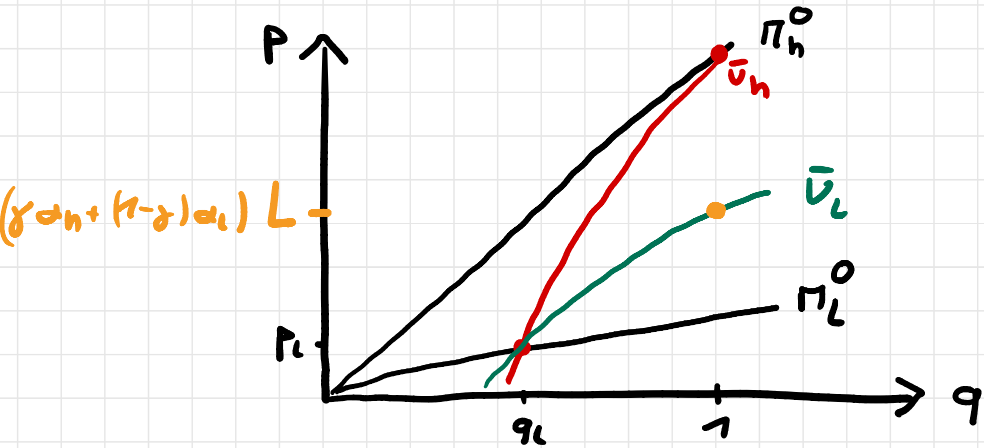
E 15: $(\gamma \alpha_h + (1-\gamma)\alpha_L) \cdot L$

- this is the expected loss of a random consumer



- as low risk type is indifferent between his RS contract and $(1, (\gamma\alpha_h + (1-\gamma)\alpha_L)L)$, the contract $(1, (\gamma\alpha_h+(1-\gamma)\alpha_L)L)$ has to be on $\bar{U}_L$

- $(1, (\gamma\alpha_h + (1-\gamma)\alpha_L)L)$ is on π_0^{pool}

↳ if π_0^{pool} is steeper than $\bar{v}^L$ at $q=1$, then there are pooling contracts with q slightly less than 1 that are profitable and attract both types $\Rightarrow$ no RS equilibrium exists.

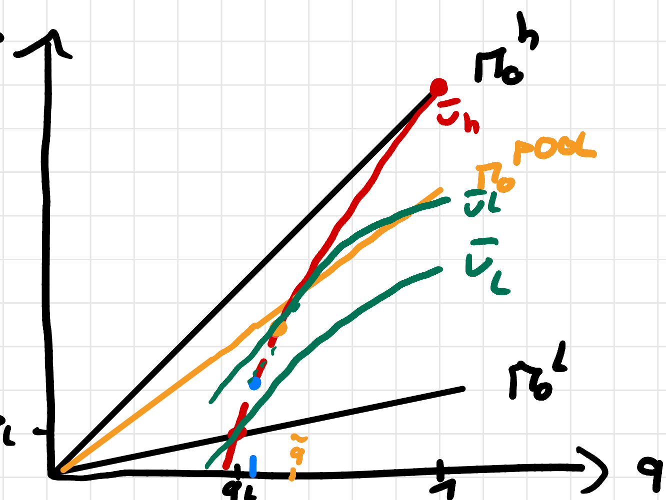
slope of π_0^{pool}:

$$(\gamma \alpha_h + (1-\gamma)\alpha_L)L$$

slope of $\bar{v}^L$ at $q=1$ is

$$\alpha_L L$$

E 14 ip



$\bar{q} \leq q_L$: RS - eq.

$q_L < \bar{q} \leq \hat{q}$: • $\bar{q}$, premium such that high risk type is indifferent between both contracts

if $\bar{q} > \hat{q}$: then there is no RS-eq as $\bar{U}^L$ through his contract intersects π_0^{pool}

if $q^L \leq \bar{q} \leq \hat{q}$:

- low risk type's expected utility is lower as • is above $\bar{U}_L$
- insurers benefit as they make positive profits with low risk types as • is above π_0^L

E 16:

- if immediate changes are possible, people might only buy insurance (upgrade to more coverage) after falling ill
  - ↳ this makes insurance impossible as at this point the risk already realized.

E 17: $u(x) = \sqrt{X}$ $W = 9$ $\alpha = \frac{1}{2}$

$L = 5$

a) $u(CE) = EU_{no\ ins}$

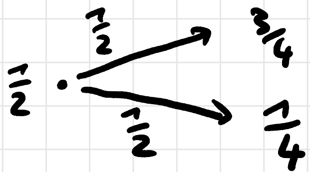
$$\sqrt{CE} = \frac{1}{2}\sqrt{9} + \frac{1}{2}\sqrt{9-5} = 2.5$$

$$\Leftrightarrow \quad CE = 2.5^2 = 6.25$$

$$RP = \frac{1}{2} \cdot 9 + \frac{1}{2}(9-5) - 6.25$$

$$= 1/4$$

b)



$$\sqrt{CE_h} = \frac{1}{4}\sqrt{9} + \frac{3}{4}\sqrt{9-5} = 2.25$$

$$\Leftrightarrow \quad CE_h = 2.25^2 = 5.0625$$

$$RP_h = \frac{1}{4} 9 + \frac{3}{4}(9-5) - 5.0625$$

$$= 5.25 - 5.0625$$

$$= 0.1875$$

$$\sqrt{CE_L} = \frac{3}{4}\sqrt{9} + \frac{1}{4}\sqrt{9-5} = 2.75$$

$$CE_L = 2.75^2$$

$$RP_L = \frac{3}{4} \cdot 9 + \frac{1}{4}(9-5) - 2.75^2$$

$$= 3/16$$

eq. with public tests:

- for low risks: $q_L = 1$ $p_L = \frac{1}{4} \cdot 5$

  ↳ expected utility

  $$\sqrt{9 - 5/4} = 2.78$$

- for high risks: $q_h = 1$ $p_h = \frac{3}{4} \cdot 5$

  ↳ exp. utility:

  $$\sqrt{9 - 15/4} = 2.29$$

exp. utility of a consumer is $\frac{1}{2} \cdot 2.78 + \frac{1}{2} 2.29$ $= 2.535$

eq. without test:

$q = 1 \qquad p = \frac{1}{2} \cdot 5$

↳ exp utility :

$$\sqrt{9 - 5/2} = \underline{2.55}$$

13 e) · In RS-eq., the high risk type has full coverage and has premium $\alpha_h \cdot L$.

↳ $q_h = 1 \qquad p_h = \frac{1}{2} \cdot 5 = 2.5$

· In RS-eq. the low risk type's premium is fair due to perfect competition

$$\Rightarrow \quad p_l = \alpha_l L \cdot q_l = \frac{1}{4} \cdot 5 \cdot q_l$$

· Indifference curve of the high risk type through (q_h, p_h):

· expected utility of high risk type:

$$u(W - p_h) = -\frac{1}{2}(W - p_h)^2 + 10(W - p_h)$$

$$= -\frac{1}{2}(9 - 2.5)^2 + 10\ (9 - 2.5)$$

$$= 43.875$$

· expected utility of the high risk type in a contract (q, p):

$$\alpha_h\, u(W-(1-q)L-p)+(1-\alpha_h)\,u(W-p)$$

- indifference curve:

$$43.875 \stackrel{!}{=} \alpha_h\, u(W-(1-q)L-p)+(1-\alpha_h)\,u(W-p)$$

$$\Leftrightarrow\ 43.875 = \tfrac{1}{2}\left(-\tfrac{1}{2}\left[9-(1-q)5-p\right]^2+10\left[9-(1-q)5-p\right]\right)$$
$$+\tfrac{1}{2}\left(-\tfrac{1}{2}\left[9-p\right]^2+10\left[9-p\right]\right)$$

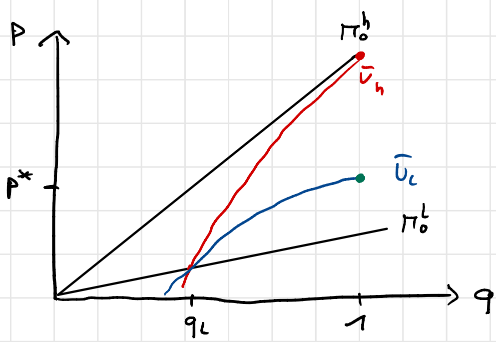
- zero profit line of low risk type:

$$p=\alpha_L L\cdot q = \tfrac{1}{4}5\,q$$

- to determine q_L: plug $p=\frac{5}{4}q$ into ⊛ and solve the resulting equation for q.

  ↳ $q_L = 0.3355$

  $p_L = 0.4193$



Is • above the π_0^P ?

- π_0^P: $p=(\gamma\,\alpha_h+(1-\gamma)\,\alpha_L)\cdot L\cdot q$

  ↳ here we consider only $q=1$

- $\bar{U}_L$:

  expected utility low risk type:

$$\frac{1}{4} v\left(9-(1-0.3355)\cdot 5-0.4193\right)$$

$$+\frac{3}{4} v\left(9-0.4193\right)$$

$$=\frac{1}{4}\left(-\frac{1}{2}\left[9-(1-0.3355)\cdot 5-0.4193\right]^2\right.$$

$$\left.+10\left[9-(1-0.3355)\cdot 5-0.4193\right]\right)$$

$$+\frac{3}{4}\left(-\frac{1}{2}\left[9-0.4193\right]^2+10\left[9-0.4193\right]^2\right)$$

$$= U_L^{eq}$$

indifference curve:

$$U_L^{eq} \stackrel{!}{=} \frac{1}{4} v\left(W-(1-q)L-p\right)+\frac{3}{4} v\left(W-p\right)$$

here $q=1$:

$$U_L^{eq} = v(W-p)$$

$$= -\frac{1}{2}(9-p)^2+10(9-p)$$

$\hookrightarrow$ solve for p, denote result by p^*, then

for which γ is $(1, p^*)$ above the zero profit pooling line?

$$\left(\gamma \alpha_h+(1-\gamma)\alpha_L\right)\cdot L < p^*$$

$$\Leftrightarrow \left(\gamma \frac{1}{2}+(1-\gamma)\frac{1}{4}\right)\cdot 5 < p^*$$

$\hookrightarrow$ solve for γ,

All values of γ such that (**) holds are such that $(1, p^*)$ attracts both risk types and makes positive profits,

i.e. $(1, p^*)$ breaks the RS-equilibrium.

ad 17 b) Expected utility with public tests is lower than without tests as people face risk over the premium, i.e. the risk of a bad test result.

private tests:

RS-eq.

- high risk type has the same contract as in "public tests": $q_h = 1$ $\quad p_h = \alpha_h \cdot L$
- low risk type: $q_L < 1$ at a premium equal to $\alpha_L q_L L$ which is worse than his contract under public tests (full coverage at a fair premium $\alpha_L L$)

$\Rightarrow$ on average consumers are worse off under private tests

c) • no test:

- monopolist is risk neutral and it is therefore profit maximizing to sell a full coverage contract
- to maximize profits, the premium is so high that the consumer is indifferent between buying insurance and not buying

$$\Rightarrow \quad p = \alpha L + RP$$

$$= \frac{1}{2} \cdot 5 + \frac{1}{4} = 2.75$$

utility: 2.5

• public test:

- full coverage and $p = \alpha_i L + RP_i$
  - low risks: $p = \frac{1}{4} \cdot 5 + \frac{3}{16} = \frac{23}{16}$
  - high ": $p = \frac{3}{4} \cdot 5 + \frac{3}{16} = \frac{63}{16}$

$U_L = \frac{11}{4}$

$U_h = \frac{9}{4}$

$\Rightarrow$

- average expected utility is same as without a test - namely $2.5 = \frac{10}{4}$
- profits with public tests are $\frac{3}{16}$ which is less than the profit without test $(\frac{1}{4})$.

18)

a) $$p^c = \frac{\alpha_L \cdot L + \lambda \alpha_L L + (1-\lambda)\alpha_h L}{2}$$

b) Low risks would benefit from switching and getting $\alpha_L L < p^c$:

$$\alpha_L L < \frac{\alpha_L L + \lambda \alpha_L L + (1-\lambda)\alpha_h L}{2} \qquad |\cdot 2$$

$$\cancel{2}\alpha_L L < \cancel{\alpha_L L} + \lambda \alpha_L L + (1-\lambda)\alpha_H L \qquad |-\lambda\alpha_L L$$

$\Leftrightarrow$

$$(1-\lambda)\alpha_L L < (1-\lambda)\alpha_H L \quad \checkmark$$

c) $$p_1^g = \alpha_L L + (1-\lambda)(\alpha_h - \alpha_L)L$$

$$p_2^g = \alpha_L L$$

- $p^c > p_2^g$ see b
- $\Rightarrow p^c < p_1^g$

$\hookrightarrow$ As $p_1^g > p^c$, credit constraint problems are more severe under guaranteed renewal than under constant premium.

d) $$p^c = \frac{\alpha_L L + \lambda \alpha_m L + (1-\lambda)\alpha_H L}{2}$$

option 1:

$$p_2^g = \alpha_L L$$

$$p_1^g = \alpha_L L + \lambda(\alpha_m - \alpha_L)L + (1-\lambda)(\alpha_H - \alpha_L)L$$

$\hookrightarrow$ $p_2^g < p^c \Rightarrow p_1^g > p^c$

Conclusion as in c)

option 2:

$$p_2^g = \alpha_m L$$

$$p_1^g = \alpha_L L + (1-\lambda)(\alpha_H - \alpha_m)L$$

$\hookrightarrow$ unclear whether p_2^g or p^c is larger

e.g. if α_m is close to α_H, then

$p_2^g > p^c$ implying that $p_1^g < p^c$

and therefore credit constraints problems

are more severe under constant premium.

E 19)

Advantage: As health care expenditures are strongly serially correlated, due to chronic illness, constant life style etc., last year's expenditures are a very good predictor of this year's expenditures.

Note: insurers have information about last year's expenditures and might use it for risk selection.

Disadvantage:

Reduction of incentives to save costs for insurers as high costs today lead to high payments from the risk adjustment scheme tomorrow.

↳ at the very least claims handling costs and other administrative costs of the insurer should not be included.