Imperfect Information in Health Care Markets

Exercise Session 8 - RS-Model, Genetic Tests

Exercise 15

Suppose that a low risk type is indifferent between his contract in the Rothschild-Stiglitz equilibrium candidate and a full coverage contract at premium $(\gamma\alpha_h + (1-\gamma)\alpha_l) * L$. What interpretation does the premium $(\gamma\alpha_h + (1-\gamma)\alpha_l) * L$ have? Demonstrate that in this case the Rothschild-Stiglitz equilibrium does not exist.

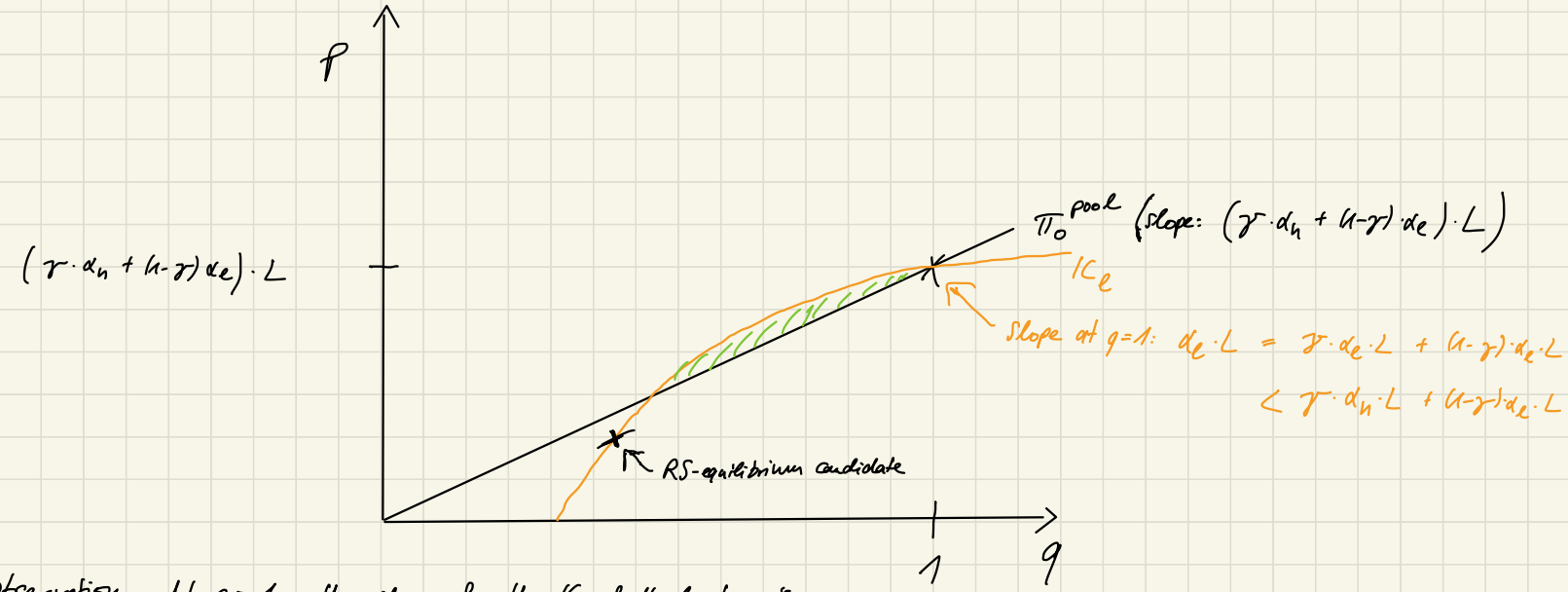
Exc. 15

The premium $(\pi \cdot \alpha_H + (1-\pi)\cdot \alpha_L)\cdot L$ is the expected cost for the insurance from a full coverage pooling contract.

Also, this number is equal to the slope of the pooling isoprofit curves.

Let's draw a picture of this situation:

Exc. 15 (continued)



Observation: At $q = 1$, the slope of the IC of the low type is smaller than the slope of the isoprofit pooling line

and these two lines intersect at $q = 1$.

$\Rightarrow$ IC of ℓ-type crosses the pooling isoprofit curve from above

$\Rightarrow$ there exists a profitable pooling contract, hence the RS-equilibrium does not exist.

↳ any contract in the green region!

Exercise 16

In the Netherlands, health insurance contracts can only be changed at the end of the calendar year. Discuss why such a regulation may or may not be a good idea. Do you know of other similar provisions or regulations?

Exc. 16

Such a regulation is a good idea for insurances:

- people switch from being low risk to being high risk and vice versa over time
  → if immediate change of plan is allowed, people could buy no insurance and go full coverage once they fall ill (So nobody would buy a high coverage insurance even though they are risk averse)
- it might be easier for insurances to predict their costs for the upcoming year (with the regulation)
- if people switch to high risk within the year, insurances might have higher costs than expected and run into liquidity problems

Comparison: German private plans that cover dental care only after 2 years.

Exercise 17

Assume that all people in our economy are similar and have the same Bernoulli utility function $u(x) = \sqrt{x}$. A person has wealth $W = 9$ and falls ill with probability $1/2$. When falling ill the person needs treatment costing $L = 5$. Assume that many insurance companies without administrative costs compete perfectly in the insurance market.

a) Determine the risk premium of a consumer for a full coverage contract. What contract will be offered in equilibrium?

Exc. 17 a)

RP = what the consumer would pay more than his expected costs to avoid the lottery.

$E(x) = \frac{1}{2} \cdot 9 + \frac{1}{2} \cdot (9-5) = 6{,}5$ expected income

$E(u) = \frac{1}{2} \cdot \sqrt{9} + \frac{1}{2} \sqrt{9-5} = 2{,}5$ → expected utility without insurance

RP is given by $u(E(x) - RP) = E(u)$

$\Rightarrow \sqrt{6{,}5 - RP} = 2{,}5$

$\Rightarrow 6{,}5 - RP = 6{,}25$

$\Leftrightarrow RP = 0{,}25$

in equilibrium: full coverage contract at a fair premium $p = 0{,}5 \cdot 5 = 2{,}5$

(this leads to an expected utility $E(u) = \sqrt{9-2{,}5} \approx 2{,}55$)

↳ expected utility from insurance contract

Exercise 17 b)

Suppose a genetic test becomes available: The test results can be either "high risk" (h) or "low risk" (l). Those that test have a 50% chance of getting either result. High risk people have probability 3/4 and low risk people have the probability 1/4 of falling ill.

1. Calculate the risk premium of an h type and the risk premium of an l type (again using a full coverage contract).
2. Assume everyone gets tested and the insurance companies can make their contracts dependent on the test result. What contracts will they offer? How do profits and expected utility change compared to a)?
3. Assume that insurance companies are prohibited from making their contracts contingent upon the test results. How do expected utility and insurance profits change compared to a)? (Note: you do not have to calculate the equilibrium contracts to answer this question qualitatively.)

Exc. 17 b)

1. h-type's utility of no insurance:

$$E(u) = \frac{3}{4} \cdot \sqrt{9-5} + \frac{1}{4}\sqrt{9} = \frac{9}{4}$$

$$\rightarrow \quad \frac{9}{4} \overset{!}{=} \sqrt{\underbrace{9 - \frac{3}{4}\cdot 5}_{5{,}25 \,=\, \frac{84}{16}} - RP} \quad \Leftrightarrow \quad RP = \frac{3}{16}$$

l-type's utility of no insurance:

$$E(u) = \frac{1}{4}\sqrt{9-5} + \frac{3}{4}\sqrt{9} = \frac{11}{4}$$

$$\rightarrow \quad \frac{11}{4} \overset{!}{=} \sqrt{9 - \frac{5}{4} - RP} \quad \Leftrightarrow \quad \frac{121}{16} = \frac{124}{16} - RP$$

$$\Leftrightarrow \quad RP = \frac{3}{16}$$

2. offered contracts with observability:

full coverage contracts at premium $p_h = \frac{3}{4}\cdot 5 = 3{,}75$ for high type

and $p_l = \frac{1}{4}\cdot 5 = 1{,}25$ for low type

Profits are zero for insurances (perfect competition)

Expected utilities: $E(u_h) = \sqrt{9-3{,}75} \approx 2{,}29$ for high type

$E(u_l) = \sqrt{9-1{,}25} \approx 2{,}78$ for low type

$\Rightarrow$ on average, $E(u) \approx 2{,}53 < 2{,}55$ ($\downarrow$ $E(u)$ in a) without tests)

3. equilibrium contracts given by the RS-model:

- h-type gets the same contract as in the observable case
- l-type gets a partial coverage contract he likes less than in the observable case

⇒ Consumer surplus is lower than in the observable case, hence also lower than without tests.

Insurances still make zero profits.