

# Applied Microeconomics: Supervision 6

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(To be completed after lecture 11. The last problem question will be marked)

1. There are two types of workers  $\theta \in \{1, 2\}$ . A workers of type  $\theta$  faces a cost of education  $c(e; \theta) = e/\theta$ , and his utility over wage and education is given by

$$u(w, e, \theta) = w - c(e, \theta).$$

Firms hire workers to maximize profits. A worker of type  $\theta$  contributes marginal product equal to  $\theta$ .

- (a) What are the possible separating and pooling equilibrium?
  - (b) Why can a pooling equilibrium be sustained in Spence's signalling model but not in the Rothschild-Stiglitz screening model?
  - (c) Explain why in both models, the "good" types (high productivity in Spence, or low risk in Rothschild-Stiglitz) lose out in a separating equilibrium.
2. Each year on the 1st of April, one in 2 Belgians develops Arcanumitis, a nonlethal but embarrassing condition which causes its victim to suddenly turn purple. Doctors believe that Arcanumitis is caused by a genetic factor, but there is as yet no way for anyone (including those afflicted) to assess whether any individual person will turn purple. The disutility of being purple is so large that anyone to whom this happens is willing to pay the €900 price of a drug that instantly reverses the effect.

- (a) Let utility over wealth be given by

$$u(w) = \sqrt{w}$$

Consider a person with a wealth of €2500. What is the maximum amount that this person will pay for insurance against the financial risk posed by Arcanumitis? How large is the risk premium?

- (b) Suppose all Belgians are like the person in part (a). There is a single insurance company whose administrative costs are €5 per customer. Under what conditions will this company be able to reliably make a profit selling insurance in this market?
  - (c) Suppose that another company with identical costs enters the market. What outcome do you expect?
  - (d) A pharmaceutical company is developing a genetic test that predicts whether a person carries the Arcanumitis gene. In laboratory trials, the test returned positive in  $2/3$  of all cases. Subjects who tested “positive” later turned purple with probability  $3/4$ . Those who tested “negative” never turned purple. If approved for commercial use, it is expected that insurance companies will use the test to set insurance premiums. What result do you expect? Should use of the test be approved? Maintain the assumption that there are only two firms, in part c.
3. (From 2019 exam) The current public healthcare system in Canada (also called “Medicare”) is very similar to the National Health Service (NHS) in the UK. It is publicly funded by the federal and provincial governments through taxes. All Canadians are entitled to the medical services provided by Medicare and these services are free of charge at the point of use.
- (a) Some Members of Parliament (MPs) do not understand why the government should use public funds for private health care, which is essentially a private good. They argue that health insurance should instead be provided by private insurance companies since the private market is more competitive and efficient. Therefore, they propose to abolish the Medicare system completely and replace it with private health insurance services. Do you think this is a good idea? Explain both the efficiency and equity effects of such a reform.
  - (b) Other somewhat less radical MPs propose that the Medicare coverage instead should become optional so that individuals can freely choose whether they want to enrol or instead buy their health insurance services from private companies. In such a scheme, individuals who choose to opt out of the Medicare system should also no longer pay the associated “Medicare tax”. Drawing on Rothschild and Stiglitz (1976), provide predictions and a detailed discussion on what would be the long-term outcomes if such a reform were introduced? Hint: the final outcomes may depend on the distribution of risk types.
4. (From 2019 exam) Consider a pooling equilibrium within the framework of Spence’s (1973) signalling model, in which agents of different types engage into the same amount of education  $e^*$ .
- (a) Use illustrative graphs to show the range of education levels  $[\underline{e}, \bar{e}]$  supporting for the pooling equilibria.

- (b) Is the pooling equilibrium with educational level  $e^*$  a second-best efficient allocation?
- (c) Please find one specific employer's wage contract  $w(e)$  that supports the education level  $e^*$  as the pooling equilibrium. Be careful when defining a wage contract and make sure to comment on how the pooling equilibrium can be sustained.
- (d) Compared the  $e^*$  with a separating equilibrium that the lower type chooses education level  $e_L = 0$  and the high type chooses education level  $e_H$ , which allocation is more efficient from a social planner's perspective?