Example # 2: insurance with adverse selection (Campbell, ch 3.10)

issue: when individuals apply for insurance, insurer cannot identify likelihood of loss

- health
- attitude towards driving

does this unobservable heterogeneity explain some properties of insurance policies? - in particular, combinations of deductible and cost?

<u>Set-up</u>:
Two types of individuals; differ in *exogenously det'd* risk: indexed by π ; high risk is π_h; low risk π_l

(Note:ranking as in general case, with π instead of θ)

Assume: individuals are risk averse in income

Market: consider competitive market (rather than monopoly)

- profits = 0 will drive results

Who's what? Principal = planner
Agents = individual demanders of insurance

<u>Benchmark</u>: first best insurance
consider single individual:

- probability of accident is π ; price p is exogenous (market determined); utility is $U(w)$
- value of *w* depends on state (accident or not) and amount of insurance

- State 1: accident; consumption is wealth=x: *a* if no insurance, a+c if has insurance.
- State 2: no accident; consumption is w=y: z if no insurance purchased, z-pc if has insurance;

Ind'ls expected utility: EU = $\pi u(x) + (1-\pi)u(y)$

without insurance, EU=$\pi u(a) + (1-\pi)u(z)$

if buy insurance, EU = $\pi U(a+c) + (1-\pi)U(z-pc)$

In state space, slope of iso-EU curve is

$$\frac{dC_2}{dC_1} = -\frac{\pi U'(x)}{(1-\pi)U'(y)}$$

$= -\pi/(1-\pi)$ where $y = x$, along certainty line

*Ind'l with higher risk, who has $\pi_h > \pi_l$, will have *steeper* IC

What about the budget line the individual faces?

- depends on cost of insurance, p
- if individuals are identical
- on representative policy,

Exp profits = $-\pi c+(1-\pi)pc$

- how will this change as coverage changes?

- compet've industry: zero expected profits on the avg policy: Implies $p=\frac{\pi}{(1-\pi)}$

- if $p>\frac{\pi}{(1-\pi)}$, expected profits are strictly positive.

- then individual's budget line: for any state contingent wealth pairs,

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$$Ew=\pi x+(1-\pi)y \;=\pi(a+c)+(1-\pi)(z-pc)$$

- holding wealth constant

$$dEw=\pi dx+(1-\pi)dy=\pi dx+\frac{\pi}{p}dy=0$$

So slope of budget line is $-p=-\frac{\pi}{1-\pi}$

This equals slope of iso-EU along certainty line

Hence: optimal choice of insurance, if *fair* insurance (that is, with zero expected profits)- full insurance: consumer moves to certainty line.

So: benchmark equilibrium?

Both types of consumers purchase full insurance.
Cost depends on type: high risk consumers pay more than low risk consumers:

$$p_l = \frac{\pi_l}{(1-\pi_l)} < \frac{\pi_h}{(1-\pi_h)} = p_h$$

So if no accident, high risk consumers have lower wealth; full insurance equates wealth across states, so high risk consumers have lower EU=realized U.

<u>Private information on risk</u>

Are 1st best contract feasible? No: high risk ind'l has incentive to misrepresent, to lower price & raise U.

Since high risk ind'l must be paid to reveal true risk, in eq'm with adverse info this ind'l will receive higher EU.

Low risk individuals will choose a contract which

1. gives them higher EU than being taken as high risk (and paying higher price)
2. satisfies self- selection constraint for high risk

Result: high risk get full insurance, higher price
low risk take less-than-full insurance: lower price and deductible.
firms? still competitive, still make Eprofits=0