1-q,b} \tag{4}
\]
Optimal benefits equation social gain from transferring another dollar to the ue state (depends on difference in mu between unemployed and employed state) with social cost of this transfer (comes from behavioral response which affects government budget constraint since has to finance the increase in ue (and ue benefits) with taxes

\[ \frac{u'(b) - u'(w - \tau)}{u'(w - \tau)} = \varepsilon_{1-q,b} \]
Local result

- Recall derivation: Baily formula is the FOC to a constrained optimization problem
- At optimum, Baily formula should be satisfied ($SMB = SMC$)
- Because of concavity, inequality can tell you if current benefits too higher or too low (local result)
- Does not tell you (globally) optimal level of benefits
  - Would need to know how to extrapolate from local condition
  - Full structural model?
Chetty (2006) shows that Baily is robust to several extensions:

- E.g. improved match quality (wage gains) from more search
- Leisure benefits of unemployment
- Borrowing constraints

(Common) Intuition: the behavioral elasticities that enter the formula are all functions of other aspects of the agent’s behavior and preferences

- Extra benefits from search (improved match quality) already internalized by agent – exploiting envelope condn
- Borrowing constraints generate larger drop in consumption hence raise optimal benefit level
- If ue has large leisure benefits, agents elect longer duration and have larger consumption drop → higher optimal benefit rate
Why uncompensated elasticity?

- Why does the uncompensated (Marshallian) elasticity of duration wrt benefits enter the formula?

  - Central insight from optimal taxation literature: efficiency consequences of taxation (and hence optimal tax rates) depend on substitution (compensation) elasticities
    - Income effects are not distortionary
  - Social insurance is a particular type of redistributive tax; why does optimal level depend on uncompensated elasticity?

- Note: Moral hazard enters Baily formula bc of government budget constraint
  - Moral hazard increases the break-even taxes
An odd social insurance formula

- Formula derived assuming absence of private insurance
  - Not robust to having a private insurance market (which responds endogenously to change in social insurance program)
  - Intuition: recall use of envelope condition in deriving formula
    - Assumptions choices within the private sector are constrained Pareto efficient (i.e. total surplus is maximized in the private sector s.t. to the constraints)
    - Existence of adverse selection (and mh) → private insurance market may not be constrained efficient → envelope thm violated (externalities from own behavior on private insurance market / others)
    - Chetty and Saez (2010) try to extend Baily Chetty to cases w private market failures
  - Strange tension given motivation for social insurance!

- Paper has been (mis)interpreted as being about optimal social insurance
  - Really about optimal insurance
  - Except that it mandates participation (no selection margin)
Hendren (2016, 2017) MVPF

Brief introduction here; will cover in more detail later.

Question: What is marginal welfare impact of government policy change (e.g. increase UI benefits)

Motivation behind approach: increasingly we estimate the causal effects of policy changes, which answers positive question: what policy changes do to behavior

Hurdle for normative evaluation of policy changes:

- Goolsbee (1999): "Theory largely relates to compensated elasticities, whereas the natural experiments provide information typically on the uncompensated effects".

Hendren: How can we use causal effects of policy directly for welfare analysis of changes to government policy?
MVPF:

- Ratio of marginal benefit to marginal cost of policy
  - I.e. ratio of beneficiaries' willingness to pay for the increase in expenditure out of their own income to cost to the government of the policy per beneficiary

Consider a $1 increase in UI benefits.

What is the marginal benefit?

- Inframarginal recipients value this as $1
- Marginal recipients (e.g. who enter unemployment because of it) is to first order indifferent by envelope theorem

What is the marginal cost?

- Mechanical cost in absence of any behavioral response: $1 to each inframarginal recipient
- Fiscal externality: impact of any behavioral response to the policy on the government budget outlays
  - Marginal recipients reduce labor supply and hence income tax receipts; all recipients may e.g. have lower publicly financed healthcare expenditures etc.
MVPF

- MVPF
  - benefit/cost ratio: marginal social welfare impact of policy per unit of government revenue expended
  
- For policies which affect taxes, transfers, or provide market goods

\[
MVPF = \frac{1}{1 + FE}
\]

"fiscal externality" \((FE)\): impact of the behavioral response to the policy on the government budget per dollar of government expenditures
Behavioral responses to marginal policy changes don’t affect utility directly (envelope theorem)

But if prices don’t reflect resource cost (due to e.g. taxes on earnings) behavioral response imposes a resource cost on society not internalized by individual through government budget

- Similar logic to Feldstein (1999) on sufficiency of response of taxable income to taxation
- Crucially, estimating fiscal externality does not require decomposition of behavioral response to policy into income and substitution effects
MVPF "vs." Baily Chetty

1. MVFP can (loosely) be thought of as the ratio of the LHS / RHS of Baily
   - Non-trivial framing difference: do we care about whether MB > MC or how MB/MC compares to other programs
   - May be happy w MB/MC < 1 if value transfers to poor (e.g. EITC, Medicaid)

2. Baily-Chetty measures "costs" as impact of ui benefits on ue duration
   - "Policy elasticity" approach incorporates budgetary impacts on additional margins (e.g. if UI changes wages, this affects government budget via income tax revenue)

3. Another difference
   - Baily-Chetty asks: What is optimal level of benefits
     - Requires benefits to be defined around the optimum
   - Hendren asks: estimating the WTP for a small local change around the status quo level of benefits
1. Background on UI [Done]

2. Theory [Done]
   - Optimal benefit level: Baily / Chetty
   - MVPF: Hendren 2016

3. Taking the Baily / Chetty formula to the data: [Up next]
   - Impact of UI benefits on ue (brief comments on extensive literature)
   - Impact of UI bens on cons smoothing (Gruber 1997)

4. An alternative approach to estimating optimal UI benefits: Liquidity vs. Moral hazard
3. Taking Baily Chetty to data

- Formula offers a potential road map for empirical work: to tell you if locally should raise or lower benefits:

\[
\frac{u'(b) - u'(w - \tau)}{u'(w - \tau)} = \varepsilon_{ue,b}
\]

- RHS: Elasticity of duration of ue wrt benefits (in principle, straightforward). Will discuss first…
- LHS: Gap in MU across states (harder)
- How to recover gap in MU’s from choice data?
  - Consumption based approach (Gruber 1997)
  - Liquidity and substitution effects (Chetty 2008)
  - Reservation Wages (Shimer and Werning 2007)
The RHS: Brief review of mh literature

- Elasticity of unemployment duration wrt the benefit rate
- Early literature used cross-sectional variation in replacement rate across individuals
  - Problem: comparisons of high and low wage earners confounded by other factors
- More modern literature:
  - Spikes in hazard rate of ue exit with benefit exhaustion
  - Exogenous variation in replacement rate from policy changes (state × year; DD; “natural experiments”)
Spike in exit when benefits are exhausted

Time Until Benefits Lapse Empirical Hazard

Source: Meyer 1990
Spike in exit when benefits are exhausted

- One of the most striking pieces of evidence for distortionary effects of UI is the spike in the hazard rate of exiting unemployment when benefits end.

- **Caveat (Card, Chetty Weber AEA P&P 2007)**
  - Austrian data suggest spike is smaller when “hazard” is re-employment as opposed to “exit from (registered) unemployment”
  - Classification change (“unemployed” vs “out of labor force”) larger than “real” change (are you employed?).
  - Distortionary cost of program depends on real behavior.
Aside: think hard about what you are measuring

- Card et al. - distinction between "exit from registered unemployment" and "re-employment"
- Recall RAND HIE: only measure spending if file a claim (and insurance coverage may affect incentives to file)
- Many other examples:
  - e.g. measuring health in claims data
  - Wald in WWII: where to armor the plane?
Figure 2.3
UI or WC Benefit Schedule in a Common Natural Experiment Study Approach

Weekly Benefit Amount

$WBA_{\text{max}}^A$

$WBA_{\text{max}}^B$

$WBA_{\text{min}}$

$E_1$, $E_2$, $E_3$

Low Earnings Group, Previous Earnings, High Earnings Group

After Benefit Increase

Before Benefit Increase
Estimating impact of benefit rate on UE duration

- “Natural experiments”: Legal variation across states and across time in benefit rates
- Change in benefit within a state that affects some groups, not others
  - “unaffected” groups can serve as control.
- Change in benefits in some states but not others
  - States that change at different times serve as controls for each other
Aside: DD estimation

- “Cookbook” approach (recipe)
  - Strengths: Transparency and easy of evaluation (checklist)
  - Weaknesses: “Boring” – then make it a point of departure!
    - Cookbook is the minimum set of things you need to do / check

- Make sure you understand the identifying (parallel trends) assumption
  - And relatedly make sure you always start with “the graph” (fullying dummying out pre and post period) vs the regression (which is just a way to summarize the graph)
“Findings” of mh literature

- Elasticity of unemployment duration wrt the benefit rate
- Elasticity of “lost work” (including incidence of ue and duration of ue) wrt ui benefits is ~1
  - See Kruger Meyer (2002) for review
  - More recent literature using Great Recession expansions in UI
  - Many dimensions of labor supply potentially affected
    - Effort on current job, probability of layoff, probability of filing a claim, time out of work conditional on being ue, willingness to accept a new job etc etc.
    - Do we need to know which ones?
Intellectual history: huge moral hazard lit pointing out distortions caused by UI

What question is not being asked: the benefits side!

Gruber (1997)

- Estimates consumption smoothing benefits of UI
- Combines these estimates with existing moral hazard estimates and plausible risk aversion values to implement Baily formula

Two main parts to paper:

- Estimates consumption smoothing benefits of UI
  - How does drop in consumption with unemployment change as increase UI replacement rate?
- Combines cons-smoothing estimates with existing moral hazard estimates and “plausible” risk aversion values to implement an approximation to the Baily formula
Using consumption for LHS of Baily

\[
\frac{u'(b) - u'(w - \tau)}{u'(w - \tau)} = \epsilon_{ue,b} 
\]

(7)

- Quadratic approximation to utility (when \( u'''(c) \approx 0 \)): i.e. First order Taylor expansion \( u'(c_e) \) around \( u'(c_u) \):
- Optimal benefit rate \( b \) is implicitly defined by

\[
\frac{\gamma \Delta c}{c} \approx \epsilon_{ue,b} 
\]

where \( \Delta c = c_e - c_u \) and \( \gamma = \frac{u''(w - \tau)}{u'(w - \tau)}(w - \tau) \) i.e. coeff of rel risk aversion

- Key: in principle we can estimate these three components empirically (or at least most of them...):
  - Elasticity of ue wrt benefits
  - Drop in consumption when become ue (as function of benefits)
  - Risk aversion
Some comments on this approximation

\[ \frac{\gamma \Delta c}{c} \sim \varepsilon_{ue,b} \]

- Quadratic approximation assumes no precautionary savings motive
  - Chetty 2006 shows this can lead to quite a bit of bias (formula only holds exactly for quadratic utility); can extend formula to include coefficient of relative prudence to improve approximation
- Assumes no state dependent utility (equating MU of consumption means equating consumption)
  - Finkelstein, Luttmer and Notowidigdo (2013) show this can have big effects on optimal benefit level (why?)
- Real issue: where are you going to get \( \gamma \)!!
Estimating consumption smoothing benefits

- PSID (1968 – 1987)
  - Sample of households where head was employed last year and is now unemployed (panel = key because dependent variable is change in consumption)
  - Key dependent variable: Food consumption

\[ \Delta C_i = \alpha + \beta_1 X_i + \beta_2 UI_i + \varepsilon_i \]

- \( \Delta C_t \): change in log consumption when become unemployed (log cons \( \text{ue} \) – log cons \( \text{emp} \))
- \( UI \) = replacement rate (between) for which individual \( i \) is eligible
  - depends on state, year, and past earnings history
  - Consumption smoothing: \( \beta_2 > 0 \) (rise in benefits reduces fall in consumption when become unemployed)

- \( X \) are vector of individual characteristics which may affect consumption changes (including year and sometimes state fixed effect)
  - Same DD methodology as papers estimating impact of replacement rate on unemployment duration (variation within state over time)
  - Now LHS variable is drop in food consumption

- Question: did he forget the individual fixed effect?!
Discussion

- Why use ue rate for which you are eligible vs rate received? (ITT)
  - Endogeneity of takeup
  - Measurement error in receipt (use as instrument)
  - Eligibility = parameter government can influence more easily

- What if want to know how receipt of a $ of UI affects consumption changes (ToT)
  - Wald estimator: ToT = ITT/Takeup
  - But is the IV interpretation valid? Not clear.
    - Exclusion restriction: UI does not affect consumption unless receive it.
    - Option value from UI even for those who don’t take up...?
How to identify consumption smoothing effect of UI?

\[ \Delta C_i = \alpha + \beta_1 X_i + \beta_2 UI_i + \varepsilon_i \]

- UI = replacement rate (b/w) for which individual i is eligible
  - depends on state, year, and past earnings history

Where is variation in replacement rate coming from?

- Presumably people with different earnings would have diff change in consumption when become ue absent UI

Potential solutions. Measure UI w:

- Max possible benefit rate (low first stage / low powered)
- Average RR for people in your state
- Variation comes from rules and also state demographics
- Simulated RR
- Instrument for UI RR you are eligible for with “simulated” replacement rate
Simulated instrument (eligibility)

Calculating simulated replacement rate:

- Take a national sample of unemployed individuals and assign the whole sample to each state in that year
- Using that state’s rules that year calculate average replacement rate for whole national sample
- Variation in RR coming only from legislative variation
  - Simulated state-year replacement rate is a function of legislated benefits for that state year, applied to a nationally uniform population independent of the actual characteristics of individuals in that state-year

- Instrument for replacement rate with simulated replacement rate

Technique has many uses / applications

- Idea of purging sample endogeneity / limiting to program variation through use common sample
- Parsimonious way to summarize multi-dimensional programs (e.g. Medicaid eligibility)
Flavor of results

- $\Delta C_i = \alpha + \beta_1 X_i + \beta_2 UI_i + \varepsilon_i$
- $\beta_2 \sim 0.27$
  - Interpretation: a 10 pctg pt rise in rr associated with 2.7% reduction in the fall in consumption when unemployed
  - Evidence of consumption smoothing
- $\alpha \sim 0.22$
  - Interpretation: without UI, people would experience a 22% drop in consumption when become ue
    - = 3 times larger than the average 7% drop in consumption among those who become ue (and get UI)
  - NB: pretty far out of sample (avg RR= 50%; 90% have RR btwn 20 and 80%)
- Evidence that there are consumption smoothing benefits of UI
  - Private insurance markets not perfect (on margin)
Consumption smoothing benefits of UI

- Consumption smoothing not 1 – for – 1
  - Each $ of UI translates into < 1 $ of increased consumption

- What is substituting for / getting crowded out by increases in UI?
  - Crowd out includes:
    - Spousal labor supply (Cullen and Gruber 2000)
    - Savings (Engen and Gruber 1995)

- Why do we care what is crowded out? Where did that appear in Baily formula?
Implications for optimal UI level

\[ \gamma \frac{\Delta c}{c_e} (b) - \varepsilon_{ue,b} = 0 \]

- Assumed (in estimating equation) effect of UI replacement rate \( b \) is linear:

\[ \frac{\Delta c}{c_e} = \alpha + \beta b \]

(here \( b = \) replacement rate)

- To evaluate:
  - Gruber estimates \( \alpha \) (~0.22) and \( \beta \) (~0.27)
  - \( \varepsilon \): he takes from Meyer (1990)
  - \( \gamma \) – takes “range of plausible values” of 1 – 4 (or more. . . !)
Calibrating the model

- Results: optimal replacement rate \((b^*)\) varies considerably with \(\gamma\)

<table>
<thead>
<tr>
<th>(\gamma)</th>
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<tr>
<td>(b^*)</td>
<td>0</td>
<td>0.02</td>
<td>0.29</td>
<td>0.43</td>
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</table>

- Gruber (1997): Optimal replacement rate \((b^*)\) as function of risk aversion (given other estimated parameters)
- Gruber: introspection + existing evidence suggests \(\gamma < 2\)
- NB: Currently average replacement rates \(~0.5\)
Question #1: Is current level of benefits ($b \approx 0.5$) too high or too low? i.e.

$$\gamma(\alpha + \beta b) >? < \epsilon_{ue,b}$$

- Finds that for risk aversion $< 2$ optimal benefit level is lower than current level (i.e. LHS $< $ RHS)
- However, at risk aversion of $\sim 4$, current benefit level $\sim$ optimal (two sides $\sim$ equal)
Implications for optimal UI level (con’t)

- Question #2 What is optimal level of benefits? i.e. find $b^*$ st 
  $$\gamma(\alpha + \beta b^*) = \varepsilon_{ue,b}$$

- Assumes
  - consumption smoothing linear in benefits
  - elasticity constant as vary benefits

- Calculates $b^*$ for different levels of risk aversion. Finds
  - close to zero for risk aversion < 2
  - about 0.5 for risk aversion of 4
Question #1: Is current level of benefits \((b \sim 0.5)\) too high or too low?.

Question #2 What is optimal level of benefits \((b^*)\)

Comment: Recall Baily formula is a local result.

- Gives you FOC for optimum so can see if currently above / below.
- Want to be careful extrapolating (with ad hoc statistical assumptions) to global optimum.

For the local question, did not need variation in UI replacement rate (to see how consumption drop changes in benefits).

- Just need drop in consumption associated with UE at observed benefit levels
Does Gruber (1997) under-estimate consumption declines due to UE?

- Recall Hendren (AER forthcoming) shows drops in consumption prior to unemployment
  - Suggests looking only at "on impact" effect of UE on consumption change underestimates causal impact of unemployment
- Hendren tries two approaches to estimate WTP for supplemental private UI
  - Inflates estimates of impact of unemployment on consumption change (a la Gruber 1997) to account for pre-unemployment drops
    - Implies a bigger drop in consumption due to unemployment
  - Uses drops in consumption or increases in spousal labor supply (in response to learning one might lose job) while currently employed to reveal WTP for supplemental UI
    - Advantage of this approach vs "changes in consumption due to unemployment approach": don't have to assume utility is state independent (a la Baily / Gruber)
Hendren (AER forthcoming) conclusions

- WTP for supplemental UI / underinsurance against job loss higher than what previous estimates like Gruber (1997) concluded
  - i.e. bigger gap in marginal utilities of consumption between unemployed and employed states (LHS of Baily formula larger)

- Could private supplemental UI exist?
  - Estimates amount of private information based on subjective probabilities
  - Computes pooled price ratio (a la Hendren 2013 EMA) - average costs of all those who are worse risks
  - Assumes a coefficient of risk aversion and concludes markups due to adverse selection (i.e. pooled price ratio in excess of own risk) exceed willingness to pay

- Concludes that privately-traded supplemental UI market would unravel due to adverse selection
  - More challenging question: what if public UI didn’t exist?
Comments on Gruber (1997) con’t: Risk aversion

- Note sensitivity of results to what is assumed about risk aversion ($\gamma$)
- Hard to estimate this parameter
  - See e.g. Cohen and Einav (1997) for one approach and discussion of some others (race track bettors; jeopardy players; labor supply...)
  - There is a great deal of uncertainty about this parameter ("plausible" values range from 1 (in macro) to 50+ (equity premium puzzle))
- Moreover risk preferences may vary across contexts
  - Size of risk (Rabin 2000; Chetty and Szeidl (2007) on consumption commitments – may be locally much more risk averse than globally where can undue your cons commitments)
  - Context-specific risk preferences? (e.g. Barseghyan et al. 2011, Einav et al. 2012)
  - [Aside: Gruber measures food consumption not total consumption. Need the "right" curvature... i.e. curvature of utility wrt food cons.]
- How useful is an "empirical formula" when very hard to pin down one of the parameters?
Lack of knowledge about risk aversion even more concerning given that consumption smoothing likely endogenous to level of risk aversion.

Chetty and Looney (JPubEc 2006):

- US and Indonesia have similar smoothness of consumption following an UE shock.
  - Very little social insurance in Indonesia.

Does Baily formula imply if UI is at optimal level in US, don’t need social insurance in Indonesia (same consumption smoothing without social insurance).
US and Indonesia have similar smoothness of consumption following an UE shock

- Very little social insurance in Indonesia
- More and less efficient forms of consumption smoothing
- In US smooth through spousal labor supply and savings; in Indonesia, by e.g. pulling kids out of school and setting them to work
- If you are very poor / very near subsistence level, you become effectively very risk averse
  - will do anything to maintain a minimum consumption including highly inefficient smoothing
- So can’t just “import” a common risk av. param in diff contexts

Relatedly: “cost” of crowd out of self insurance varies

- How inefficient is the crowded out consumption smoothing mechanism?
- So evidence of what is crowded out may be relevant (if unsure about risk aversion...)
Gruber (1997) – concluding remarks

- Attractions
  - Great question: Optimal level of unemployment benefits
    - A new point – prior literature just focused on documenting distortions
  - Goes beyond demonstrating that “consumption smoothing benefits exist” to try to make welfare statements

- Limitations
  - This is an "early" paper
    - What might we like to see differently now when using this type of identification strategy?
  - Really only a local result (are current benefits too high / too low)
  - Concerns about heterogeneous treatment effects
    - Do consumption smoothing and unemployment duration estimates come from the same population / same source of variation?
    - Ideally estimate all the parameters you need internally to your paper
  - How useful is this formula given huge uncertainty about risk aversion? (and endogeneity of consumption smoothing to it... )
Outline

1. Background on UI [Done]
2. Theory [Done]
3. Taking the Bailey / Chetty formula to the data [Done]
   - Impact of UI benefits on ue (brief comments on extensive literature)
   - Impact of UI bens on cons smoothing (Gruber 1997)
4. An alternative approach to estimating optimal UI benefits: Liquidity vs. Moral hazard [Up next]
   - Chetty 2008 JPE
   - Policy application: UI accounts
4. Liquidity vs. moral hazard

- Chetty (2008): An alternative approach to calculating optimal UI benefits / implementing Baily formula
- Policy application: UI accounts
An alternative approach to calculating optimal UI benefits / implementing Baily formula

Major motivation: get away from needing to make assumption about risk aversion

An alternative way to measure the benefits side of Baily formula
Overview of paper

- Develops an alternative formula to Baily formula for optimal benefit level that depends on ratio of liquidity effect to moral hazard effect
- Estimates liquidity effect and moral hazard effect of unemployment benefits
  - Estimates that ~60% of impact of UI benefits on durations is due to liquidity effect
- Plugging estimates into new formula finds that an increase in ue benefits from current rate (~50% rr) would produce small (positive) welfare gain
  - Vs Gruber results? (varied with risk aversion choice)
Individuals experience an event (job separation / ue) with probability $p$, chosen with separable effort $\Psi(p)$

- two states: employed state (e) and unemployed(ue)
- probability of event $p$ is decreasing in effort, with disutility of effort $\Psi$

Utility is given by:

$$pu(c_{ue}) + (1 - p)u(c_e) - \Psi(p)$$

So can think of individuals choosing effort or choosing $p$
Utility is given by:

\[ pu(c_{ue}) + (1 - p)u(c_e) - \Psi(p) \]

Note that \( p \) multiplies the level of utility in each state of the world.

As a result, FOC for \( p \) relates the level of utilities in each state of the world to the marginal cost of effort:

\[ u(c_{ue}) - u(c_e) = \Psi'(p) \]
Derivation (con’t)

- FOC: \( u(c_{ue}) - u(c_e) = \Psi'(p) \)
- Consider a comparative static in which assets (A) are increased. This is assumed to increase \( c_e \) and \( c_{ue} \) by an equal amount:

\[
u'(c_{ue}) - u'(c_e) = \Psi''(p) \frac{dp}{dA}
\]

(\( \frac{dp}{dA} \) is change in chosen \( p \) in response to exogenous change in assets)
- Consider comparative static in which benefits (b) are increased (\( c_{ue} \) increases) but the individual does not change \( c_e \):

\[
u'(c_{ue}) = \Psi''(p) \frac{dp}{db}
\]

- Combining:

\[
\frac{u'(c_{ue})}{u'(c_e)} = \frac{\frac{dp}{db}}{\frac{dp}{db} - \frac{dp}{dA}}
\]

\[
\frac{u'(c_e) - u'(c_{ue})}{u'(c_e)} = \frac{\frac{dp}{dA}}{\frac{dp}{db} - \frac{dp}{dA}}
\]
\[ \frac{u'(c_e) - u'(c_{ue})}{u'(c_e)} = \frac{dp}{dA} - \frac{dp}{db} \]

- LHS of Baily formula (difference in MU’s across states) can be rewritten as a ratio of liquidity effect \( \frac{dp}{dA} \) to "moral hazard" effect \( \frac{dp}{db} \)
- The bigger the role of the liquidity effect (relative to the total moral hazard effect) the larger the optimal benefits
What happened to risk aversion?

- Consumption drops (Gruber 97) representation of Baily requires risk aversion, liquidity effect (Chetty 2008) does not. Why?
- Ratio of liquidity to moral hazard elasticities related to risk aversion.
  - Highly related to Chetty 2006 AER (estimating risk aversion from labor supply responses... )
Why is formula intuitive (and also not)?

\[
\frac{u'(c_e) - u'(c_{ue})}{u'(c_e)} = \frac{dp}{dA} \frac{dp}{db} - \frac{dp}{dA}
\]

- **Intuitive: Value of liquidity**
  - Insurance is more valuable if it relaxes liquidity constraints
- **Not intuitive: why does one need to isolate the impact of liquidity per se on behavior to capture this?**
  - Value of insurance (WTP) is a function of first derivatives (MRS)
  - Behavioral response (elasticities) reflect second derivatives (how MUs change)
    - derivative of the FOC with respect to liquidity
    - How did we manage to write WTP (LHS of Baily) as a function of second derivatives (elasticities)?
  - In general welfare impact of insurance depends on first derivative of utility function (marginal utility of consumption) while how behavior changes with change in budget set depends on second derivative
How did we manage to write WTP / value (≡ LHS of Baily) as a function of second derivatives (elasticities)?

Key is that \( p \) does not enter utility function directly - it multiplies utility function:

\[
pu(c_{ue}) + (1 - p)u(c_e) - \Psi(p)
\]

So \( u(c, x) \) has been written \( xf(c) \)

- Quite restrictive
- Natural when \( p \) is a probability (this is the vNM utility structure)
- But what about when we think of \( p \) (as in empirical work) as duration of \( ue \) rather than its incidence
- e.g. if searching for a job requires gas money, then this structure is violated

In addition, key assumption that disutility of search effort \( \Psi(p) \) is additively separable from utility of consumption

- Without additive separability, you’d get more terms

Formula may not be robust?
Where do we go from here?

- Potentially fruitful research project: under what conditions can we write MUs as elasticities?
  - Often want to know value of goods but only see behavioral changes, not WTP. So would be great if behavioral changes (elasticities) could tell us about value

- Hendren conjecture: requires additively separable effort cost (no complementarities between consumption and effort) + binary state variable

- Some takeaways:
  - “sufficient” statistics are sufficient given the model
  - Portability across contexts: what might be a reasonable model in one context may not be in another
Goal of empirics

- Estimate:
  - (Marshallian) moral hazard effect of benefits on unemployment duration
  - Liquidity effect on unemployment duration

- From these two, can back out moral hazard (substitution) effect
  - Marshallian – liquidity = substitution

- Ideally: Want to estimate the two parameters on same population
  - Random assignment of lump sum grants to some job losers vs standard benefits to others. Compare subsequent unemployment durations
    - Always useful to articulate the ideal benchmark when starting a project...

- Chetty pursues two independent (complementary) empirical strategies
  - Another nice feature: he tells you the limitations of what he’s doing (vs leaving it to you to figure out or not...)
Approach 1

  - Needs panel (vs e.g. CPS) in part bc needs pre ue wealth
  - Restrict to prime age males searching for a job and on UI in first month after job loss

- Standard state x year variation in ui benefits
  - Innovation: look at differential impact of benefits on ue duration by pre-ue wealth level

- Key finding: Impact of UI benefits on ue duration is declining as pre-ue wealth increases
  - Can’t reject no effect for highest quartile wealth group
  - Suggests effect may be primarily a liquidity (vs moral hazard) effect

- Main results: visible in figures (now standard... at time relatively novel)
Divides sample by average UI benefit (state x year variation) into above vs below median benefits (and also by (pre-ue) wealth quartile)

Plots UE duration separately for state-years above vs below median benefit levels, separately by wealth quartile

- Always nice to begin with a simple cut of the data (although important to follow up with the more formal / careful analysis)
- i.e. here we are pooling cross state and cross time variation and not using the DD as intended...
Effect of UI Benefits on Duration: Lowest Net Worth Quartile

Wilcoxon Test for Equality: $p = 0.01$

Mean rep. rate = 0.53

Mean rep. rate = 0.48
Effect of UI Benefits on Duration: Second Net Worth Quartile

Wilcoxon Test for Equality: \( p = 0.04 \)

Mean rep. rate = .53

Mean rep. rate = .48
Effect of UI Benefits on Duration: Third Net Worth Quartile

Wilcoxon Test for Equality: $p = 0.69$

Mean rep. rate = .52

Mean rep. rate = .46
Effect of UI Benefits on Duration: Top Net Worth Quartile

Wilcoxon Test for Equality: $p = 0.43$

Mean rep. rate = 0.52

Mean rep. rate = 0.43

Weeks Unemployed

Fraction Unemployed

Avg. UI benefit below mean

Avg. UI benefit above mean
Formal hazard model analysis

- Cox proportional hazard model. Hazard (h): probability of leaving unemployment at date t conditional on entering unemployment at date t unemployed.
  - Kiefer (1988 JEL) is very nice intro to hazard models.
- \( \log h_{i,t} = \alpha_t + \beta_1 \log b_i + \beta_2 (t \times \log b_i) + \beta_3 X_{i,t} \)
  - Alpha’s are week fixed effects (specifying baseline hazard fully flexibly)
  - Effect of benefits (b) allowed to vary with duration (t)
  - Coefficient of interest \( \beta_1 \): elasticity of hazard wrt UI ben at beg. of spell
  - Theory is about impact of benefit on initial hazard (no clear prediction regarding time varying effect of UI on benefits)
  - \( X \)'s include: state and year fe (for DD), other flexible controls (occupation and industry dummies, pre-ue wage, wealth, age, education etc)
    - How define benefits? (see next slide)
Formal hazard model analysis (con’t)

- Cox proportional hazard model. Hazard \( h \): probability of leaving \( \text{ue} \) at date \( t \) conditional on entering date \( t \) unemployed

\[
\log h_{i,t} = \alpha_t + \beta_1 \log b_i + \beta_2 (t \times \log b_i) + \beta_3 X_{i,t}
\]

- How define benefits?
  - Baseline: avg \( \text{ue} \) benefits in state and year. Issue: picks up demographic differences across states (although tries to control for them)
  - Max weekly benefit
  - Predict individual wages based on demographics and then calculate benefits based on predicted wage, state and year
  - [Why not use simulated instrument a la Gruber? IV w hazard models... control function approach?]
Formal hazard model analysis (cont)

- \( \log h_{i,t} = \alpha_t + \beta_1 \log b_i + \beta_2 (t \times \log b_i) + \beta_3 X_{i,t} \)
- \( \log h_{ijt} = \alpha_{tj} + \beta_{j,1} Q_{ij} \log b_i + \beta_{j,2} Q_{ij} (t \times \log b_i) + \beta_3 X_{ijt} \)

- Same model by stratified by asset quartile \((Q_j)\)
- \(Q_{i,j}\) is an indicator variable for whether agent \(i\) belongs to quartile \(j\) of wealth distribution
- \(\beta_{j,1}\) is elasticity of hazard rate w.r.t UI benefit in quartile \(j\) of asset distribution
- Key question: how does elasticity of UE hazard wrt UI vary by wealth quartile?
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<tr>
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<th>(2)</th>
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<tr>
<td><strong>Marshallian elasticity</strong></td>
<td><strong>Pooled Full cntrs</strong></td>
<td><strong>Stratified No cntrs</strong></td>
<td><strong>Stratified with Full Controls</strong></td>
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<tr>
<td>log UI ben</td>
<td><strong>-0.527 (0.267)</strong></td>
<td></td>
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<tr>
<td>Q1 x log UI ben</td>
<td>-0.721 (0.304)</td>
<td>-0.978 (0.398)</td>
<td>-0.727 (0.302)</td>
<td>-0.642 (0.241)</td>
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<tr>
<td></td>
<td>10% increase in UI benefits reduces hazard (exit from ue) by 5.3%</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Q2 x log UI ben</td>
<td><strong>-0.699 (0.484)</strong></td>
<td><strong>-0.725 (0.420)</strong></td>
<td><strong>-0.388 (0.303)</strong></td>
<td><strong>-0.765 (0.219)</strong></td>
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<td>Q3 x log UI ben</td>
<td>-0.368 (0.309)</td>
<td>-0.476 (0.358)</td>
<td><strong>-0.091 (0.370)</strong></td>
<td><strong>-0.561 (0.156)</strong></td>
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<td>Q4 x log UI ben</td>
<td><strong>0.234 (0.369)</strong></td>
<td><strong>0.103 (0.470)</strong></td>
<td><strong>0.304 (0.339)</strong></td>
<td><strong>0.016 (0.259)</strong></td>
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<tr>
<td>Q1=Q4 p-val</td>
<td>0.039</td>
<td>0.013</td>
<td>0.001</td>
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<tr>
<td>Q1+Q2=Q3+Q4 p-val</td>
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<td>4337</td>
<td>4054</td>
<td>4054</td>
<td><strong>4054^60</strong></td>
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</table>
Key finding: effect of UI benefits declines monotonically in net wealth

Concern I: People with different asset levels may differ in other ways than their liquidity that affect their elasticity of ue wrt benefit levels (why do people choose diff asset levels?)

- Relatedly, do not know what fraction of constrained group’s behavioral response is liquidity vs. substitution effect unless assume substitution effect same for constrained and unconstrained groups (i.e. same preferences)
- NB: a huge strength of paper is that Chetty is aware of and discusses this issue up front
  - Also tries an alternative strategy w its own (but different!) concern
Concern II: are we measuring liquidity constraints?

- Ideally want to identify those who are able to smooth consumption in response to temporary income shocks (i.e. can equate mu of consumption in ue and employed states) vs. those who cannot
- Is liquid net wealth a good proxy for this?
  - Perhaps it is the people who are not liquidity constrained who don’t feel the need to save! (i.e. the high net wealth people may be high net wealth precisely because they need to save bc borrowing is costly!)
  - Might say: but then how explain patterns? But see heterogeneous treatment effects issue...
Concern II: are we measuring liquidity constraints?

- Paper investigates robustness to other measures of constraints and finds similar results (nice)

  - Spousal work status: evidence that cons smoothing is lower (i.e. drop in cons when get ue is greater) among single earners.
  - Do you have a mortgage? If yes have less ability to smooth the remainder of your consumption than a renter (evidence in other papers that renters move not infrequently in response to ue but owners rarely sell houses. Although perhaps can borrow against home equity...?)
Approach 2: Variation in severance pay

- Recall ideal experiment: randomly assign some job losers lump sum (non work contingent) payments and others traditional (work contingent) benefits
  - Compare subsequent unemployment durations

- In practice, some firms pay (lump sum) severance pay
  - Not contingent on subsequent work; therefore behavioral response picking up pure liquidity effect
  - Does not affect UI benefits
  - On average about one week of wages per year of service at firm

- Variation across firms in whether pay severance pay and amount of severance pay used to id liquidity effect
  - Major concern: this is not randomly assigned! Workers who receive severance pay may differ in other ways that is related to their expected unemployment duration
• Finds neat data (another v nice feature of a good paper!)
  • Two surveys conducted by Mathematica on job losers that contain data on receipt of severance pay and self-reported time duration
• NB: Chetty notes that workers who receive severance pay look different from ones who don’t on observables (see next slide)
  • Can control for observable differences but...
<table>
<thead>
<tr>
<th></th>
<th>Pooled</th>
<th>No Severance (0.83)</th>
<th>Severance (0.17)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent dropouts</td>
<td>14%</td>
<td>15%</td>
<td>6%</td>
</tr>
<tr>
<td>Percent college grads</td>
<td>17%</td>
<td>13%</td>
<td>34%</td>
</tr>
<tr>
<td>Percent married</td>
<td>58%</td>
<td>56%</td>
<td>68%</td>
</tr>
<tr>
<td>Mean age</td>
<td>36.2</td>
<td>35.2</td>
<td>40.6</td>
</tr>
<tr>
<td>Median pre-unemp annual wage</td>
<td>$20,848</td>
<td>$19,347</td>
<td>$30,693</td>
</tr>
<tr>
<td>Median job tenure (years)</td>
<td>1.9</td>
<td>1.5</td>
<td>4.8</td>
</tr>
</tbody>
</table>
Figure 5
Effect of Severance Pay on Durations (controlling for job tenure)

Fraction Unemployed

Weeks Unemployed

No Severance
Received Severance
Is effect of severance pay causal?

- Obvious concern: Receipt of severance pay correlated w other factors that are correlated with observables:
  - omitted variable bias
  - endogeneity: firms offer severance packages b/c finding new job difficult

- Three additional pieces of evidence consistent with a causal interpretation
  - Results not sensitive to controlling for rich set of covariates
  - Relationship between severance pay and duration much longer among “constrained” (assets below median) than “unconstrained” (assets above median)
    - again not clear that assets are a good measure of constraint
    - doesn’t observe assets directly but predicts based on covariates (and asset-covariate relationship in SIPP)
  - Larger severance packages correlated with longer duration (intensive margin)
    - Variation in severance package comes from job tenure.
<table>
<thead>
<tr>
<th>Effect of Severance Pay: Cox Hazard Model Estimates</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Table 4</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Severance Pay</strong></td>
</tr>
<tr>
<td>Pooled: -0.233</td>
</tr>
<tr>
<td>(0.071)</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>(Netliq &lt; Median) x Sev Pay</strong></td>
</tr>
<tr>
<td>Pooled: -0.457</td>
</tr>
<tr>
<td>(0.099)</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>(Netliq &gt; Median) x Sev Pay</strong></td>
</tr>
<tr>
<td>Pooled: -0.088</td>
</tr>
<tr>
<td>(0.081)</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>(Tenure &lt; Median) x Sev Pay</strong></td>
</tr>
<tr>
<td>Pooled: -0.143</td>
</tr>
<tr>
<td>(0.055)</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>(Tenure &gt; Median) x Sev Pay</strong></td>
</tr>
<tr>
<td>Pooled: -0.340</td>
</tr>
<tr>
<td>(0.119)</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Equality of coeffs p-val</strong></td>
</tr>
<tr>
<td>Pooled: &lt;0.01</td>
</tr>
<tr>
<td>By Sev. Amt.: 0.03</td>
</tr>
</tbody>
</table>

N=2428; all specs. include full controls.
Is effect of severance pay causal? (con’t)

- Bonus round: Card, Chetty and Weber (QJE 2007)
  - Austrian system: eligibility for severance pay (not job contingent) based on discontinuous rule: People w ≥ 3 years of job tenure are eligible, those w shorter job tenure are not
  - RD design
  - Estimates impact of severance pay on duration
Doubling UI benefit reduces hazard rate by approximately 41%.
- Comes from state x year variation (average across groups)
- See Table 2 column 1 (hazard model coeff on b is -0.51.
  - \( \exp(-0.53) - 1 \approx 41\% \)

“Pure liquidity effect”: Severance pay estimated to reduce hazard by approximately 21%.
- Comes from estimates of effect of severance pay (Table 4)
- So mixing different estimation strategies and samples...
- Scaling: At mean spell length and mean job tenure, receipt of severance pay is equivalent to an 85% increase in UI benefit level
- Cash grant equivalent to doubling UI benefit would reduce hazard by \( \frac{21}{0.85} = 25\% \)

Putting all together: Roughly 60% of UI-duration link due to liquidity effect
- Durations rise largely because job losers have more cash-on-hand; not purely “gaming the system” because of distorted wage
Calibration: welfare implications

- Take these estimates & Chetty’s new formula for optimal b
- Estimates welfare gain from (balanced budget) raising of weekly benefit level by $1 from current level in U.S. (50% wage replacement) is equivalent in utility terms to a 4 cent weekly wage increase for all workers, or $2.00 per year
  - Small but positive welfare gain from raising benefit level in U.S.
- NB: this is a local result
  - Formula tells you whether at an optimum and welfare gain associated with marginal change
  - Once again, would want more structure to go much further out of sample to get at optimal benefit level
    - E.g. elasticities estimated may not be the same at diff benefit levels so useful for marginal welfare effects (local policy change around observed value) vs. any policy change
Comment: Risk aversion

- Consumption drops (Gruber 97) representation of Baily requires risk aversion asmpt, liquidity effect (Chetty 2008) does not (ratio of liquidity to mh effect related to risk aversion):
  - Gruber (1997) estimates that $c(u)/c(e) \sim 0.9$ so would need $\gamma \sim 5$ to be consistent with 60% liquidity effect.
  - Is $\gamma \sim 5$ reasonable?
    - Wide range of risk aversion estimates
    - Seems “high” but depends on context.
      - Risk aversion may be higher in context of moderate shocks bc of consumption commitments.
      - May not be a universal “risk aversion” parameter (Einav, Finkelstein, Pascu and Cullen 2012)
Comment: policy implications

- If major benefit from UI is to provide liquidity / combat credit market failures, perhaps optimal UI policy should combine
  
  (1) loans to unemployed (to provide liquidity)
  
  with
  
  (2) traditional unemployment benefits (insurance against uncertain duration)

- Currently UE benefits play a dual role
  
  - Insure workers against uncertainty in finding a job
  
  - Provide workers with ability to consumption smooth while unemployed (given credit market failures)

- Best policy is usually the direct policy
  
  - If problem is credit market failure / liquidity, solve that directly

- See:
  
  - Shimer and Werning (2006) “liquidity and insurance”
  
  - Feldstein and Altman (1998) “unemployment insurance accounts”
UI Savings accounts

- **Idea (Altman and Feldstein):**
  - Required to save a fraction of wage income
  - If lose job and eligible for UI, withdraw amount equal to regular UI benefits from personal account
    - So held harmless wrt current program
  - If funds not sufficient to pay benefit, government lends necessary amount
  - **Key point:** individuals who always have positive balance (and expect to remain positive) is residual claimant on funds and therefore internalizes effect of increased duration on budget constraint
    - At retirement age, funds are merged into individual’s IRA (if die, bequeathable)
  - Individuals who expect to retire or die with negative balance (at which point govt cancels debt) face same incentive problem as under current system (but w/o the discipline that comes from employer experience rating)
    - They estimate that most insured UE would have positive balances

- **Issue:** liquidity constraints among young
Shimer and Werning (QJE 2007)

- Infer gap in marginal utilities across states from comparative statistics of reservation wages (instead of effort) in a model of job search
  - Reservation wage: wage that would make agent indifferent about accepting a job immediately vs remaining unemployed (receiving benefits and random draws from wage offer distribution)

- Key statistic: response of (after-tax) reservation wage to UI benefit levels
  - Encodes the marginal value of insurance because reservation wage directly measures expected value when unemployed
    - The higher the reservation wage, the higher the utility when unemployed
  - Raising benefits is desirable when it raises the (after-tax) reservation wage.
    - Nets two effects...
Raising benefits is desirable when it raises the (after-tax) reservation wage.

Two effects of raising benefits:

- **Effect 1:** Utility when unemployed (benefits): Higher benefits reduce the cost of remaining unemployed and therefore raise the pre-tax reservation wage.
  
  - If the pre-tax reservation wage is very responsive to UI benefits, raising UI benefits has a strong positive effect on workers' welfare.

- **Effect 2:** Utility when employed (taxes): Higher benefits must be funded by an increase in taxes when employed. The higher the unemployment rate or the more responsive it is to UI benefits, the greater is the need to raise the tax.
  
  - Formula nets this out by looking at responsiveness of after-tax reservation wage to benefits.
Issue: How to measure reservation wages (and their response to benefits)?

- Direct survey evidence - Feldstein and Poterba (1984)
  - Recent new evidence: Krueger and Mueller (2011)

- How reliable? Esp since UI benefit levels don’t seem to impact subsequent wage rates (Card et al. 2007)
  - In general we tend to be skeptical of what people say that they would do

Finding: large welfare gain from raising benefits from current levels

  - Recall though Gruber “conclusion” depends on choice of risk aversion.
Over-identification?

  - Consumption drop w/ u.e., duration elasticity, and risk aversion
    - Can use alternative consumption measures if have appropriate curvature
  - Chetty (2008): compare Marshallian elasticity of u.e. duration wrt b with impact of lump sum (liquidity)
  - Shimer and Werning (2007): Comparative static of how reservation wage moves with benefits

- Over or under-identified?!
  - Depends on how well we think we can estimate each of the formulas...
  - E.g. could we use Chetty 2008 to pin down / calibrate risk aversion and feed into consumption drops?
Summary: Empirical analysis of optimal UI benefits

Sufficient statistics approaches

- Gruber (1997). Need to estimate 3 parameters:
  - Impact of UI on UE duration (large empirical literature)
  - Consumption smoothing benefits of UI
    - Panel data on consumption = very rare (PSID = only food)
  - Risk aversion (pulled from “literature”). calibration

- Chetty (2008): Need to estimate 2 parameters:
  - Impact of UI on UE duration
  - Fraction of impact that is due to liquidity (vs moral hazard)

- Shimer and Werning (QJE 2007).
  - Response of reservation wage to benefit levels
Summary of some empirical techniques

- “Classic” DD estimates of impact of UI on UE duration
  - State x year variation
  - Good practice
- Simulated instruments (Gruber 1997)
  - Parameterizing policy variation
- Good empirical practice (Chetty 2008)
  - Showing results in figures
  - Highlighting key assumptions and limitations
  - Exploring robustness / additional tests
  - Innovative data!
Benefit level is only one of many important design questions

- Duration and benefit tilt (see e.g. Kolsrud et al. 2016 Optimal Timing of UE benefits)
- Public provision vs private mandate (or subsidy)
- Financing – optimal experience rating
- Eligibility requirements / how to target or screen
  - Which brings us to our next topics...