

1 Asymmetric information

- Why do professors require medical notes from students for missing a midterm test?
- A modest proposal for grading: Let each student choose between an individual grade or get an average grade of all students who choose to be part of the average after they take the test.
- Why do commerce students get paid more when they graduate than economics graduates?
- Often two agents want to engage in an economic transaction where one agent knows more about the value of the transaction than the other agent.
- E.g. seller knows more about the quality of the good that she is selling.

- Buyer knows how much he is willing to pay for the good.
- Worker knows how much effort he is exerting.

2 Moral hazard

- Principal has a machine that she wants to hire an agent to operate.
- It is costly for the agent to exert effort to do the task.
- Principal cannot observe effort but sees whether quality of the task completed.

- Let agent choose effort 0 or 1. The cost of effort 0 is 0. The cost of effort 1 is 1.
- If agent chooses effort 0, output is produced with probability $\frac{1}{4}$. If agent chooses effort 1, output is produced with probability $\frac{3}{4}$.
- Let the value of output be 2 if it is produced.
- The first best solution. Assume principal hires herself to do the task. Her profit if she exerts no effort is

$$\pi_0 = \frac{1}{4} \cdot 4 - 0 = 1$$

- Her expected profit if she exerts effort 1 is

$$\pi_1 = \frac{3}{4} \cdot 4 - 1 = 2$$

- Since expected profit is higher if she exerts effort, principal will exert effort.
- Assume that worker's reservation utility is zero.
- If principal offers a risk neutral worker a fixed wage of 1 to exert effort, the worker will get a expected utility of

$$1 - 1 = 0$$

if he exerts effort.

- He will get a utility of 1 if he exerts no effort.
- If the principal cannot observe effort, he will maximize his utility by exerting no effort.
- Principal will earn in this case

$$\pi^* = \frac{1}{4}4 - 1 = 0$$

- Can the principal do better?
- What if the principal offers to pay $2 + 4\varepsilon$ if output is observed and -2 if output is not observed. (Pay for performance)

- If worker works, his expected utility is:

$$\frac{3}{4}(2 + 4\varepsilon) + \frac{1}{4}(-2) - 1 = \varepsilon > 0$$

- If he does not work, his expected utility is:

$$\frac{1}{4}(2 + 4\varepsilon) + \frac{3}{4}(-2) - 0 = -\frac{1}{2} + \varepsilon$$

- So in this case, the worker will work.
- Another way to look at the problem is that the principal should offer to sell the machine to the worker for $2 - \delta$. As her own principal, agent will earn $2 - (2 - \delta) = \delta > 0$.

- What happens if principal cannot give a negative wage to worker. I.e. lowest wage is 0. In this case principal wants to pay the smallest y if successful and 0 if not successful such that worker will prefer to work rather than not:

$$\begin{aligned} \frac{3}{4}(y) + \frac{1}{4}(0) - 1 &> \frac{1}{4}(y) + \frac{3}{4}(0) - 0 \\ \frac{3}{4}(y) - 1 &\geq \frac{1}{4}(y) \\ y &\geq 2 \end{aligned}$$

- Note that worker's utility is

$$\frac{3}{4}(2) + \frac{1}{4}(0) - 1 = \frac{1}{2}$$

- Worker gets more than his reservation utility of 0.
- Principal will get an expected profit of

$$\frac{3}{4}(4 - 2) + \frac{1}{4}(0 - 0) = \frac{3}{2}$$

which is less than what she will get in first best.

- Why grade on a curve?

3 Adverse selection

- Who buys insurance?
- You will get disproportionate high risk individuals.
- But if you charge high premiums, you may drive the market out completely.
- Can warranties solve the market for lemons?

3.1 Screening

- King Solomon's solution.
- Upward sloping tenure earnings profile to screen out movers.
- Why is the commerce program so tough?

3.2 Signalling

- How does the peacock gets its tail?
- Why do companies engage in expensive non informative advertising like build a big corporate headquarters?

- There are two types of sellers, high and low quality. Buyers cannot ex-ante tell them apart but will pay more for the high quality type.
- So both types will claim to be high quality.
- The high quality type has a lower cost of investing in a project than the low quality type.
- The high quality type signals its quality by investing more in the project such that the low type will not want to follow.
- The investment by the high type has to be more than what it is efficient for the high type to do if not for the adverse selection problem.
- How do you signal to your employer that you are hard working?