Imperfect Information in Health Care Markets

Exercise Session 11 - Moral Hazard

Exercise 27

Suppose a study like the RAND health insurance experiment could be redone for $ 200 million. On what should the new study focus, i.e. how should it be different from the old one? Do you think it would be worth the money?

Exc. 27

What such a new study could focus on:

- potential for consumers to shop for value in health care
- in patient care that may or may not be prevented by generous drug benefits
- mental health treatment approaches
- health savings accounts
- other forms of cost sharing (e.g. in Germany the "Quartalspauschale")
- maybe focus more on deductibles rather than copayment

=) Could well be worth the money since potential savings are very high

Exercise 28

A consumer has wealth $W = 64$ and faces a potential loss of
$L = 15$. The consumer has to decide whether to "be careful" or
not. If he is careful, the loss realizes with probability $1/4$. If he is
not careful, the loss realizes with probability $1/2$. Being careful
costs (the money equivalent of) 1 unit of income. (The consumer
is a risk averse expected utility maximizer and you can assume
$u(x) = \sqrt{x}$.)

  a) Consider the situation where the consumer is not insured. Will
     he be careful?

  b) Consider the situation where the consumer is fully insured at
     premium $p > 0$. Will he be careful?

Exc. 28

a) Consumer is careful: $E(u) = \frac{3}{4} u(W-1) + \frac{1}{4} u(W-L-1)$ ← cost of being careful

$$= \frac{3}{4} \cdot \sqrt{63} + \frac{1}{4} \cdot \sqrt{48} \approx 7,68$$

consumer is not careful: $E(u) = \frac{1}{2} \cdot u(W) + \frac{1}{2} \cdot u(W-L)$

$$= \frac{1}{2} \cdot \sqrt{64} + \frac{1}{2} \cdot \sqrt{49} = 7,5$$

$\Rightarrow$ the consumer will be careful if he has no insurance

b) with full coverage insurance:

$E(u)_{careful} = u(W-p-1)$

$E(u)_{careless} = u(W-p) > E(u)_{careful}$

he will not be careful due to moral hazard

Note: Being careful is socially desirable as the expected benefit is $\frac{15}{4}$ and costs are only 1.

$\hookrightarrow$ probability of losing 15 reduces by $\frac{1}{4}$

Exercise 29

A consumer with Bernoulli utility $u(x) = -x^2 + 10x$ has wealth $W = 4$ and faces a potential (money equivalent) loss $L = 2$ which realizes with probability $\alpha = 1/2$. If the loss realizes the consumer can (partially) make up for the loss by treatment $M \in [0, 2]$. The insurance will cover qM of these treatment expenditures for some coverage rate $q \in [0, 1]$. Treatment M will mitigate the loss to $L - 2M + M^2/2$.

a) If the consumer is ill, what treatment intensity $M^*(q)$ will he choose?

b) (numerical) Assume that the insurance premium is fair, i.e. $p = \alpha q M^*(q)$. Write down the consumers expected utility. Which q maximizes expected consumer utility? How and why does this result differ from models without moral hazard?

Exc. 29

a)

First, note that $u'(x) = -2x + 10 > 0$ for $x < 5$

$\rightarrow u(x)$ is a positive monotone transformation of x in this case (as income will be between 0 and 4)

$\hookrightarrow \hat{u}(x) = x$

$\Rightarrow$ If the consumer is ill, he solves the following problem: (as we can also just use the utility function $u(x) = x$)

$$\max_{\mu \in [0,2]} \quad W - \rho - L + 2\mu - \frac{\mu^2}{2} - (1-q)\mu \qquad (q \cdot \mu \text{ is paid by insurance})$$

$$FOC : \quad 2 - \mu - (1-q) \overset{!}{=} 0$$

(first-order-condition)

$$\Longrightarrow \mu^*(q) = 1 + q$$

b)

Consumer's expected utility:

$$U = \alpha \cdot u\left(W - L + 2\mu^*(q) - \frac{\mu^*(q)^2}{2} - \alpha \cdot q \cdot \mu^*(q) - (1-q)\mu^*(q)\right)$$

loss case

cost

premium

own costs of treatment

$$+ (1-\alpha) u\left(W - \alpha q \, \mu^*(q)\right)$$

no loss case

premium

Optimal coverage level with Moral Hazard

Legend:
- ["EU with moral hazard", ▓▓▓▓▓▓▓▓▓▓▓▓▓▓]
- [▓▓▓▓▓▓▓▓▓▓▓▓▓▓ "EU without moral hazard"]
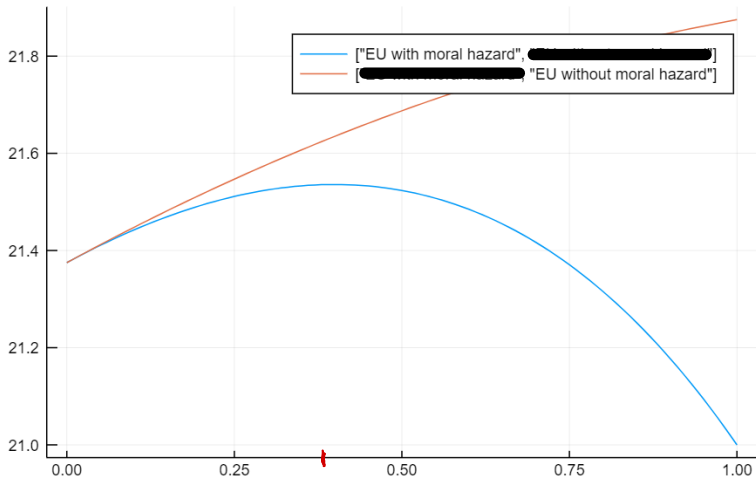
q

→ Consumer's utility is maximised for $q \approx 0.39$

29. 6) (continued)

This result is interesting since without moral hazard, a risk-averse consumer would always prefer more coverage over less coverage (at a fair premium).

The problem here is that with higher coverage, the consumer adjusts his behavior (overconsumption) and pays a higher premium (which he dislikes).

This is why the optimal coverage level for the consumer with the presence of moral hazard smaller than 1 (partial coverage only).

Exercise 30

Consider the following case: "I met Jane at a gas station in the outskirts of Oklahoma City where she was filling up her 8 year old Chevrolet. She was in her fourties and when I asked for the way she was happy to help me out. The moment she talked it became apparent that some of her teeth were missing which impeded her speech slightly (the pronounciation of "s" was a bit off). As a result, I misunderstood her first and had to ask her to repeat. The second time I got it and apologized for my earlier misunderstanding. 'Don't worry, it happens all the time. Ever since I had the tooth thing three years ago. It hurt so bad...After two days I begged my brother to pull them out.' she said. 'I see. Did it help?' I asked politely. 'Well first he did not want to do it. But after another day he said yes. It was terrible. He did not get them first time and then it hurt even more and there was lots of blood. But, yeah, it got better when they were out.' It took me a second to follow but then it dawned on me: 'I guess your brother is not a dentist...'

Exercise 30 (cont.)

'No, of course not,' Jane laughed, 'he did his best. I called the dentist but they said it was 500$. I mean, who can pay that if you have no insurance, you know.'"

Discuss whether Jane should have had a dentist to treat her toothache from a welfare perspective.

Exc. 30

Jane has no insurance and did not see a dentist. Hence, her WTP is below the cost of a dentist and it is most efficient for her not to see a dentist.

Objections:
- Maybe, it is rather about ability to pay than about willingness to pay (however, she could have sold her car)

- you could argue that some social health insurance should be paying for her treatment. In this case, we would use health insurance to redistribute wealth.

→ potential disadvantage: If Jane were given 500$ cash for her treatment, she might still use it for something else.

→ potential advantage: negative externalities of non-treatment can be prevented, which might be socially desirable (e.g. for infectious disease)