Two types: prob of accident $= \underbrace{p_1}_{\text{prob } \alpha_1} < \underbrace{p_2}_{\text{prob } \alpha_2}$

Expected utility w/o insurance: $u' > 0 > u''$

$(1-p_i)u(w) + p_i u(w-L)$ (↓ when p_i ↑)

Contract "chosen" by type p_i:

$(\underbrace{I_i}_{\text{premium}}, \underbrace{D_i}_{\text{deductible}}) \mapsto \text{Utility} = p_i u(w - D_i - I_i) + (1-p_i)u(w - I_i)$

First best: $D_i = 0$, $I_i = p_i L$

assume perfect competition among insurance providers.

To derive FB:

$$\max_{I_i, D_i} (1-p_i)u(w - I_i) + p_i u(w - (D_i + I_i))$$

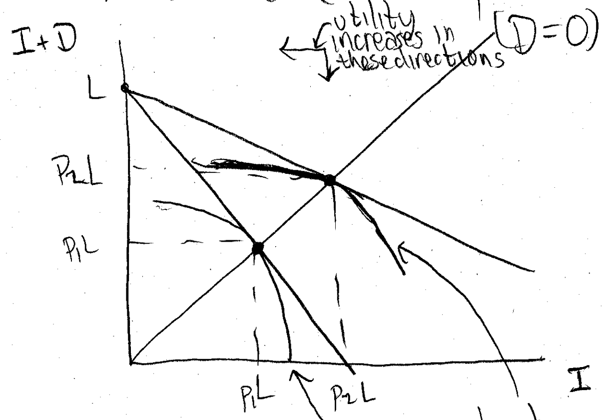
$$\text{s.t. } I_i \geq p_i(L - D_i)$$

$$\Rightarrow \underbrace{D_i = 0}_{\substack{\text{by risk} \\ \text{aversion}}}; \underbrace{I_i = p_i L}_{\substack{\text{by zero} \\ \text{profit condition}}}$$

Second best (adverse selection):

- Incentive constraints: If $(I_1, D_1) \neq (I_2, D_2)$, then we need to ensure that type i chooses (I_i, D_i) over (I_{-i}, D_{-i}) and $\underbrace{(0,0)}_{\text{no insurance}}$.
- Look for pooling and separating equilibrium.

Cannot have a pooling equilibrium.



First best contract
- $I_1 = p_1 L$
- $I_2 = p_2 L$
- $D_1 = D_2 = 0$

Separating contracts

high-risk type indifference curve

low-risk type indifference curve

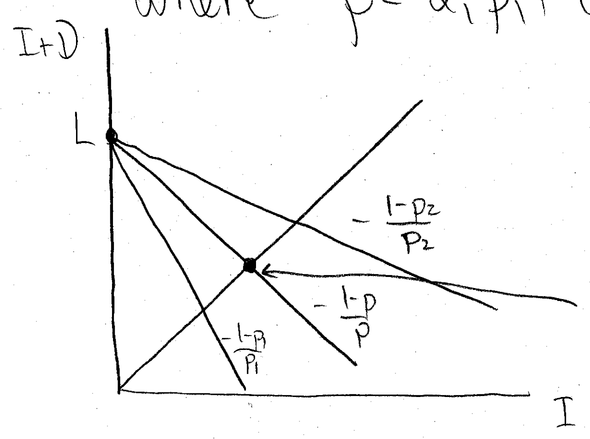
- If given access to both, the high-risk type will choose the low-risk type's bundle.

Consider a pooling contract $(I_i, D_i) = (I, D)$ $i = 1,2$
- Zero profit condition: $I = p(L-D)$

$$\Leftrightarrow (1-p)I = pL - p(I+D)$$

$$\Leftrightarrow (I+D) = L - \frac{1-p}{p} I$$

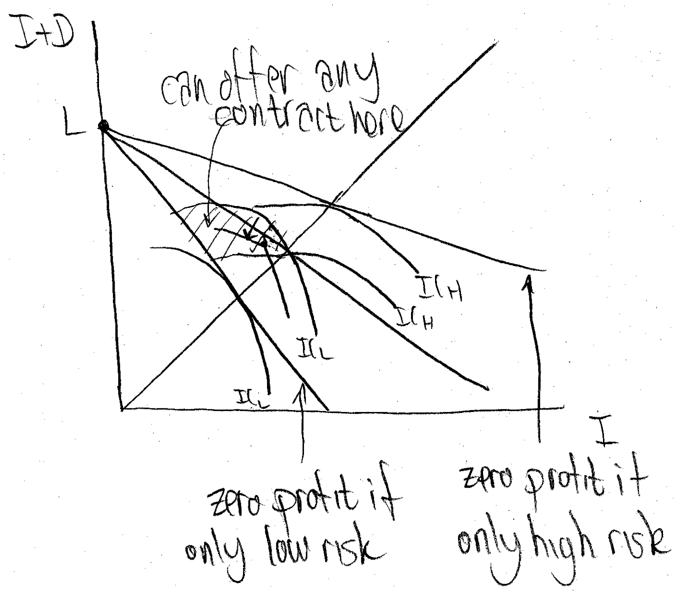
where $p = \alpha_1 p_1 + \alpha_2 p_2$, α_i - prob of type i



zero profit pooling contract.

Can we have a zero profit pooling equilibrium?

- No. It is possible for an entrant to offer a contract that is strictly better for the low risk, strictly worse for the high risk type, and yields positive profits, since only the low risk types will buy.



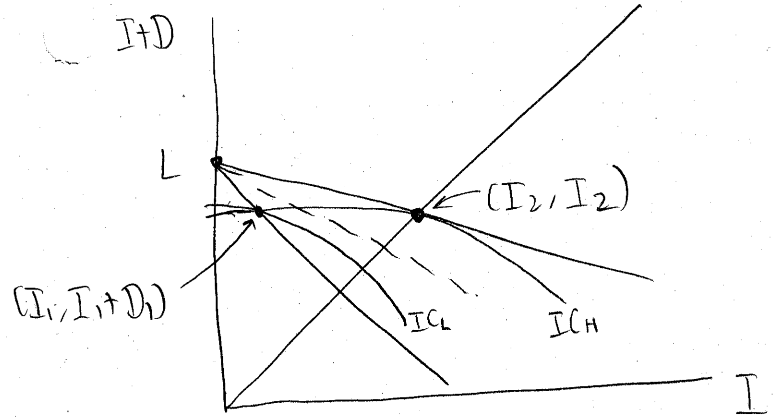
- Offer something with nonzero deductible and lower premium
- This is not a Nash equilibrium, since this entrant "deviates" from not entering to entering.

Can we have a zero profit separating equilibrium?

- Want:
  - $I_1 = p_1(L - D_1)$
  - $I_2 = p_2(L - D_2)$ } zero profit
  - $(I_1, D_1) \neq (I_2, D_2)$ separating

Two incentive constraints:

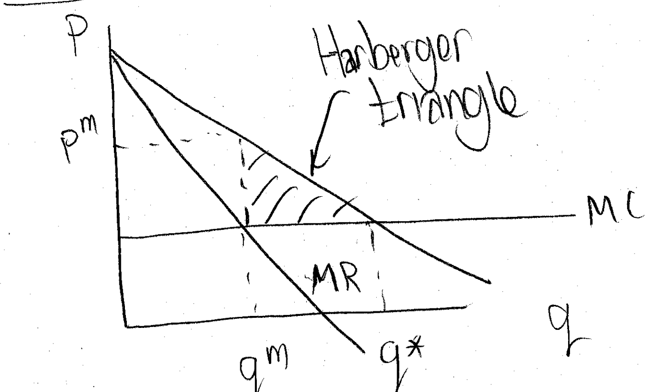
$$p_1 u(W - (I_1 + D_1)) + (1-p_1) u(W - I_1) \geq p_1 u(W - (I_2 + D_2)) + (1-p_1) u(W - I_2)$$
$$p_2 u(W - (I_2 + D_2)) + (1-p_2) u(W - I_2) \geq p_2 u(W - (I_1 + D_1)) + (1-p_2) u(W - I_1)$$



- High risk type is indifferent
- Both contracts are zero-profit.
- These are just necessary conditions for an equilibrium.

- There may be a profitable deviation by an entrant firm to offer a pooling equilibrium, depending on the proportion of high risk/low risk people,
  - Not as it is drawn in the above diagram, though.

Monopolist choosing optimal nonlinear pricing



Monopolist + Linear pricing = bad

- Two-part tariff
  - $P_m = mc$
  - fee $= \underbrace{U(q_c)}_{\int_0^{q_c} p(q)\,dq} - P_m q_c \equiv F$

- Need $U(q_c) - F - P_m q_c \geq 0$ for participation constraint