

Contracts: Unemployment Insurance

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Optimal Unemployment Insurance

- An unemployed worker searches for a job.
- The job finding rate depends on search effort a .
- Income is low during unemployment.
- The worker is risk averse and likes smooth consumption.
- Design an unemployment insurance scheme that trades off **consumption smoothing** and **incentives** to search hard.

- Preferences:

$$E \sum_{t=0}^{\infty} \beta^t [u(c_t) - a_t] \quad (1)$$

$$c_t, a_t \geq 0 \quad (2)$$

- The worker starts unemployed with income 0.
- Consumption equals income. No storage.
- All jobs pay w .
- The job finding rate is $p(a)$ with $p(0) = 0$, $p' > 0$, $p'' < 0$.

- When employed: $c = w$. $a = 0$.
- $V^e = \frac{u(w)}{1-\beta}$.

$$V^u = \max_a u(0) - a + \beta [p(a) V^e + (1 - p(a)) V^u] \quad (3)$$

FOC:

$$\beta p'(a) [V^e - V^u] \leq 1$$

with equality if $a > 0$.

Solution is time invariant a and V^u .

- The insurance agency can observe and control search effort.
- This eliminates the incentive problem and yields full insurance.

- Assume the worker is promised utility V .
- The cost of delivering V is $C(V)$.
- The unemployment agency designs a contract to minimize $C(V)$.
- In each period: assign a search effort a and consumption c .
- If search fails: update V .

- The agency's problem:

$$C(V) = \min_{c,a,V^u} c + \beta [1 - p(a)] C(V^u) \quad (4)$$

subject to promise keeping

$$u(c) - a + \beta [p(a) V^e + (1 - p(a)) V^u] \geq V \quad (5)$$

where $V^e = w / (1 - \beta)$.

- θ is the Lagrange multiplier on the promise keeping constraint.

$$c : 1 = u'(c) \theta$$

$$V^u : \beta p'(a) C'(V^u) = \theta \beta p'(a)$$

$$\implies C'(V^u) = \theta$$

$$a : \beta p'(a) C(V^u) = \theta \{1 - \beta p'(a) [V^e - V^u]\}$$

- Envelope:

$$C'(V) = \theta$$

Characterization

- $C'(V) = \theta = C'(V^u)$.
- Assumption: C is strictly convex (verify later).
- Then

$$V^u = V \quad (6)$$

- Constant θ implies constant c and a .
- Intuition: Without incentive issues, the problem of the unemployed is stationary.

- If the agency makes transfers to the household ($V^u > V^{aut}$), incentives for search are reduced.
- If a is not contractable, the worker chooses a below "optimal"
- Example: $V = V^e \implies a = 0$.
- A contract must provide a penalty for not finding a job quickly.
- In the data: Unemployment benefits typically declines with unemployment duration.

Optimal contract with asymmetric information

- The agency cannot observe a .
- It still controls c through unemployment benefits.
- The agency's problem:

$$C(V) = \min_{c, a, V^u} c + \beta [1 - p(a)] C(V^u) \quad (7)$$

subject to promise keeping

$$u(c) - a + \beta [p(a) V^e + (1 - p(a)) V^u] = V \quad (8)$$

and incentive compatibility.

- The assigned a must be consistent with the household's first-order condition from

$$\max u(c) - a + \beta [p(a) V^e + (1 - p[a]) V^u] \quad (9)$$

- The FOC is the same as under autarky:

$$\beta p'(a) [V^e - V^u] \leq 1 \quad (10)$$

$$\begin{aligned} C(V) = & \min_{c,a,V^u} c + \beta [1 - p(a)] C(V^u) \\ & + \theta [V - u(c) + a - \beta p(a) V^e - \beta [1 - p(a)] V^u] \\ & + \eta [1 - \beta p'(a) \{V^e - V^u\}] \end{aligned}$$

$$c : \theta u'(c) = 1$$

$$a : C(V^u) = \theta \left[\frac{1}{\beta p'(a)} - (V^e - V^u) \right] - \eta \frac{p''(a)}{p'(a)} (V^e - V^u) \quad (11)$$

$$V^u : C'(V^u) = \theta - \eta \frac{p'(a)}{1 - p(a)}$$

Envelope:

$$C'(V) = \theta$$

Notes:

- With $\eta = 0$ the FOCs with full control emerge.
- $[\cdot] = 0$ in (11) because of incentive compatibility.

Optimal contract

- Assume: $C(V^u) > 0$ so that promise keeping is binding ($\theta > 0$).
- Then

$$C'(V) = \theta = C'(V^u) + \eta \frac{p'(a)}{1 - p(a)} > C'(V^u)$$

- Assumption (tricky): C is convex. Then

$$V^u < V$$

- For a household who remains unemployed: $V' = V^u$ and V is falling over time.
- Then θ rises over time ($C'' < 0$) and c falls over time.

- From the household's FOC

$$\beta p'(a) [V^e - V^u] \leq 1$$

it follows that a rises over time.

- Intuition: Agency interprets long unemployment as evidence of low search effort.

- Ljungqvist & Sargent, "Recursive methods," 2nd ed. ch. 21.