EC2106 PUBLIC ECONOMICS
LECTURE 8 - Social insurance

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Fall 2022

Social Insurance - Outline

1. What is insurance and why do individuals value it?
     Key benefit: **Consumption smoothing.**

2. Why have social insurance?
     - The role of *asymmetric information*:
     1. *Adverse selection.*
     2. *Moral hazard.*

3. Other reasons for government intervention in insurance markets.

4. Social insurance versus self-insurance: How much consumption smoothing?

- www.menti.com

Definitions

- Social insurance programs: Government interventions in the provision of insurance against adverse events.

  Examples:
  (a) health insurance;
  (b) retirement and disability insurance;
  (c) unemployment insurance.

- Means-tested: Programs in which eligibility depends on the level of one's current income or assets.

  Examples in the US: Medicaid (health insurance for the poor) is means-tested. Medicare (health insurance for elderly, 65+) is not means-tested.

  Examples in Sweden: Maintenance support (Försörjningsstöd). Some proposals to make childcare benefits dependent on income.

  Hypothetical example: Condition unemployment benefits on the amount of wealth.

What is insurance?

Insurance premium: Money that is paid to an insurer so that an individual will be insured against adverse events.

Examples of (privately and publicly provided insurance) are:

- Health insurance

- Auto insurance

- Life insurance

- Casualty and property insurance

Why do individuals value insurance?

- Consumption smoothing: The translation of consumption from periods when consumption is high, and thus has low marginal utility, to periods when consumption is low, and thus has high marginal utility.

- The fundamental result of basic insurance theory: individuals demand ***full insurance to fully smooth their consumption across states of the world***.

Expected utility model

Individuals maximize expected utility.

If q is probability of adverse event, expected utility is written as:

$$EU = (1-q) * U(\text{consumption with no adverse event}) +$$
$$q * U(\text{consumption with adverse event})$$

Insurance premium that is set equal to the insurer's expected payout.

Expected utility model, formally

Let $U(c)$ be increasing and concave, i.e. $U'(c) > 0$ and $U''(c) < 0$.

Each person has W wealth and gets sick with probability q.

If you become sick you incur medical costs, d.

Insurance contracts states that you pay premium, p, and receive benefits b if sick.

$$EU = (1 - q)U(W - p) + qU(W - p - d + b)$$

Firm profits: $p - qb$.

With perfect competition among firms, profits are zero:
$p - qb = 0 \Leftrightarrow b = p/q$. Insurance is actuarially fair.

Expected utility model, formally

Individual chooses premium p to maximize *expected* utility:

$$EU = (1-q)U(W-p) + qU(W-p-d+\tfrac{p}{q})$$

FOC:

$$0 = \frac{\partial EU}{\partial p} = -(1-q)U'(W-p) + q(-1+\tfrac{1}{q})U'(W-p-d+\tfrac{p}{q})$$

$$\Leftrightarrow U'(W-p) = U'(W-p-d+\tfrac{p}{q})$$

$$\Leftrightarrow W-p = W-p-d+\tfrac{p}{q}$$

$$\Leftrightarrow 0 = -d+\tfrac{p}{q} \Leftrightarrow p = dq$$

What is the implication for consumption in the sick and healthy states, respectively?

Expected utility model, implications

- Perfect insurance. Individual consumes same amounts in both states.

- With **concave utility** individuals are **risk averse** $\Leftrightarrow$ marginal utility of consumption is decreasing.

  $\Rightarrow$ Always desirable – in utility-terms – to take consumption from the high consumption state to the low consumption state.

- Thus far: No reason for government involvement.

Heterogeneity in risk across individuals

Suppose we have two types of individuals who face different risks: sickly ($q = q_S$) and healthy ($q = q_H$), with $q_S > q_H$.

First scenario: Symmetric (full) information: Both insurance companies and individuals observe q_S and q_H-types.

Then insurance companies will offer two policies, one for each type. Because of perfect competition, the contracts will be actuarially fair:

$$\{p_S, b_S = \frac{p_S}{q_S}\}$$

$$\{p_H, b_H = \frac{p_H}{q_H}\}$$

Each type $(T = S, H)$ will buy perfect insurance and consume the same amounts in both states (L and H):

$$c_{SL} = c_{SH} = W - q_S d$$

$$c_{HL} = c_{HH} = W - q_H d$$

so that $b_S = b_H = d$, and

$p_S = d \times q_S;\ p_H = d \times q_H$.

Role of insurance? Equalization of consumption **within** a type but not **across** types.

I.e., market will have **inequality in insurance premia** but no market failure.

- Thus far: No reason for government involvement.

Heterogeneity continued

Second scenario: Asymmetric information: Insurance companies cannot observe q_S and q_H-types, but individuals do.

What would happen if the insurance company offered two policies as before?

$$\{p_S = q_S \times d, b_S = d\}$$
$$\{p_H = q_H \times d, b_H = d\}$$

Everybody would buy the healthy insurance which is cheaper (healthy-plan). $\Rightarrow$ Insurance company makes losses.

$\Rightarrow$ Cannot be an equilibrium [this is called adverse selection].

The market for insurance **fails**.

Market Unravelling

- Insurance companies start offering insurance at average price.

  Average price is good for sickly, but bad for healthy.

⇒ Mostly sickly buy the plan.

⇒ Insurance companies make losses ⇒ Raise the price.

⇒ Only highly sickly buy the plan.

⇒ Insurance companies make losses again ⇒ No insurance offered
  at all even though everyone wants insurance.

Two equilibrium possibilities:

1. Pooling equilibrium: Insurance companies offer a contract based on average risk (good deal for sickly, mediocre deal for healthy, but maybe better than no insurance).

    - Healthy buy the premium at higher price if sufficiently risk averse.

2. Separating equilibrium: Insurance companies offer two contracts: one expensive contract with full insurance for sickly, one cheap contract with partial insurance for the healthy. The types self-select into the contracts.

    Separating equilibrium **not efficient**. Healthy are underinsured relative to the perfect-information case.

   ⇒ Role gov't intervention.

How does the government address adverse selection (AS)?

- The gov't addresses AS (and improves efficiency), but it involves redistribution, which may be unpopular.

- Natural solutions:

(i) impose a mandate (= everybody must buy the insurance).
  - Real-world example: car insurance.

(ii) public provision.
  - Health insurance.

- If price is the same for everyone, the low risk (healthy) end up subsidizing the high risk (sickly).

- Is this necessarily bad? If being sickly is not the consequence of individual choices, society may want to compensate them.

- This argument explains why all OECD countries have adopted universal health insurance (with US being the last one).
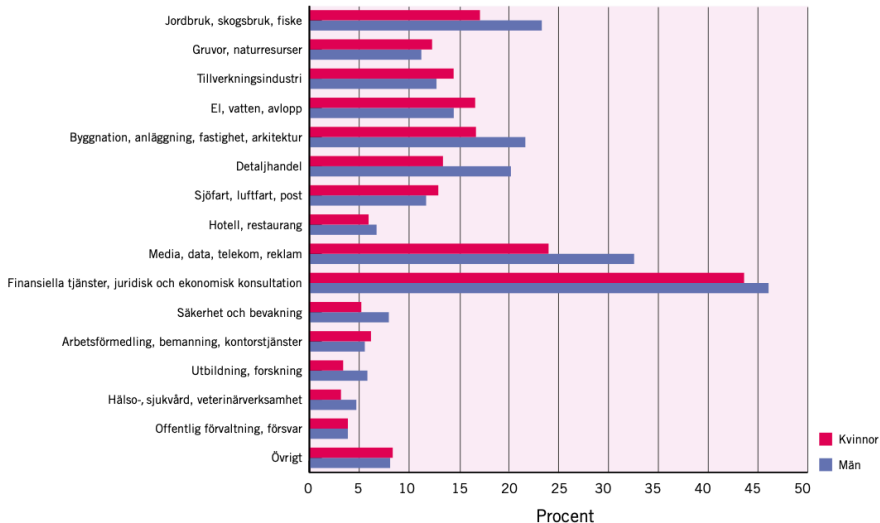
Interaction b/w Gov't and Private markets

In Sweden, health insurance publicly provided. Yet, private market is growing fast.

Antal, tusental

Legend: Totalt, Arbetsgivarbetald, Individuell, Grupp
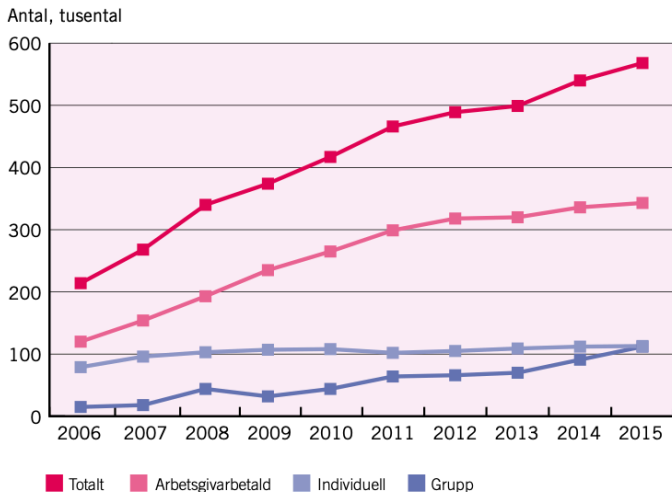
Source: Palme (2017).

Division by Gender and Industry

Other rationales for social insurance

- Your lack of insurance $\Rightarrow$ my probability of illness $\Uparrow$ (negative physical externality).

- Example 1: flu shots protect the individual who gets it, but also indirectly others as the flu is contagious.

- Example 2: If you dont have auto insurance and crash into me, my insurance company and I bear the cost.

Administrative costs

- The administrative costs for Medicare $<$ 2 % of claims paid. Administrative costs for private insurance are 14 %!

- $\Rightarrow$ At those higher prices, some not-very-risk-averse individuals do not buy insurance.

- Administrative inefficiencies lead to market failure, as not all are fully insured, which would be optimal.

Other rationales for social insurance

Redistribution

- Genetic testing solves a lot of asymmetric information problem. But, do you want to charge a higher premium for those with elevated cancer risks?

- Pricing based on average risk involves redistribution which is preferable.

Individual failures

- Individuals may not appropriately insure themselves against risks if the government does not force them to (because of myopia, lack of information, self-control problems).

- If individuals understand their own failures, they will support social insurance.

- If individuals do not understand them, they will oppose social insurance.

Social vs self-insurance

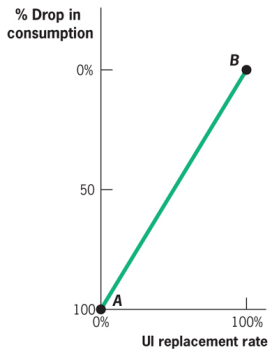**Self-insurance:** Private consumption smoothing over adverse events.

Example: Unemployment insurance.

Individuals typically do **not** have private unemployment insurance, but they have other means to smooth consumption:
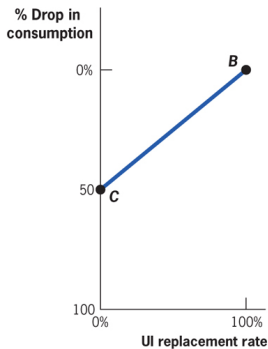
- Decumulate assets (savings).

- Borrow.

- Other family members (e.g. spouse) can increase their labor earnings.

- Receive transfers from extended family, friends, or local organizations.
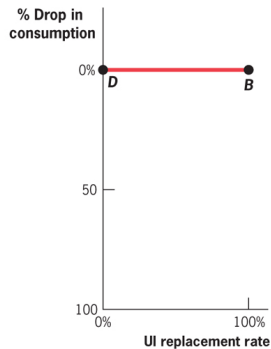
⇒ Public UI crowds out private UI.

Social vs self-insurance: How much consumption smoothing?

(a) No self-insurance; full consumption smoothing by UI

(b) Partial self-insurance; partial consumption smoothing and partial crowding out by UI

(c) Full self-insurance; full crowding out by UI

Moral hazard

Moral hazard: Adverse actions taken by individuals or producers in response to insurance against adverse outcomes.

Example: Unemployment insurance benefits replace lost wages ⇒ do not search as hard for a new job.

Moral hazard exists as long as insurer **cannot observe perfectly** the insured person. This leads insurers to not offer perfect insurance.

- **What Determines Moral Hazard?**
    - How easy it is to observe whether the adverse event has happened.

    - How easy it is to change behavior in order to establish the adverse event.

- **Moral Hazard Is Multidimensional**
    - In examining the effects of social insurance, four types of moral hazard play a particularly important role:

    1. Reduced precaution against entering the adverse state.

    2. Increased odds of entering the adverse state.

    3. Increased expenditures when in the adverse state.

    4. Supplier responses to insurance against the adverse state.

Important social insurance components

- **Unemployment insurance (UI)**

- Qualifying event: Job loss, job search

- Duration: 26-65 weeks

- Difficulty of verification: Job loss – easy. Search intensity – difficult.

- **Disability insurance** (*Sjukersättning; Förtidspension*)

- Qualifying event: Disability

- Duration: Indefinite

- Difficulty of verification: Observe disability – quite difficult.
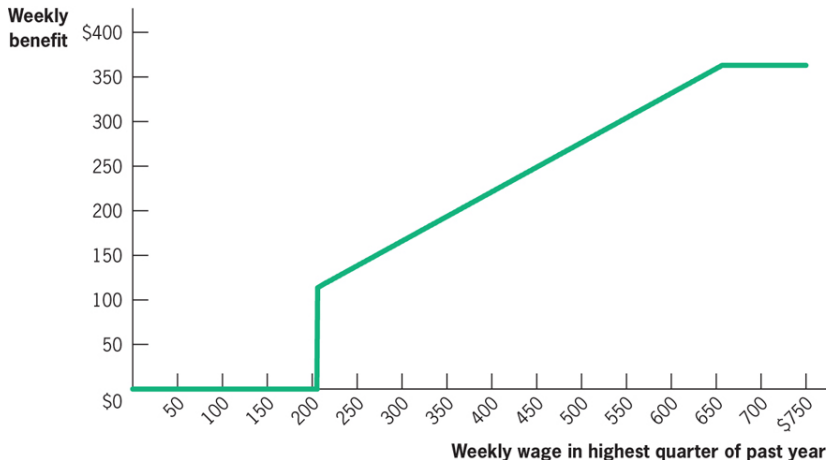
Unemployment insurance (UI)

- Large program in developed countries.

- Macroeconomic stabilization / stimulus tool.

- **Benefit:** Helps smooth consumption.

- **Cost:** Reduces incentives to search while unemployed.

UI Benefits

Benefits are typically a function of previous earnings.

Replacement rate: $R = B/W$

Weekly benefit vs. Weekly wage in highest quarter of past year

Optimal Unemployment Insurance

How do we know what is the optimal level of unemployment insurance?

Need a mathematical framework with a well-defined objective – what should the government maximize?

Typically society maximizes agent's welfare.

Expected utility model, formally

Individuals' expected utility is:

$$EU = (1-p)U(c_e) + pU(c_u) = (1-p)U(w-t) + pU(b)$$

p : probability of unemployment

c_e : consumption in employment

c_u : consumption in unemployment

w : wage when working

t : tax used to finance program

b : UI benefit

Government's budget is balanced: $t(1-p) = pb$.

Optimal UI with no moral hazard

What is moral hazard here?

p is affected by UI through individuals' actions.

Using govt budget, expected utility is:

$$EU = (1-p)U(w - \frac{pb}{1-p}) + pU(b)$$

Govt objetive: find b that maximizes utility.

Optimal UI with no moral hazard

- What is **moral hazard** here?

- UI $\Rightarrow p$ ($b \Uparrow \Rightarrow$ I search less, $p \Downarrow$).

  Using govt budget, expected utility is:

  $$EU = (1-p)U(w - \frac{pb}{1-p}) + pU(b)$$

  Govt objetive: find b that maximizes utility.

  Case 1. No moral hazard $\Rightarrow p$ not affected by b.

- Solution: b^* implies that $c_e = c_u$.

  Full insurance!

Optimal UI with moral hazard

- Case 2. Moral hazard:

  UI $\Rightarrow p$ ($b \Uparrow \Rightarrow$ I search less, $p \Downarrow$).

- Govt chooses b to maximize EU, **recognizing that p is a function of b:**

$$EU = (1-p)U(c_e) + pU(c_u) = (1-p)U(w-t) + pU(b)$$

New formula for optimum:

$$\frac{U'(c_u) - U'(c_e)}{U'(c_e)} = \frac{1}{1-p}\varepsilon_{p,b}$$

where $\varepsilon_{p,b}$ is the elasticity of unemployment probability w.r.t. benefits (moral hazard).

Optimal benefits are increasing in curvature of u and decreasing in elasticity.

Unemployment insurance features

- So far, everyone is covered by UI $\Rightarrow$ Moral hazard issues

- Sweden is an exception to this **rule**.

  $\Rightarrow$ UI Membership is **voluntary**.

  (Basic mandated coverage + voluntary supplemental coverage)

- Premium heavily subsidized (far from actuarially fair).

  $\Rightarrow$ Adverse selection (AS).

Premium and membership
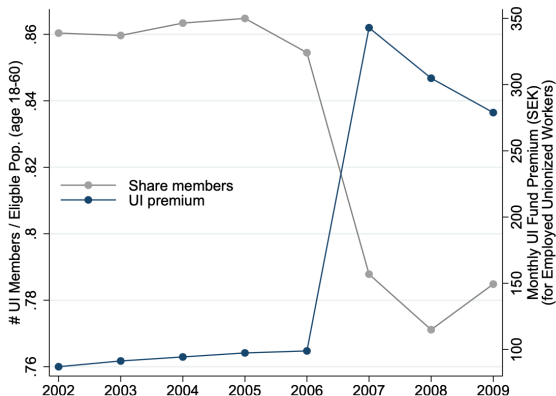
- Source: Landais et al. (2018)
- Result: Despite strong AS, current setting is better than full mandate.

REFERENCES

- Jonathan Gruber, Public Finance and Public Policy, Fifth Edition, 2018 Worth Publishers, Chapter 12 and 14.

- Landais, C., A. Nekoei, P. Nilsson, D. Seim and J. Spinnewijn, 2018. "Risk-based selection in unemployment insurance: Evidence and implications", (link).

- Mårten Palme, 2017. "Vem har privat sjukvårdsförsäkring i Sverige", Svensk Försäkrings rapportserie Vår framtida välfärd, Särtryck av Del 5, (link).