Imperfect Information in Health Care Markets

Exercise Session 10 - Advantageous Selection, Moral Hazard

Exercise 22

greek "eta"

Let consumers have the utility function $u(x) = -e^{-\eta x}$. Each consumer faces a loss L of his initial wealth W with probability α. While W and L are the same for all consumers, consumers differ in η and α. Let $W = 10$ and $L = 5$.

a) Compare the willingness to pay for a full coverage insurance contract of two consumers: Consumer A has risk $\alpha_A = 0.3$ and risk aversion $\eta_A = 1$. Consumer B has risk $\alpha_B = 0.2$ and risk aversion $\eta_B = 1.5$.

b) Using otherwise the same parameters as in a), who would have the higher willingness to pay if η_B was 1 as well?

c) Using otherwise the same parameters as in a), who would have the higher willingness to pay if α_B was 0.3 as well?

Exc. 22

a) Recall WTP for a full coverage insurance contract:

$$u(W - WTP) \overset{!}{=} u(\text{no insurance})$$

$$\Rightarrow -e^{-(10-WTP)r} = u(10-WTP) \overset{!}{=} \alpha \cdot (-e^{-5r}) + (1-\alpha)(-e^{-10r})$$

$$\Leftrightarrow e^{-(10-WTP)r} = \alpha \cdot e^{-5r} + (1-\alpha) \cdot e^{-10r}$$

Recall exponential functions as well as the natural logarithm

$$\Rightarrow -(10 - WTP)r = \ln\left(\alpha \cdot e^{-5r} + (1-\alpha) e^{-10r}\right)$$

$$\Leftrightarrow -10 + WTP = \frac{1}{r} \ln\left(\alpha \cdot e^{-5r} + (1-\alpha) e^{-10r}\right)$$

$$\Leftrightarrow WTP = 10 + \frac{1}{r} \cdot \ln\left(\alpha \cdot e^{-5r} + (1-\alpha) e^{-10r}\right)$$

$$\overset{\alpha_A = 0{,}3,\ r_A = 1}{\Rightarrow} \quad WTP_A \approx 3{,}812$$

$$\overset{\alpha_B = 0{,}2,\ r_B = 1{,}5}{\Rightarrow} \quad WTP_B \approx 3{,}929$$

b) $WTP_B(r_B = 1) \approx 3{,}417 < WTP_A$

c) $WTP_B(\alpha_B = 0{,}3) \approx 4{,}198 > WTP_A$

Exercise 22

d) (PC exercise in spread sheet application or Julia) Let there be a continuum of consumers whose risk α is uniformly distributed on $[0.5, 0.75]$. Assume that $\eta(\alpha) = 3 - \alpha$ and consider a full coverage insurance contract. Is this a case of adverse or advantageous selection? Repeat with $\eta(\alpha) = 3 - 3.75\alpha$.

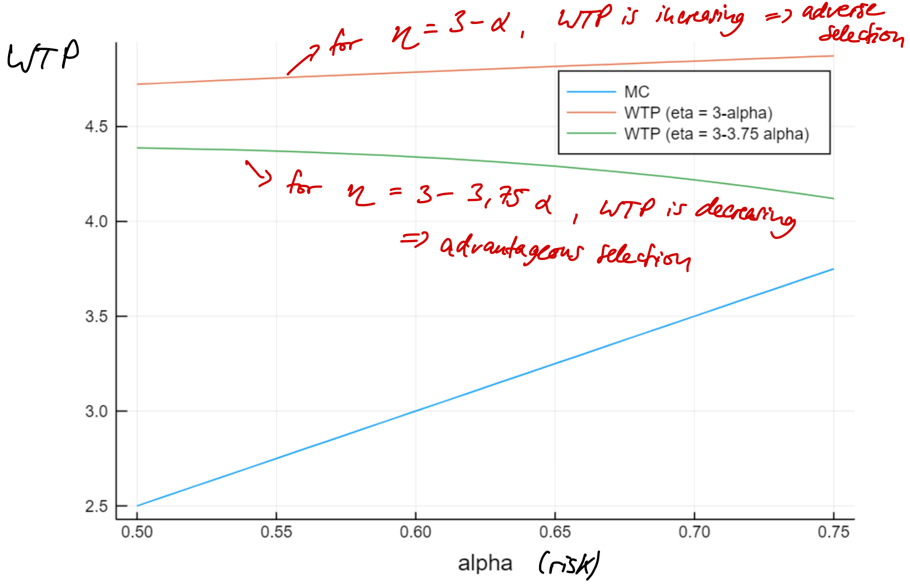
Q: How does the WTP depend on α?
(this is another way to put the question)

d)

analytical way to solve this: plug in $\eta(\alpha)$ in the term defining the WTP and then take the first derivative with respect to α

$\Rightarrow$ If $WTP'(\alpha) > 0$, high risk types will buy more insurance than low risk types $\Rightarrow$ adverse selection

If $WTP'(\alpha) < 0$, low risk types will buy more insurance $\Rightarrow$ advantageous selection



WTP
→ for η = 3 − α, WTP is increasing ⇒ adverse selection
MC
WTP (eta = 3-alpha)
WTP (eta = 3-3.75 alpha)
→ for η = 3 − 3,75 α, WTP is decreasing ⇒ advantageous selection
4.5
4.0
3.5
3.0
2.5
0.50
0.55
0.60
0.65
0.70
0.75
alpha (risk)

Exercise 23 (Advantageous Selection)

Consider the fixed coverage model with perfect competition and no administrative costs for insurance companies. Assume that all consumers are risk averse.

a) How do the marginal cost, average cost and demand curve look in case of advantageous selection?

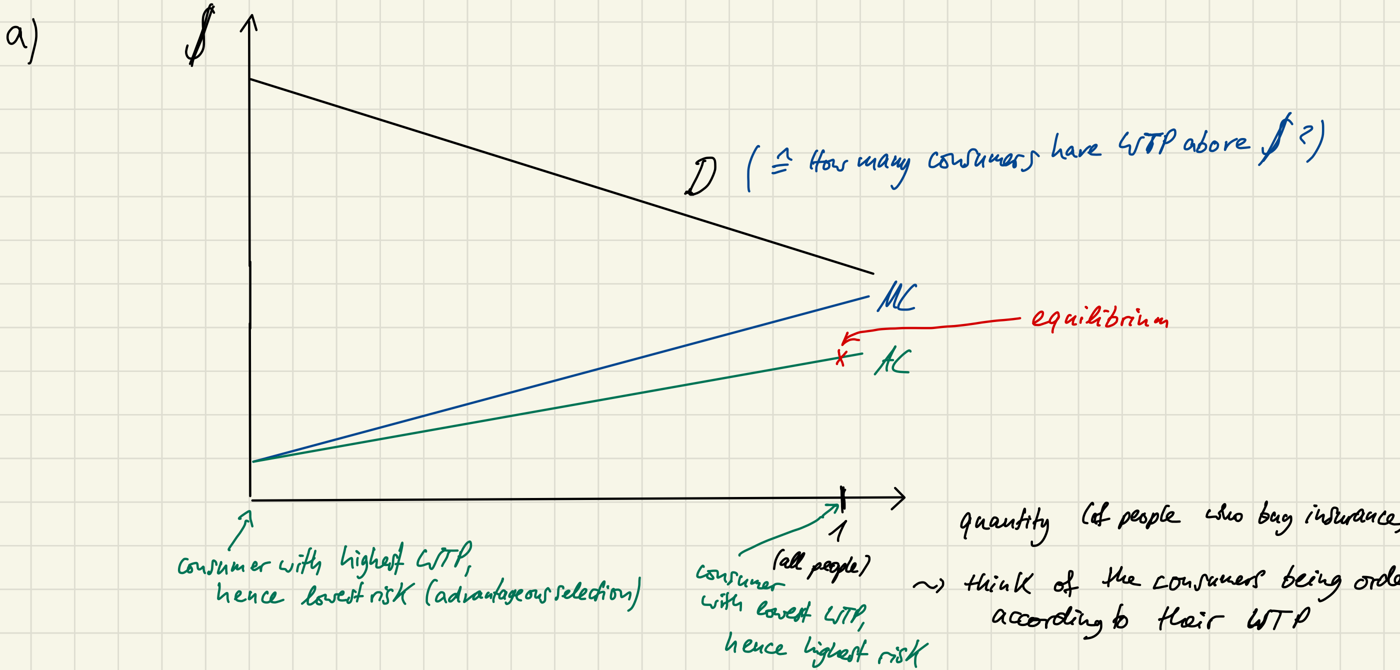
b) Is the market equilibrium efficient?

c) Consider now insurance companies with contracting and claim handling costs, i.e. each sold contract leads to expected administrative costs $c > 0$. What is the market equilibrium and is it efficient?

d) For the case with administrative costs, consider a tax on insurance premia (to be paid by consumer). What is the impact of this tax on welfare?

Exc. 23

a)



⇝ think of the consumers being ordered according to their WTP

b) By assumption, everyone is risk averse $\Rightarrow$ WTP > MC everywhere / for everyone

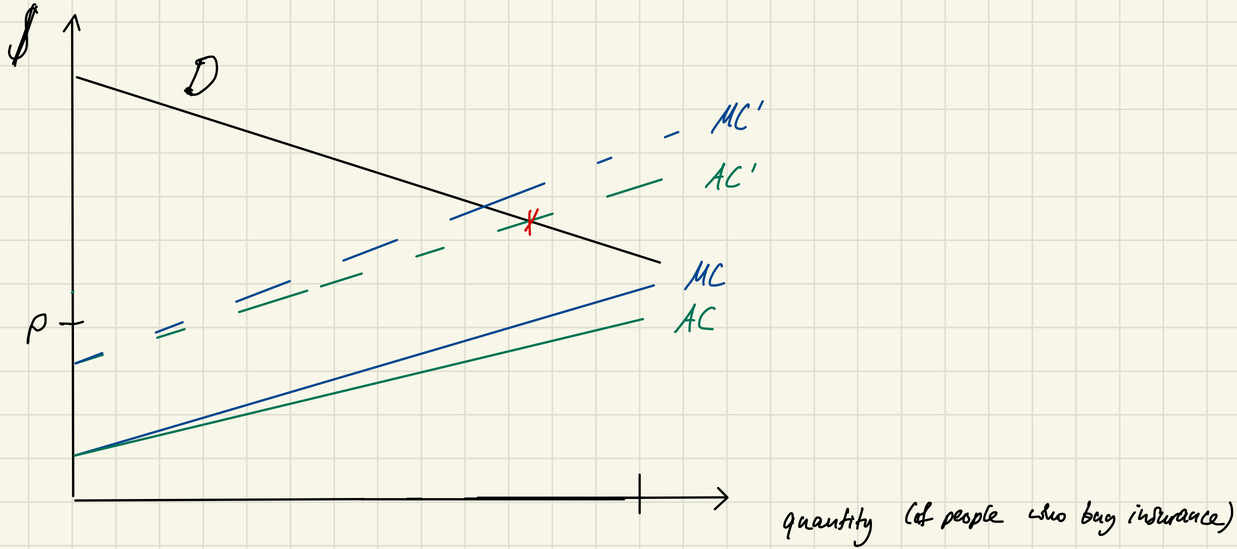
Therefore also WTP > AC

$\Rightarrow$ equilibrium is that everyone is insured at a premium that equals population AC.

This is efficient. ✓

Exc. 23

c)



Admin costs shift MC and AC parallelly up by c.

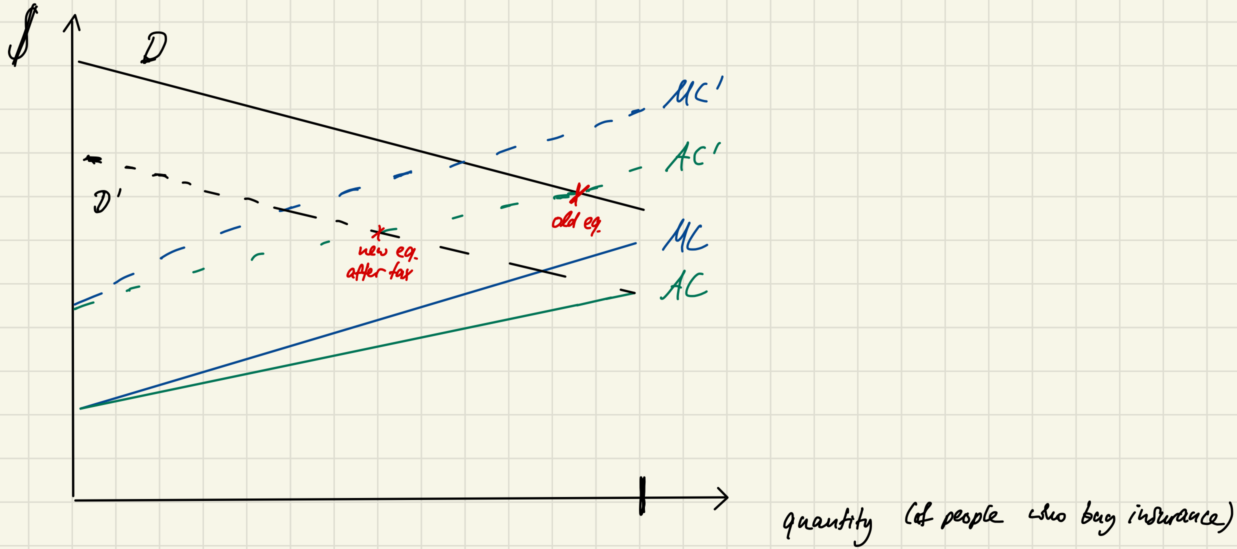
Equilibrium is at the intersection of D and AC'!

As D and MC' also intersect on the left side of this point, this means that there are some people for which insurance is inefficient.

$\longrightarrow$ too much insurance in equilibrium

Exc. 23

d)



The tax t parallelly shifts demand down to D'. In case there was overinsurance in equilibrium before, this can reduce the amount of overinsurance and can therefore be welfare-enhancing (if the collected tax is used for something useful)

Exercise 24

Ambulatory mental health care was the most price sensitive element of health care in the RAND health insurance experiment. How do you think the market for mental health care has changed since the 1970s? How does this affect the price sensitivity? What evidence would you look for to support your claims?

Exc. 24

Changes in the market for mental health care:

- less social stigma of mental health care nowadays
- psychiatry has turned heavily towards psychopharmacy and away from psychology
- regulatory environment has changed (harder to get renewal for prescription)

effect on price sensitivity is unclear

However: If price sensitivity would have changed, insurances would have realized first and changed their offer / coverage

↪ they did not, so price sensitivity should be the same

Exercise 25

Dental care was quite price sensitive in the RAND health insurance experiment. This effect was particularly large in the first year. What is the explanation for this? What are the implications?

Exc. 25

Explanation: Randomly enrolled people had neglected dental care for some time and thus took a lot of dental care when they had low copayment rates in the first year. Later, the demand went down since they already took it.

$\Rightarrow$ studies need a sufficiently long time horizon to give reliable results