

14.472 Public Finance II

Topic III: Optimal Provision of Social Insurance Benefits

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- Transition now from a potential motivation for government intervention in social insurance market (asymmetric information) to questions of design of government policy
- Descriptive: what is the impact of alternative design?
- Normative: what are the welfare consequences of alternative designs? What is the optimal design?

Optimal Level and Structure of Social Insurance Benefits

- Theory: Optimal level and duration of benefits:
 - Baily (1978)/ Chetty (2006) formula
 - Schmeider and von Wachter (2017) overview
- Empirics: How to implement theory
 - Note: Requires estimating value of additional insurance
 - Closely related to estimating welfare in insurance markets (Section II)
 - Except now we are focusing on markets where we don't observe insurance choices! (Recall II.d "When markets don't exist").

Comment: Welfare Analysis of Social Insurance

- Once again an emphasis on welfare:
 - 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

A very brief history of optimal social insurance research

- General question: Optimal level or duration of benefits / value of a given level of social insurance program
- Initial work (80s and 90s) focused on moral hazard / distortionary costs of UI on unemployment duration
- What about benefits of UI? (large, and still active, literature begins with Gruber 1997)
- Literature is focused primarily on UI
 - What about other programs?
- Literature is focused primarily on optimal level of benefits or optimal benefit duration
 - What about financing? (e.g. level of experience rating)
 - What about eligibility? (monetary and non-monetary)
 - What about take up? (enrollment not automatic. will return to...)
- Clear value for more work both in UI and other contexts

1. Brief background on UI
 - 1.1 Institutional features (many not well-studied)
 - 1.2 Rationales and evidence for government intervention
2. Theory: Optimal benefit and duration level (Baily/Chetty)
3. Empirics: Taking Baily / Chetty to Data

UI (Brief) Institutional Background

UI: What is the Risk Being Insured?

- The risk being insured: consumption losses when temporarily out of work and looking for a new job
 - For workers with attachment to labor force
 - Not for permanently displaced workers (see e.g. disability insurance)

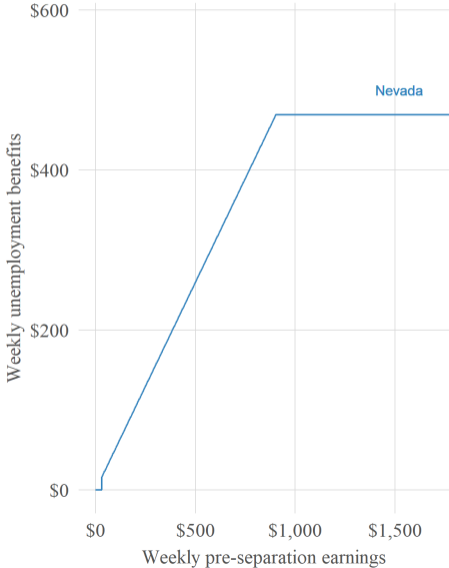
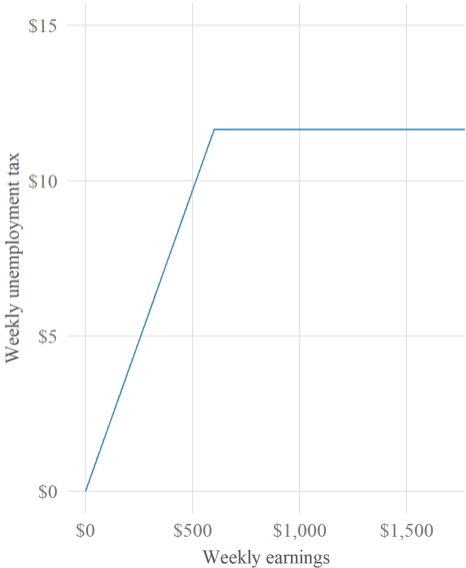
Structure of UI systems

- Many countries (and all OECD countries) have some form of UI
 - Nice aspect of this literature in last decade is that it has expanded to studies of non-US systems!
 - Other countries offer: interesting design alternatives, rich administration data, useful variation
- Most countries have uniform, government-mandated benefit level
 - Sweden / Denmark/ Finland / Iceland offer some choice in benefit level (will return to)

Structure of UI benefits

- Eligibility when enter unemployment depends on
 - employment history (minimum work experience)
 - reason for being unemployed (voluntary quit or fired for misconduct usually not covered)
 - actively searching for jobs
- Coverage duration
 - Waiting period before receiving benefits (deductible)
 - Potential benefit duration (may vary with work experience, age, or economic conditions)
- Benefit level
 - "Replacement rate": Benefits as a percentage of pre-unemployment earnings (coinsurance)
 - Typically have a maximum replacement rate (progressivity)

Figure 1: Example for a representative state: Nevada in 2019



US UI inherits most features of the original legislation

	1935	2019
Replacement Rate	50%*	50%*
Maximum Benefits/Prior Earnings	66th pctile of prior earnings*	varies widely
Duration	15 weeks*	26 weeks*

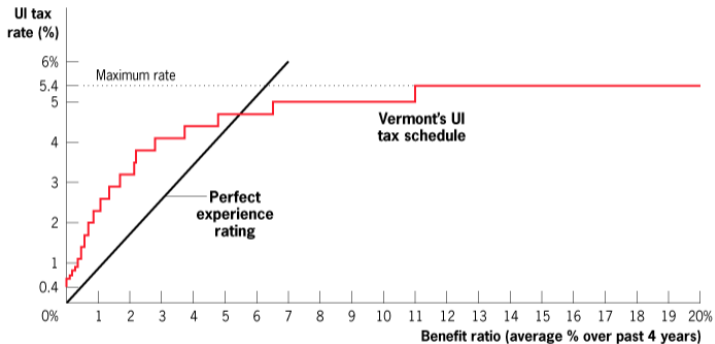
Note: describes US rules outside of a recession. * for modal state

UI Financing (US)

- Financed by payroll tax on firms
- Experience rating: dynamic payroll tax
 - Firm's tax rate increases as firm's workers are laid off / claim UI benefits (and decreases when they don't)
 - Analog to “risk adjustment” in government payments to private health insurers (Medicare Part D, Medicare Advantage, ACA exchanges)
- Partial experience rating:
 - Worker UI claims increase firm tax rates but less than 1 for 1
 - Optimal level of experience rating involves tradeoff between incentives and insurance.

Partial experience rating for UI

■ FIGURE 14-7



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.

Economics of experience rating

- Benefits: align incentives / reduce moral hazard
 - with full experience rating firms internalize the fiscal externality of their layoffs (i.e. pay full marginal cost of laying off a work)
 - can reduce e.g. firm-worker collusion
- Costs of experience rating:
 - Insurance-incentive tradeoff: experience rating reduces insurance to firm (and implicitly to worker if incidence is on worker)
 - May discourage hiring in times and industries when unemployment is already high; firms now face higher taxes (Johnston 2021)
 - Encourage employers to make it hard for their employees to access UI (Sorkin, Lachowska and Woodbury 2021)
- Ripe for more empirical work
 - "Optimal experience rating" is conceptually very similar to "optimal benefit level" (coming up) but little empirical work

- Focus has been on level and duration of benefits
- But note other policy instruments / design elements worth exploring theoretically and empirically
 - Eligibility requirements (monetary and non-monetary)
 - Take up in US is highly incomplete (enrollment not automatic. Why not?)
 - Financing / level of experience rating

Why is Government Involved

Why don't firms provide UI for their workers?

- If firms and workers (or their unions) can bargain efficiently and costlessly, firms should provide UI
 - Big if
- Bi-lateral contracts won't insure against shocks to firm or to industry
 - Firm could contract with a third-party insurer but then worry about adverse selection and aggregate risk

Why don't private insurance markets provide UI?

- Incomplete borrowing markets (a.k.a credit market failures or liquidity constraints)
- Behavioral frictions
- Adverse selection
- Moral hazard
 - no comparative advantage of government
- Aggregate risk

Evidence of these potential frictions?

- Note: Large empirical literature on public unemployment insurance (costs and benefits)
 - Dating back to 80s (costs) and 90s (benefits)
 - Focus primarily on question of optimal benefit level and duration
- Until recently, very little analysis of existence of potential rationales for government intervention

Incomplete borrowing markets

- Measured as a share of lifetime income, there is almost no **uncollateralized** lending
 - due to asymmetric information in credit markets?
- Evidence for role of liquidity constraints in affecting the unemployed:
 - Chetty (2008) shows that impact of UI on unemployed's job-finding decisions is much greater for those without assets (and perhaps nil for those with)
 - Landais and Spinnewijn (2021) show MPC much higher when unemployed
- Why not improve credit markets for ue directly? (will return to)

Behavioral frictions

- examples:
 - under-estimate unemployment risk (but in fact people over-estimate it)
 - over-estimate re-employment chances (e.g., Spinnewijn JEEA 2015)
 - time inconsistent preferences over consumption (e.g. hyperbolic discounting)
- can create:
 - insufficient demand for private insurance
 - insufficient liquid savings for unemployment
 - inefficiently low search effort

Adverse selection in private UI: Anecdotes

- Short-lived attempts at private UI: SafetyNet, IncomeAssure, Paycheck Guardian (Einav, Finkelstein, Fisman 2023)
- Steps to combat adverse selection - e.g. six month waiting period
 - “Anyone who knows they are likely to be laid off after six months, I am happy to sell them an insurance policy... I’d like to get some lottery tickets and stock tips from them” - CEO of IncomeAssure (interview in NYTimes, 2016)*

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“I looked hi and lo for this kind of insurance six months before I was laid off because I could smell the blood in the water having worked at this particular firm for 8 years” - Jackson of Boston (posting a comment to the Times article)

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- IncomeAssure goes out of business two years later

Adverse Selection: Evidence

- Lacking until very recently
- Two recent papers (studying markets that don't exist)
 - Hendren (2017) shows that survey elicitation about probability of unemployment are correlated with actual unemployment among older workers in US (conditional on potential observables)
 - Landais et al (2021) show that workers with a higher probability of unemployment are more likely to purchase supplemental UI in Sweden

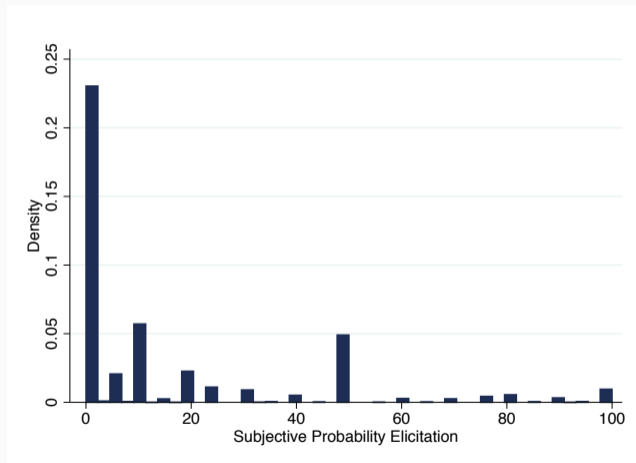
- Paper has 3 main components
 - Test for private information and potential adverse selection in unemployment insurance
 - tricky when market doesn't exist!
 - Estimate willingness to pay for additional UI (on top of government program)
 - again, tricky when market doesn't exist!
 - Ask whether adverse 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 US UI

- Unlike Sweden, cannot observe individual choices over 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...

Self-reports of probability of job loss within 12 months

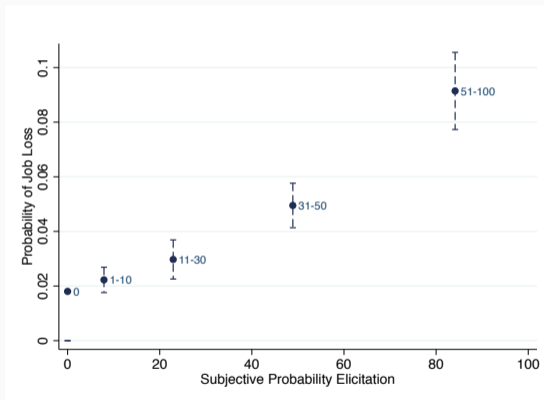
FIGURE I: Histogram of Subjective Probability Elicitations



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



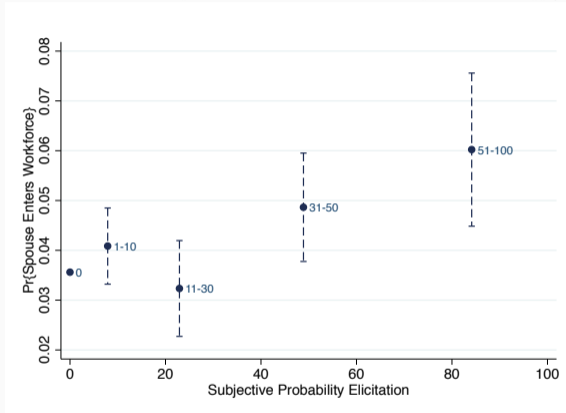
Notes: This figure reports mean unemployment rate in each elicitation category controlling for demographics, job characteristics, and year controls. To construct this figure, I run the regression in Equation (1). The figure plots the coefficients on bins of the elicitations. I omit the lowest bin (corresponding 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.

Does private information predict behavior?

- Does private information about probability of job loss affects individual behavior?
 - Can't look at insurance demand (a la Finkelstein and McGarry 2006) because private UI doesn't exist
- Instead looks at two other tests:
 - Looks at whether private information about job loss probability (prior to job loss) predicts change in spousal labor supply (HRS)
 - Looks at whether individuals change consumption prior to job loss (PSID)
 - Idea: if individuals use private information in these behavioral decisions, presumably might in selecting an insurance contract if offered

Private information predicts behavior Part I: Spouses

FIGURE III: Relationship between Potential Job Loss and Spousal Labor Supply



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.

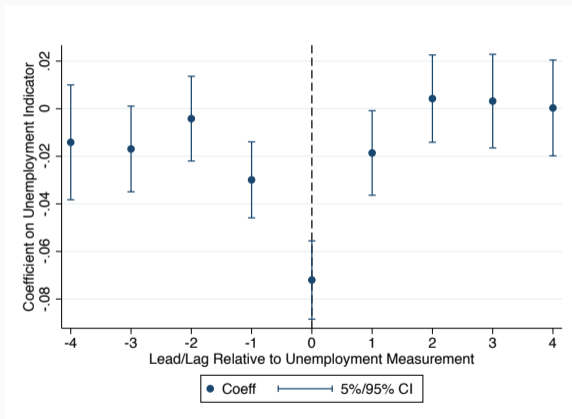
Private information predicts behavior (con't)

- 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

Private information predicts behavior (con't)

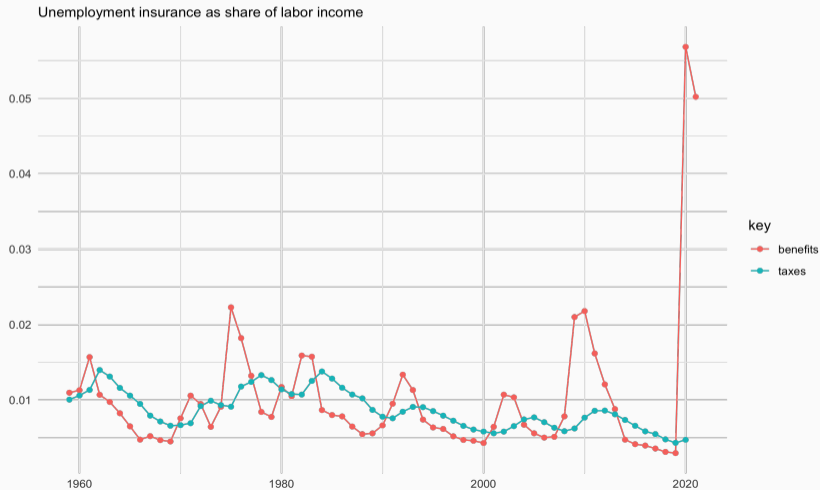
- Changes in consumption observed prior to event suggests event anticipated
 - Pre-trends as friend instead of foe!
 - Concern: perhaps declines in consumption prior to ue reflect declining income
 - But results robust to controlling for cubic in changes in income
- Summary: beliefs (conditional on what 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 information "large enough" to explain lack of existence of private UI market? Will come back to later in this unit...

Figure 2: Aggregate risk: cyclicality of UI benefits and taxes



- Taxes pay off debt after each recession. Could states get financing in private market? At what price? (“tax smoothing” as in Barro 1979)

Figure 3: Aggregate risk from pandemic



Aggregate Risk

- Up until now: insurance diversifies (idiosyncratic / cross-sectional) risk
- Aggregate risks are difficult for private insurance markets
 - e.g. business cycles
 - see also: terrorism; natural disasters; pandemics; nuclear war
- States (even those not allowed to run deficits) can finance current benefits out of future expected taxes during recessions
- Potential role for capital markets? Relatively little work.

Armageddon Insurance

We will all go together when we go

All suffuse with an incandescent glow

No one will have the endurance to collect on his insurance

Lloyd's of London will be loaded when they go

-Tom Lehrer

1. Brief background on UI [Done]
 - 1.1 Institutional features (many not well-studied)
 - 1.2 Rationales and evidence for government intervention (much of the evidence is quite recent)
2. Theory: Optimal benefit and duration level (Baily/Chetty) **[Up next]**
3. Empirics: Taking Baily / Chetty to Data

Application: Caveat

- Enormous amount of work on optimal UI benefits (vs. e.g. disability insurance, worker's compensation, health insurance, annuities for SS, life insurance)
 - Probably path dependent (state-year variation in UI benefits)
 - Think about applying the upcoming approaches to other sectors
- Not clear unemployment is a / the major a source of risk
 - Lucas (1987) calculates that a representative, optimizing agent would pay less than 1% of lifetime consumption to entirely eliminate business cycle fluctuations in the absence of any private or public insurance
 - That result can be overturned if:
 - Allow for heterogeneous impacts - see labor literature (e.g. some people experience a permanent 30 percent drop in earnings)
 - Allow for imperfect borrowing markets (see public finance UI literature, coming up)
 - Behavioral biases?

Optimal UI Benefits: Theory

Optimal structure of UI benefit levels and durations

- Schmeider and von Wachter (2017) provide a very nice overview model
 - Summarizes Baily-Chetty framework in terms of impacts for optimal level of UI benefits and optimal duration of UI benefits
- For simplicity / to fix ideas I am going to focus only on benefit level
 - But see their paper for how model naturally extends to benefit duration (and large empirical literature on impact of benefit duration)

Benchmark Static Model: Overview

- First best problem:
 - Social planner chooses benefits to maximize utility
 - subject to government break even constraint (benefits financed by tax)
 - Solution: Full insurance
 - Benefits 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 benefits to maximize utility subject to
 - Government breaks even (benefits financed by tax)
 - Consumers choose search given benefits
 - Generates first order condition for optimal level of benefits

Setup: states and utility

- Binary risk with states high h and low l
 - Job loss (UI), health expense (HI), injury at work (Worker's Comp), etc.
 - e is share of time spent in high state, $1 - e$ is share of time in low state
 - Convex cost of effort function: $\psi(e)$
 - Key point: e can be endogenous to benefit design (moral hazard)

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- Hand-to-mouth consumption implies

$$c_h = y_h = w_h - \tau(b)$$

$$c_l = y_l = w_l + b$$

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- State-dependent utility is $v(c_h), u(c_l)$

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$$c_l = y_l = w_l + b$$

- State-dependent utility is $v(c_h), u(c_l)$
- Assume $w_l > 0$
 - Can be motivated by spousal income, informal or home production, exogenous assets
 - Remark: Avoids $u'(0) = \infty$

First best

- Key: social planner can control search effort e (perfect monitoring)
- Set benefits (and taxes) and effort to maximize social welfare subject to the government's break even constraint

$$\begin{aligned} \max_{b,e} W(b, e) &= ev(w_h - \underbrace{\tau(b, e)}_{\text{tax}}) + (1 - e)u(w_l + b) - \psi(e) \\ \text{s.t. } \tau(b, e) &= b \frac{(1 - e)}{e} \end{aligned}$$

Substituting in:

$$\max_{b,e} W(b, e) = ev \left(w_h - b \frac{(1 - e)}{e} \right) + (1 - e)u(w_l + b) - \psi(e)$$

First best (con't)

$$\max_{b,e} W(b, e) = ev \left(w_h - b \frac{(1-e)}{e} \right) + (1-e)u(w_l + b) - \psi(e)$$

$$\frac{\partial W}{\partial e} = -\psi'(e) + v(c_h) - u(c_l) - ebv'(c_h) \frac{d}{de} \left(\frac{1-e}{e} \right)$$

$$\frac{\partial W}{\partial e} = 0 \Rightarrow$$

$$\psi'(e) = \underbrace{v(c_h) - u(c_l)}_{\text{probability effect}} + \underbrace{\frac{bv'(c_h)}{e}}_{\text{fiscal effect}}$$

First best (con't)

$$\frac{\partial W}{\partial b} = -\frac{\partial \tau}{\partial b} e v'(c_h) + (1 - e) u'(c_l)$$

$$\begin{aligned}\frac{\partial W(b)}{\partial b} &= 0 \Rightarrow \\ -\frac{1 - e}{e} e v'(c_h) &= (1 - e) u'(c_l) \Rightarrow \\ v'(c_h) &= u'(c_l)\end{aligned}$$

First best (comments)

- Define $\lambda(b, e) = \frac{bv'(c_h)}{e}$ as the fiscal saving due to increased effort.
- First order conditions

$$e : \psi'(e) = v(c_h) - u(c_L) + \lambda(b, e)$$

$$b : v'(c_h) = u'(c_l)$$

- Planner chooses effort e so that marginal cost of effort ($\psi'(e)$) equals (social) marginal benefit of effort $v(c_h) - u(c_L) + \lambda(b, e)$
 - Social marginal benefit of effort is the private benefit (difference in utility between employment and unemployment) plus public benefit (fiscal cost of the benefit)
- Planner chooses benefit level b to achieve full insurance $v'(c_h) = u'(c_l)$
 - Discussion question: how is this different from choosing b such that $y_h = y_l$? why might $y_h = y_l$ not be socially optimal?

Agent's problem

- Agent chooses search effort $e \in [0, 1]$

$$\max_e V(e) = ev(c_h) + (1 - e)u(c_l) - \psi(e)$$

$$\Rightarrow \psi'(e^*) = v(c_h) - u(c_l) \quad (1)$$

- Key point: Worker equates marginal cost of effort e with *private* marginal benefit of effort (difference in utility between employment and unemployment)
 - Unlike in the first best, they do not take account of the public benefit from effort: reduced taxes due to reduced ue benefits
- Other remarks:
 - This is a static representation of a problem that is actually dynamic. In dynamic formulation, search effort e exerted only when in low state.
 - Assume a continuum of agents so that each agent's decision e has no effect on tax rate $\tau(b)$.
 - Cost of effort $\psi(e)$ is additively separable. Can imagine richer utility functions.

Public cost of raising benefits (ignored by agent)

- Actuarially fair tax $\tau(b, e) \equiv b \frac{1-e}{e}$.

$$\begin{aligned} \frac{d\tau(b, e)}{db} &= \frac{d}{db} (b) \frac{1-e}{e} + b \frac{d}{db} \left(\frac{1-e}{e} \right) \\ &= \frac{1-e}{e} - b \frac{de}{db} \frac{1}{e^2} \\ &= \underbrace{\frac{1-e}{e}}_{\text{mechanical cost of higher } b} + \underbrace{\left(\frac{de}{db} \right) \frac{d}{de} \tau(b, e)}_{\text{behavioral cost of higher } b} \end{aligned} \quad (2)$$

- Remarks:
 - e is share of time employed so $\frac{de}{db} < 0$.
 - This decomposition into the mechanical (holding behavior constant) cost versus behavioral cost (fiscal externality) will come up again later

Planner's (second best, constrained efficient) problem

$$\begin{aligned} \max_b W(b) &= ev(w_h - \tau(b, e)) + (1 - e)u(w_l + b) - \psi(e) \\ \text{subject to } e &= e^*(b); \tau = b \frac{(1 - e)}{e} \end{aligned}$$

$$\frac{dW(b)}{db} = -\frac{d\tau}{db} e^* v'(c_h) + (1 - e^*) u'(c_l) + \underbrace{(-v(c_h) + v(c_l) - \psi'(e^*))}_{\text{zero by equation (1) - agent foc}} \frac{de^*}{db}$$

- 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**). Will discuss more later.

Planner's problem (con't)

$$\frac{dW(b)}{db} = -\frac{d\tau}{db} e^* v'(c_h) + (1 - e^*) u'(c_l) + \underbrace{(-v(c_h) + v(c_l) - \psi'(e^*))}_{\text{zero by equation (1) - agent foc}} \frac{de^*}{db}$$

- Key differences from first best: $\frac{d\tau}{db}$ now includes the mechanical cost (as before) and the behavioral cost (new to second best with agent choice):

$$\frac{d\tau(b)}{db} = \underbrace{\frac{1 - e}{e}}_{\text{mechanical cost of higher b}} + \underbrace{\left(\frac{de}{db}\right) \frac{d}{de} \tau(b, e)}_{\text{behavioral cost of higher b}}$$

- Note: the reason that impact of benefits on employment (ue duration) matters is because of the budget constraint (keep this in mind; will come back to)

Planner's problem (con't)

- Using the agent's foc for e we get:

$$\frac{d\tau(b)}{db} = \underbrace{\frac{1-e}{e}}_{\text{mechanical cost of higher } b} + \underbrace{\left(\frac{de}{db}\right) \frac{d}{de}\tau(b, e)}_{\text{behavioral cost of higher } b}$$

$$\begin{aligned}\frac{dW(b)}{db} &= (1-e)u'(c_l) - \frac{d\tau}{db}ev'(c_h) \\ &= (1-e) \left[u'(c_l) - \left(1 + \frac{\varepsilon_{1-e,b}}{e}\right)v'(c_h) \right]\end{aligned}$$

where $\varepsilon_{1-e,b} \equiv \frac{d(1-e)}{db} \frac{b}{1-e}$ denotes the elasticity of the probability of being in the bad state w.r.t. the benefit level.

Planner's problem (con't)

$$\frac{dW(b)}{db} = (1 - e) \left[u'(c_l) - \left(1 + \frac{\varepsilon_{1-e,b}}{e} \right) v'(c_h) \right]$$

- This equation is hard to interpret because it is in utils.
- Conventional to normalize the welfare gain from a \$1 (balanced budget) increase in the social insurance benefits by the welfare gain from raising the wage bill by \$1 in the “high” state

$$M_W(b) \equiv \frac{\frac{dW(b)}{db} / (1 - e)}{\frac{dW}{dw_h} / e} = \frac{u'(c_l) - \left(1 + \frac{\varepsilon_{1-e,b}}{e} \right) v'(c_h)}{v'(c_h)} = \frac{u'(c_l) - v'(c_h)}{v'(c_h)} - \frac{\varepsilon_{1-e,b}}{e}$$

Baily (1978)-Chetty (2006) formula.

$$M_W(b) = 0 \Rightarrow$$
$$\underbrace{\frac{u'(c_l) - v'(c_h)}{v'(c_h)}}_{\text{welfare gain from increase in insurance}} = \underbrace{\frac{\varepsilon_{1-e,b}}{e}}_{\text{fiscal cost of increasing insurance}}$$

- It will guide the questions we study for the rest of this unit.

Baily (1978)-Chetty (2006) formula. LHS.

$$\underbrace{\frac{u'(c_l) - v'(c_h)}{v'(c_h)}}_{\text{welfare gain from increase in insurance}} = \underbrace{\frac{\varepsilon_{1-e,b}}{e}}_{\text{fiscal cost of increasing insurance}}$$

- LHS: difference in marginal utilities across state (i.e. $MU(c)$ when unemployed minus $MU(c)$ when employed) = wedge in full consumption smoothing
 - quantifies welfare gain from transferring additional \$ to the unemployed state. (Gain comes from smoothing consumption)

Remark: envelope theorem

$$\underbrace{\frac{u'(c_l) - v'(c_h)}{v'(c_h)}}_{\text{welfare gain from increase in insurance}} = \underbrace{\frac{\varepsilon_{1-e,b}}{e}}_{\text{fiscal cost of increasing insurance}}$$

- Key concept on LHS: envelope theorem
 - Use of envelope theorem: impact of benefits on “effort” (e) only enters formula through government balanced budget constraint because agent already optimizing.
 - So other effects of search effort (e.g. on match quality /wages) on worker utility similarly drop out by envelope argument.
 - Don't need to measure all effects on work - 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

Robustness of formula

- 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 u_e has large leisure benefits, agents elect longer duration and have larger consumption drop \rightarrow higher optimal benefit rate

Some cases where formula would need to be modified

- Externalities
 - Aggregate demand effect - product demand inefficiently low in a recession; higher UI generosity can raise aggregate demand
 - Rat race effect - if more generous UI causes some workers to search less and the number of jobs is fixed
 - Vacancy Posting Effect: if more generous UI means workers demand higher wages, expected profits from posting a vacancy falls, vacancy posting falls, and u_e rises
- Internalities (optimization failures by unemployed workers)
 - Coined by Herrnstein et al. (1993)
 - “An externality is the long-term benefit or cost to an individual that they do not consider when making the decision to consume a good or service.”
 - Examples motivated by behavioral theories of self-control: smoking, exercise
 - When agent optimization fails, Baily-Chetty no longer sets optimal UI benefits

Baily (1978)-Chetty (2006) formula. RHS.

$$\underbrace{\frac{u'(c_l) - v'(c_h)}{v'(c_h)}}_{\text{welfare gain from increase in insurance}} = \underbrace{\frac{\varepsilon_{1-e,b}}{e}}_{\text{fiscal cost of increasing insurance}}$$

- RHS: social cost of transferring a \$ to the unemployed state due to the behavioral response (moral hazard effect of increased benefits)
- This fiscal externality of behavioral response on the government budget (bc has to finance an increase in benefits with taxation) is not taken into account in the worker's optimization (choice of e)
 - This introduces the wedge from the first best (i.e. full consumption smoothing)
 - Requires estimate of causal impact of increase in benefits (financed by increase in taxes) on government expenditure on unemployment benefits
- As the behavioral effect $\frac{\varepsilon_{1-e,b}}{e}$ approaches zero, the optimal benefit policy approaches the first best.

Remark: Fiscal Externalities

- Key concept on RHS: fiscal externality
 - Causal impact of increase in benefits (financed by increase in taxes) on government expenditure on unemployment benefits
- In this example, arises by impact of increased benefits on unemployment duration
- But there could be other behavioral responses to increase in UI benefits that generate additional fiscal externalities:
 - Increased wages
 - Increased entry into unemployment
 - Impacts on health and hence public health care expenditures?
- Lee et al. (2021) emphasizes the key cost measure is the (total) negative fiscal externality

Aside: "Good" vs "bad" moral hazard?

- Nyman (1999 JHE) "The Value of Health Insurance: The Access Motive":
 - Liquidity constraints in financing health care
 - Also: Health risk is not proportional to income
 - Costs of some illness may be greater than PDV lifetime resources so can only access it if have health insurance
- Evidence of liquidity constraints playing a role in driving moral hazard in health insurance (Layton, Gross and Prinz AERI 2022)
- So if moral hazard is "good" should it not be considered part of "costs"?
 - No! Access motivate means you have high marginal utility of consumption in sick state of world if uninsured
 - So marginal utility varies a lot across states
 - Left hand side of Baily-Chetty formula may be large!
 - Moral hazard still needs to remain on right hand side!

Remark: Baily-Chetty is a local result

$$M_W(b) = 0 \Rightarrow \underbrace{\frac{u'(c_l) - v'(c_h)}{v'(c_h)}}_{\text{welfare gain from improvement in insurance}} = \underbrace{\frac{\varepsilon_{1-e,b}}{e}}_{\text{welfare loss from higher taxes}}$$

- 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 high or too low (local result)
 - Can (and will) evaluate $M_W(b)$ away from the optimum benefit
 - Does not tell you (globally) optimal level of benefits
 - Would need a fully, structural model

Remark: Why UI (when people can save)?

- In static Baily-Chetty, UI enables hand-to-mouth agents transfer funds from the high state to the low state

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 - Assume worker can freely borrow and save and lifetime unemployment duration $1 - e$ is known

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 - Assume worker can freely borrow and save and lifetime unemployment duration $1 - e$ is known
 - Worker can “tax” themselves to self-insure.
 - Further, there is no negative search externality under self-insurance
 - Achieve perfect consumption smoothing
 - Motivates relaxing the hand-to-mouth assumption
 - Also highlights role for UI in providing liquidity (will return to)

Remark: 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
 - Existence of adverse selection \rightarrow envelope thm violated (externalities from own behavior on private insurance market)
 - 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)

Baily-Chetty Summary

- Welfare costs (RHS) from higher benefits are captured by the impact of households' behavioral responses to the policy on government's budget (" **fiscal externality**")
- Welfare gains (LHS) from higher benefits are captured by the gap in marginal utility of consumption across states of nature
 - This gap is zero in the first best allocation (marginal utilities are constant across states of nature)
 - Size of gap measures market inefficiency and quantifies potential benefit from additional benefits
- Empirical marching orders:
 - Measuring the RHS: Impact of higher UI benefits on government budget (via behavioral responses of individual)
 - Measuring the LHS: Gap in marginal utility of consumption between employed and unemployed state

1. Brief background on UI [DONE]
 - 1.1 Institutional features (many not well-studied)
 - 1.2 Rationales and evidence for government intervention
2. Theory: Optimal benefit and duration level (Baily/Chetty) [DONE]
3. Empirics: Taking Baily / Chetty to Data [**UP NEXT**]
 - 3.1 RHS: Fiscal externality from insurance on government budget
 - 3.2 LHS: Gap in MUs across states