

Asymmetric Information: Adverse Selection

Week 12

M. Pelliccia

Introduction

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- Good “starting point” for developing a theory of demand because of its simplicity but it is often NOT realistic.

Example

- You are going to a dinner party where you anticipate that food will be prepared. You are expected to bring a bottle of wine as a present. In the wine shop there are some varieties from Italy, France, Spain, and many other countries. They have prices that range from £3 and up per bottle.

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- Assume that you don't know much about wine and you are not sure whether your host knows much either. You decide to spend more than £3 and opt for a bottle that costs £6, hoping it is a good choice within this price range. Then you take the price sticker off the bottle of wine so that your host does not know how much you paid.

Example cont.

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Do we have a theory for this type of decisions?

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- **Adverse Selection** (or hidden information)

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Economists break up the study of asymmetric information into two sub-cases:

- **Adverse Selection** (or hidden information)
- **Moral Hazard** (or hidden action)

In the wine example, the wine maker has most likely tasted the wine repeatedly before bottling it and pricing it. So this example has an aspect of adverse selection. It may also entail moral hazard, since the wine maker decides how much effort and care to put in the cultivation of the grapes and in the making of the wine.

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- an informed person's benefiting trading (contracting) with less informed person...
- ...who does not know about an unobserved characteristic of the informed person.

The “Market for Lemons”

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He was awarded the 2001 Nobel Prize in economics for this work.

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The “Market for Lemons” (cont.)

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- The buyers’ willingness to pay for a used car is based on the quality they expect to find, rather than on the actual quality of the car.
- If the buyer asked the seller about the quality of the car, the buyer should be surprised if the seller says anything other than that the car is of top quality. So the buyer should typically discount, if not totally ignore, what the seller is saying.

The “Market for Lemons” (cont.)

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The “Market for Lemons” (cont.)

- This means that a seller of an above average quality used car is unable to collect a premium for that better quality.
- Without the premium, the seller of a high quality car may opt to hold onto the car rather than sell it.
- But if sellers with high quality cars hold those cars from the market, what happens to the average quality of those cars on the market?
- This degradation in quality will lower the price buyers are willing to pay and induce a feedback effect - even more high-quality sellers will want to take their cars off the market.

Example

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- Everyone knows that 50 cars are *plums* and 50 cars are *lemons*.
- The current owner of each car knows its quality, but the prospective buyer can't tell a good car from a bad car.

Example cont.

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- Prospective buyers are happy to pay up to 2400 GBP for a good car, but only up to 1200 GBP for a bad car.
- If information was perfect, then both sides would gain from a trade and all cars will be sold: good cars will have a price between 2000 and 2400; bad cars will have a price between 1000 and 1200.

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- Why? Given that all cars look identical to the buyer, why pay more?
- A seller that claims that his car is of higher quality and hence demands a higher price is not to be trusted - of course he claims that!

Example cont.

What will be the price for a car in this market?

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Let's ask what is the maximum price that a buyer is willing to pay: he knows that with probability $1/2$ he will get a good car and with probability $1/2$ he will get a bad car. Hence it would not be rational to pay more than:

$$\frac{1}{2}1200 + \frac{1}{2}2400 = 1800$$

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If this is the highest price at which any buyer is happy to trade, which cars will be traded?

Example cont.

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But then 1800 is too high a price for a lemon: 1800 is the price that a buyer is happy to pay for a average car, given that all cars are traded. When it is only the bad cars that are traded, then the buyers are only happy to pay up to 1200 for a car.

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But then 1800 is too high a price for a lemon: 1800 is the price that a buyer is happy to pay for a average car, given that all cars are traded. When it is only the bad cars that are traded, then the buyers are only happy to pay up to 1200 for a car.

Example cont.

Given that sellers of bad cars are inclined to sell them for any price above 1000, then bad cars will be traded for a price between 1000 and 1200.

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Because of asymmetric information, buyers get to trade only with the worst sellers. Hence the name "adverse selection".

Example cont.

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At a price of 2280, both sellers of good cars and sellers of bad cars are happy to trade. There is no adverse selection!

Adverse Selection

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If too many low-quality items are offered for sale it makes it difficult for owners of good quality items to sell their products.

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Imagine that information was imperfect, but symmetrically so: neither a buyer nor a seller can tell a good car from a bad car.

Asymmetric Information or Imperfect Information? (cont.)

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Asymmetric Information or Imperfect Information? (cont.)

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What is the lowest price that a seller is willing to consider?

$$\frac{1}{2}1000 + \frac{1}{2}2000 = 1500$$

Asymmetric Information or Imperfect Information? (cont.)

What is the highest price that a buyer is happy to pay?

$$\frac{1}{2}1200 + \frac{1}{2}2400 = 1800$$

What is the lowest price that a seller is willing to consider?

$$\frac{1}{2}1000 + \frac{1}{2}2000 = 1500$$

ALL cars are traded!

Not just cars!

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- **Labour markets:** prospective workers are of different ability, but skills and ability is not immediately recognizable by employers.

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One can apply the same reasoning to:

- **Labour markets:** prospective workers are of different ability, but skills and ability is not immediately recognizable by employers.
- **Credit markets:** entrepreneurs seek financing for investment projects which are of different quality, however bankers may not be able to tell a potentially successful project from a bad one.
- **Insurance markets:** when we contract insurance we might have a better idea of how likely we are to have to claim than the insurance company.

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Role for improvement: market intervention? regulation?

Limiting “Lemons”

- Laws to prevent opportunism
- Consumer screening
- Third party comparison
- Standards and Certifications
 - *Standards*: metric or scale for evaluating the quality of a particular product.
 - *Certifications*: report that a particular product meets or exceeds a given standard level.

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But there are also other “remedies” that might help mitigate the problem: signalling, screening, role for reputation.

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What if we make it costly to a seller to lie?

Then the market may work! (even if there will be a cost to the seller so that this is only a *second best solution*).

By providing a guarantee, the seller may signal that he has a good quality car.

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This only works if the cost of providing the guarantee to him is such that he would only do it if the car was good (too costly to commit to free servicing of a bad car, for example).

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Signalling is a choice of the informed party.

Screening is similar, but is a choice of the uninformed party.

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Insurance companies screen customers by asking them to choose between different levels of own risk (excess). The premium is lower if a higher excess is chosen. The idea is that only customers who believe that they will not need to claim (hence low risk customers) will choose a high excess.

More precisely,

Screening: action taken by an uninformed person to determine info possessed by informed people.

Signalling: action taken by an informed person to send information to a less-informed person.

Signalling: Labour market (Spence (1974))

- Workers have innate ability, that college does not increase (nor decrease!).
- However going to college is more costly for less able people (they need to work more in order to attain the same results)
- Hence having gone to college is a signal of high ability.
- Higher education leads to higher pay in the labour market even when it does not increase productivity.

Signalling: Labour market (Spence (1974))

What if education both increases productivity and serves as a signal?

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How to distinguish the two effects?

The “*sheepskin effect*”: the earnings of people who have graduated from high school are much higher than the incomes of people who have only completed most of it. Discontinuous jump in earnings!

Example

There are two types of workers. One kind has a (constant) marginal product worth 10 GBP (w_l) to the employer, and the other kind has a (constant) marginal product worth 15 GBP (w_h). There are equal numbers of workers of each kind. A firm cannot directly tell the difference between the two kinds of workers.

Example (cont.)

1) If the labour market is competitive, workers will be paid the average value of their marginal product. What is this amount?

Pooling equilibrium

In general, if in equilibrium the employer cannot distinguish the workers, the outcome is a **pooling equilibrium**.

Example (cont.)

2) Suppose that a local college offers evening classes. The high-productivity workers think that taking this course is just as bad as a 3 GBP wage cut, and the low productivity workers think that it is just as bad as a 6 GBP wage cut. The firm can observe whether the worker has taken the classes or not. Suppose that the high productivity workers all choose to take the classes and the low productivity workers all choose not to. What is the equilibrium wage for those who take classes and those who do not? Will this be an equilibrium?

Separating equilibrium

If in equilibrium, one type of people takes actions that allow them to be differentiated from other types of people, the outcome is a **separating equilibrium**.

Example (cont.)

3) Suppose that the share of the population with high productivity is $\theta \in [0, 1]$, and thus the one with low productivity is $(1 - \theta)$. For what values of θ is a pooling equilibrium possible?

Example (“Variable Quality”)

There are two types of electric pencil-sharpener producers. **High quality** manufacturers produce very good sharpeners that consumers value at 14 GBP. **Low quality** manufacturers produce less good ones that are valued at 8 GBP. At the time of purchase, customers cannot distinguish between a high quality product and a low quality product; nor can they identify the manufacturer. However, they can determine the quality of the product after the purchase. The consumers are risk-neutral.

Example (“Variable Quality”)

If they have probability p of getting a high quality product, they value this prospect

$$14p + 8(1 - p)$$

Each type of manufacturer can produce the product at a constant unit cost of 11.

Example (“Variable Quality”)

1) Suppose that the sale of low quality electric pencil-sharpener is illegal, so that the only items allowed to appear on the market are of high quality. What will be the equilibrium price?

Example (“Variable Quality”)

2) Suppose that there are no high quality sellers. How many low quality sharpeners would you expect to be sold in equilibrium?

Example (“Variable Quality”)

3) Could there be an equilibrium in which equal (positive) quantities of the two types of pencil sharpeners appear in the market?