Social Insurance with Private Insurance Markets

1 Overview

• in many insurance applications, public and private insurance co-exist

• even when private insurance markets may not be important, such as with UI, there exist other channels for private insurance such as informal (intra-household) risk-sharing arrangements or employer provided severance pay

• have ignored the endogenous reaction of such private insurance when designing social insurance so far, “crowding out”

• more generally, when should insurance be provided publicly or privately, markets versus governments (especially in health insurance)?

2 Social Insurance with Endogenous Private Insurance

2.1 Setup

• Chetty and Saez (AEJ Policy 2010)

• basic idea: account for private insurance in Bailey-Chetty formula

• what are the quantitative effects from accounting for it compared to ignoring it?

• as before, simple moral hazard model with two states \((z_H, z_L)\) (low state is negative shock, e.g. job loss)

• probability of \(z_H\) is \(e\), chosen unobservedly by individual at cost \(\psi(e)\)

• insurance contract pays \(B\) in low state and requires premium \(T\) from individual in high state

• break even

\[ eT = (1 - e)B \quad \Rightarrow \quad T = \frac{1 - e}{e} B, \]
so consumption levels are a function of $B$ only:

$$
\begin{align*}
  c_H &= z_H - \frac{1-e}{e} B, \quad c_L = z_L + B \\
  c_H &= z_H - \frac{1-e^*}{e^*} B, \quad c_L = z_L + B
\end{align*}
$$

- individual effort $e^*$ is a function of $B$ through the incentive constraint
- second best optimal contract $B$ maximizes

$$
W = e^* u \left( z_H - \frac{1-e^*}{e^*} B \right) + (1-e^*) u(z_L + B) - \psi(e^*) \tag{1}
$$

- $B$ is the total insurance coverage, composed of government provided insurance $b$ and private coverage $b_p$, $B = b + b_p$
- government sets premium $\tau = b(1-e)/e$, private insurer sets premium $\tau_p = b_p(1-e)/e$
- assume that private benefit level $b_p$ depends on public benefit $b$ through some function $b_p(b)$, capturing “crowding out”
- crowdout parameter

$$
r = -\frac{db_p}{db}
$$

gives rise to $B(b) = b + b_p(b)$, government sets $b$ to maximize (1)
- take FOC (using the envelope theorem, as we did for the standard Bailey formula) and define the elasticity of the probability of the low state $1-e^*$ w.r.t. the government benefit $b$

$$
\epsilon_{1-e^*b} \equiv \frac{d(1-e) b}{db} \frac{1-e}{1-e^*}
$$
to obtain the following welfare gain for a marginal increase in the social insurance benefit

$$
\frac{dW}{db} = (1-e)(1-r)u'(c_H) \left[ \frac{u'(c_L) - u'(c_H)}{u'(c_H)} \frac{\epsilon_{1-e^*b} 1 + b_p/b}{e \frac{1-e}{1-r}} \right] \tag{2}
$$
and thus the modified Bailey-Chetty formula

$$
\frac{u'(c_L) - u'(c_H)}{u'(c_H)} = \frac{\epsilon_{1-e^*b} 1 + b_p/b}{e \frac{1-e}{1-r}}
$$

- key new terms: crowdout $1-r$ and share of private insurance $b_p/b$
• interpretation: consumption smoothing effect as before, but moral hazard cost is now different

• key:

\[
\frac{de}{db} = \frac{de}{dB} \frac{dB}{db} = \frac{de}{dB} (1 - r)
\]

and thus

\[
\left(1 + \frac{bp}{b}\right) 1 - r = \frac{B \cdot d(1 - e) \cdot b}{b \cdot dB \cdot b} = \frac{e_{1-e,B}}{1 - e},
\]

so the RHS includes the moral hazard cost in terms of the total insurance coverage \( B \)

• note: private insurance amplifies the cost term since

\[
1 + \frac{bp}{b} > 1
\]

through the crowdout effect \( 1 - r \) and the mechanical effect from the fact that a smaller level of \( b \) is required to achieve a given level \( B \) (which is what eventually matters in terms of welfare)

• to get money metric, normalize welfare gain from increasing \( b \) (which is paid in the low state) by the welfare gain from raising consumption in the high state to get

\[
G(b) \equiv \left(\frac{dW}{db} \frac{1}{1 - e}\right) / \left(\frac{dW}{dz} \frac{1}{1 - e}\right) = \left(\frac{dW}{db} \frac{1}{1 - e}\right) / u'(c_H)
\]

\[
= (1 - r) \left[ u'(c_L) / u'(c_H) - 1 - \frac{e_{1-e,b}}{1 - e} \left(1 + \frac{bp}{b}\right) / (1 - e) \right]
\]

(3)

2.2 Application I: Unemployment Insurance and Severance Pay

• private insurance: severance payments

• focus on moral hazard problem from job loss, ignore moral hazard problem from job search upon unemployment

• need to estimate \( r \) and \( \frac{bp}{b} \)

• use data on severance pay from Chetty (JPE 2008)

• find

\[
\frac{bp}{b} = \frac{0.15 \times 10.7}{0.5 \times 15.8} = 0.2
\]
from

- 15% of job losers in dataset report receiving severance pay
- mean severance payment conditional on receipt is equal to 10.7 weeks of wages
- mean UI level is 50% of wage
- mean unemployment duration is 15.8 weeks

• as for $r$, exploit cross-state variation in UI benefit levels and regress

$$sev_i = \alpha + \beta \log b + f(w_i) + \gamma X_i + \epsilon_i$$

where $sev$ is indicator for severance payment, $b$ is UI benefit level, $f(w)$ is a wage spline and $X$ is a vector of additional controls

• use individual benefit level $b_i$ instrumented by maximum benefit in the state due to endogeneity of individual benefit as discussed last week

• however, even though state maximum benefits are exogenous to individual characteristics, they are not orthogonal to all aspects of the economic environment due to policy endogeneity

• e.g. richer states provide both more public and private insurance, so both state UI maximum benefits and the fraction of individuals receiving severance pay are positively correlated with mean wage rate in the state

• this is why flexible control for wages is included

• find $\beta = -0.105$ from 2SLS, i.e. doubling UI benefit would reduce severance receipt by 10.5 percentage points

• relative to mean of 15% implies $\epsilon_{b_p,b} = -0.7$ and thus

$$r = -\frac{db_p}{db} = -\epsilon_{b_p,b} \frac{b_p}{b} = 0.7 \times 0.2 = 0.14$$

• calibration of (3) using CRRA preferences with $\gamma = 2$ and

- $e = 0.95$ (5% unemployment rate)
- $r = 0.14$ from above
- $b_p/b = 0.2$ from above
- $c_L/c_H = 0.9$ from Gruber (AER 1997)
- leave $\varepsilon_{1-\epsilon,b}$ (elasticity of probability of job loss w.r.t. UI benefit) unspecified

- obtain
  \[
  G(b) = (1 - 0.14)(0.23 - 1.47\varepsilon_{1-\epsilon,b})
  \]
  and so increasing $b$ has a negative welfare effect if $\varepsilon_{1-\epsilon,b} > 0.15$

- in contrast, ignoring crowdout of private insurance would yield
  \[
  G(b) = 0.23 - 1.05\varepsilon_{1-\epsilon,b}
  \]
  and thus $G(b) < 0$ only if $\varepsilon_{1-\epsilon,b} > 0.25$

- adjusting formula for endogenous private insurance may lead to different policy implications

2.3 Application II: Health Insurance

- can adapt same model to health insurance

- purchasing health care costs $C$, only extensive margin (i.e. demand or don’t demand health care)

- continuum of agents who differ in valuation $v_i$ of health care

- purchase health care if
  \[
  u(w - C + b + b_p) + v_i > u(w - \tau - \tau_p)
  \]

- $v_i$ is distributed according to cdf $F$

- mass of agents who buy health care is then
  \[
  s = 1 - F(z)
  \]
  with
  \[
  z \equiv u(w - \tau - \tau_p) - u(w - C + b + b_p)
  \]
• aggregate utility gain from health care is
\[ v(s) = \int_{\mathbb{R}} v_i dF(v_i) = \int_{F^{-1}(1-s)} v_i dF(v_i), \]
increasing, concave

• aggregating over agents yields social welfare
\[ W = (1-s)u(w-\tau-\tau_p) + su(w-C+b+b_p) + v(s), \]
i.e. same structure as before, just \( s \) instead of \( 1-e \) and \( v(s) \) instead of \( -\psi(e) \)

• by the previous results, immediately get the (money metric) welfare gain of a marginal increase in public health insurance
\[ G(b) = (1-r) \left[ \frac{u'(c_L)}{u'(c_H)} - 1 - \frac{\varepsilon_{s,b}}{1-s} \frac{1+b_p/b}{1-r} \right] \]

• calibration:
  - \( s = 0.1 \) using inpatient usage rate from RAND HIE (Manning et al., AER 1987)
  - \( \varepsilon_{s,C} = -0.2 \) from RAND HIE (will discuss later)
  - \( r = 0.5 \) from Cutler and Gruber (QJE 1996)\(^1\)
  - \( b_p/b = 0.89, b/C = 0.45 \) from National Health Care Statistics (2006)
  - \( c_L/c_H = 0.85 \) from Cochrane (JPE 1991)
  - \( \gamma = 2 \) from Chetty (AER 2006)
  - note that \( \varepsilon_{s,b} = -\varepsilon_{s,C} \frac{b}{C} = 0.2 \times 0.45 = 0.09 \)

• yields welfare gain starting from current situation
\[ G(b) = (1-0.5) \left( 1.384 - 1 - \frac{0.09}{0.9} \frac{1+0.89}{0.5} \right) = 0.0017 \]
so suggests we are near the optimal level of public health insurance

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\(^1\)They use the expansion of Medicaid in the 1980/90s from very low income women and children in single-parent families to higher incomes and families with two parents, and find a 50% crowdout from reduced takeup of employer provided insurance coverage.
• if we had ignored private insurance markets,

\[ G(b) = 1.384 - 1 - \frac{0.09}{0.9} = 0.28 \]

so taking crowdout into account lowers estimated welfare gain by a factor of more than 100

• issues:
  
  – ignores adverse selection in private health insurance
  
  – if there is negative correlation between health shocks and income (ignored here), welfare gains from social insurance may increase (Netzer and Scheuer, JPubE 2007)\(^2\)
  
  – private health insurance is already subsidized in US
  
  – heterogeneity, e.g. there may be larger welfare gains for subgroups such as the uninsured
  
  – state-dependent utility (Finkelstein, Luttmer, Notowidigdo, 2008): marginal utility of consumption in case of illness?
  
  – ignores dynamic problems with private insurance markets
    
    * commitment problems from insuring premium/reclassification risk (Hendel and Lizzeri, QJE 2003, Cochrane, JPE 1995)
    
    * dynamic incentive problems for effort/saving (Golosov and Tsyvinski, QJE 2007)

3 Markets versus Governments

3.1 Overview

• public versus private provision of insurance in view of
  
  – adverse selection
  
  – commitment problems

• Netzer and Scheuer (JPE 2010)

\(^2\)Netzer and Scheuer (2007) also account for adverse selection in private markets and show how contracts endogenously react to social insurance and tax policy.
• idea:
  1. government/firms offer insurance contracts
  2. agents choose some hidden effort
  3. government/firms may change their contracts
  4. agents may switch firms (in case of private provision)

• key: in this dynamic setting, moral hazard problem becomes an adverse selection problem at the ex post stage (after effort has been chosen)

• as we’ve discussed, adverse selection is main (efficiency) argument for social insurance

• point out that, with lack of commitment, adverse selection is in fact the key reason why private markets perform (Pareto) better than the government

• addresses old question by Hayek (AER 1945) on when markets can do better than governments, overturns conventional wisdom that government can always replicate the market outcome (or even improve upon it in case of market failure)

• commitment problem: underinsurance optimal ex ante to provide effort incentives, but once effort is sunk, want to deviate to full insurance

• applications:
  – insurance with ex ante moral hazard, such as unemployment risk to workers, risk of illness to patients, default risk of loan portfolio to bankers
  – education and subsequent labor markets

3.2 Setup

• moral hazard problem with idiosyncratic output risk (can be interpreted as damage or illness risk as well)

• two possible output realizations: \( y_l, y_h \)

• hidden effort:
  – if choose high effort \( \varepsilon \), agent becomes good type who produces \( y_h \) with probability \( p_g \)
- low effort \( \varepsilon \): bad type, \( y_b \) realized with probability \( p_b < p_g \)

- separable preferences \( U(c) - H(e) \), use inverse \( \Phi(U) = U^{-1}(U) \)

- normalize \( H(\varepsilon) = 0 \), but there is ex ante heterogeneity in the cost of high effort (can interpret as skill type), i.e. \( H(\varepsilon) = d \) and \( d \sim G(d) \) on \([0, \infty)\)

- both \( d \) and \( e \) are unobservable, but output \( y \) is observable

### 3.3 Government without Commitment

- timing:
  1. agents choose effort level
  2. social planner announces social insurance scheme (2 contracts w.l.o.g.)
  3. agents choose preferred contracts
  4. output is realized

- note: dropped initial contract offers since irrelevant

- examples: social insurance with ex ante moral hazard, or education and salary structure in public sector/redistributive tax policy

- observation 1: effort choice must have threshold form, i.e. there exists \( \hat{d} \) such that \( e(d) = \bar{\epsilon} \) if \( d \leq \hat{d} \) and \( \varepsilon \) otherwise

- solve backwards: government forms belief about \( \hat{d} \) and, taking it as given, solves

\[
\max_{u_{g,h} \mid u_{g,l}} G(\hat{d})[p_g u_{g,h} + (1 - p_g) u_{g,l}] + (1 - G(\hat{d}))[p_b u_{b,h} + (1 - p_b) u_{b,l}]
\]

s.t.

\[
p_k u_{k,h} + (1 - p_k) u_{k,l} \geq p_k u_{k,h} + (1 - p_k) u_{k,l} \quad \forall k, \tilde{k} \in \{g, b\} \quad \text{(IC)}
\]

\[
G(\hat{d})[p_g \Phi(u_{g,h}) + (1 - p_g) \Phi(u_{g,l})] + (1 - G(\hat{d}))[p_b \Phi(u_{b,h}) + (1 - p_b) \Phi(u_{b,l})] \leq \mathbb{E}[y|\hat{d}] \quad \text{(RC)}
\]

- note that, at the ex post stage, effort is sunk, so government just faces an adverse selection problem

- Lemma: The solution always involves pooling at full insurance

\[
V^G(\hat{d}) \equiv u^G_{k,j}(\hat{d}) = U(\mathbb{E}[y|\hat{d}]) \quad \forall \hat{d}, k, j
\]
• intuition: utilitarian planner would only deviate from complete redistribution to improve effort incentives, but those are sunk at the ex post stage

• in paper, do more general analysis with Pareto weights $\Psi(\hat{d})$ and derive same result whenever $\Psi(\hat{d}) \leq G(\hat{d})$ (redistribution from high to low cost of effort types)

• now go back to optimal effort choice in stage 1. Suppose agents anticipate some policy $(u_{k,h}^G(\hat{d}), u_{k,l}^G(\hat{d}))$, $k = g, b$. Then their optimal effort strategy is given by the threshold

$$D^G(\hat{d}) \equiv p_g u_{g,h}^G(\hat{d}) + (1 - p_g) u_{g,l}^G(\hat{d}) - p_b u_{b,h}^G(\hat{d}) - (1 - p_b) u_{b,l}^G(\hat{d})$$

• in equilibrium, need fixed point condition $\hat{d} = D(\hat{d})$

• by Lemma 1, $D^G(\hat{d}) = 0 \forall \hat{d}$, so there is a unique fixed point $\hat{d} = 0$

• nobody provides effort, full insurance in unique equilibrium $(0, V^G(0))$. same if $\Psi(d) \succeq_{FOSD} G(d)$. complete breakdown of incentives under government without commitment.

3.4 Competitive Markets without Commitment

• same timing and commitment/informational constraints:

1. agents choose effort
2. some market game takes place, resulting in set of offered contracts
3. agents choose their preferred contract

• in paper, very general treatment of stage 2 (axiomatic approach to capture entire set of reasonable market outcomes under adverse selection)

• here: focus on Miyazaki-Wilson outcome for simplicity, which solves

$$\max_{u_{b,h}, u_{b,l}, u_{g,h}, u_{g,l}} \left[ p_g u_{g,h} + (1 - p_g) u_{g,l} \right]$$

s.t. (IC), (RC) and

$$\Phi(p_b u_{b,h} + (1 - p_b) u_{b,l}) \geq p_b y_h + (1 - p_b) y_l \quad \text{(CS)}$$

• almost same as planning problem for the government but
– different objective: all Pareto weight on ex post good types
– additional constraint (CS): requires that certainty equivalent of bad types’ contract is at least as high as their expected output, i.e. cross-subsidization can only go from good to bad types (bad types’ contract cannot make profits)

• if (CS) binds, get Rothschild-Stiglitz outcome without cross-subsidization (bad types get full and good types underinsurance, both contracts are fair). In particular, they don’t depend on \( \hat{d} \) and are such that

\[
D^{RS}(\hat{d}) = p_g u^{RS}_{g,h} + \left(1 - p_g\right) u^{RS}_{g,l} - u^{RS}_b = \Delta > 0 \forall \hat{d}
\]

• for higher \( \hat{d} \), get cross-subsidization from low to high risks, and \( D^{MW}(\hat{d}) \) declines continuously to zero for \( \hat{d} \to \infty \)

• see graph, there exists strictly positive fixed point \( \hat{d}^* > 0 \)

• immediately implies that market without commitment implements more effort than government without commitment

• but result is even stronger

• Theorem: The market outcome \( V^{MW}(\hat{d}^*) \) Pareto dominates the outcome with a government \( V^G(0) \), and strictly so if (CS) is slack.

• idea:
  – with government, everyone ends up as a bad type and gets full insurance at the fair rate for bad types
  – with the market, some agents remain bad types and also get full insurance at the fair or a subsidized rate \( \to \) better off (and strictly so if (CS) does not bind)
  – others prefer to become good types and choose a contract that they strictly prefer to the bad types’ contract \( \to \) always strictly better off than with government

• ex post adverse selection with underinsurance/separation is key for the market to be able to Pareto dominate the government

• market in aggregate acts like a social planner who only cares about good types ex post, thus providing maximal effort incentives

• casts doubt on policies that aim at reducing contract discrimination/separation and underinsurance