The Insurance Market

The discussion is based on Rothschild and Stiglitz (QJE, 1976)

Question: Why do we see a menu of different price-quantity combinations being offered in the insurance market?

The authors posed this question in the backdrop of the prevailing paradigm of competitive markets, with single price and market clearing quantities.

They show that once you take into account asymmetric information, competitive equilibria may not exist, and when they exist, they might have 'unusual' properties.

Consider an individual who has wealth W if there is no accident, and would suffer a loss d if an accident happens, and wealth will be $W - d$ in that case.

She can buy insurance, pay premium α_1, and get reimbursed $\hat{\alpha_2}$ if accident happens.

Let $\alpha_2 = \hat{\alpha_2} - \alpha_1$; this is net payment to consumer if accident happens.

Without insurance, the consumer's wealth in the two states, 'no accident' and 'accident' is $(W, W - d)$

With insurance, wealth would be $(W - \alpha_1, W - d + \alpha_2)$

The pair (α_1, α_2) characterizes an insurance contract.

The 'state-space' representation

Let 'no accident' be state 1, and 'accident' be state 2, and W_1 be consumer's income in state 1 and W_2 be income in state 2.

Consumer's expected utility

$$\hat{V}(p, W_1, W_2) = (1 - p)U(W_1) + pU(W_2)$$

where p is the probability of an accident and $U(\cdot)$ is the utility of money income. Assume $U'(\cdot) > 0$ and $U''(\cdot) < 0$.

Consumer's demand for insurance

The value of an insurance contract $\alpha = (\alpha_1, \alpha_2)$ to the consumer is

$$V(p, \alpha) = \hat{V}(p, W - \alpha_1, W - d + \alpha_2)$$

which is

$$(1 - p)U(W - \alpha_1) + pU(W - d + \alpha_2)$$

From all the contracts on offer, consumer would choose α to maximize $V(\alpha, p)$

She always has an option not to buy insurance, hence she will buy insurance only if

$$V(p, \alpha) \geq V(p, 0) = \hat{V}(p, W, W - d)$$

We will first consider a market with identical consumers, with same p.

Now we are going to make some assumptions about the supply side of the market, the insurance firms. Some of these assumptions are ad hoc, to simplify things. Part II of R-S paper argues that the key insights of the model are robust to these assumptions.

We assume:

- risk neutral firms, expected profit maximizers
- competitive market, i.e free entry
- firms have the resources to supply any number of contracts, i.e if a contract is profitable (in expectation), and if there's a buyer for it, it will be supplied. In other words, no rationing due to capacity constraints.

Expected profit of selling a contract α, where consumers all have the same probability of accident p

$$\pi(\alpha, p) = \alpha_1 - p\hat{\alpha_2} = \alpha_1 - p(\alpha_1 + \alpha_2)$$

With free entry and competition, in equilibrium firms will earn zero expected profit.

The 'competitive' equilibrium set of contracts in this market is characterized as follows:

- consumers maximize expected utility
- no contract offered in equilibrium makes negative expected profit
- any contract that makes non-negative expected profit is offered