INFORMATION ECONOMICS

Transactions undertaken in conditions of asymmetric information

about:

- The quality of the goods or services (hidden information);
- The actions undertaken during a transaction (hidden action)

E.g.

An employer who has to hire a worker:

✓ Hidden information: worker's productivity

An employer who has hired a worker:✓ Hidden action: worker's effort

ASSUMPTIONS:

- Perfect rationality
- Opportunism

TWO PROBLEMS:

- Pre-contractual opportunism + hidden information \rightarrow ADVERSE SELECTION
- Post-contractual opportunism + hidden action

\rightarrow MORAL HAZARD

Adverse selection

Ex-ante one of the two parties has **more information** about some relevant variables

Gresham's law (1500)

currency \rightarrow gold coins \rightarrow they can be shaven

- only shaven coins will circulate!!!
- bad money drives out good money!!!

Akerlof's model of lemons

Akerlof G. A. (1970), The Market for "Lemons": Quality Uncertainty and the Market Mechanism, *The Quarterly Journal of Economics*, Vol. 84, No. 3., pp. 488-500

"bad used cars scare away good used cars"
first formal model → asymmetric information
affects equilibrium trades

MODEL

Assumptions:

• N used cars

• $\underline{x} \le x \le \overline{x} \rightarrow$ index of the quality of each car

two types of agents: type 1 and type 2

$$U_1 = M + \sum_{i=1}^N x_i$$

$$U_2 = M + \sum_{i=1}^{N} \frac{3}{2} x_i$$

- \rightarrow U depends on car quality too
- \rightarrow different weights

Given a car of any level of quality x:

• <u>agents of type 1</u>: buy it if $p \le x$ sell it if p > x

• <u>agents of type 2</u>: buy it if $p \le 1.5 x$ sell it if p > 1.5x

If *x*=100 and *p*=120.....

agents of type 1 \rightarrow potential sellers (or buyers) agents of type 2 \rightarrow potential buyers

All cars are owned by agents of type 1, and they can sell them, either to agents of type 2 or to agents of type 1

PERFECT INFORMATION

All the cars would be sold at a price:

x≤p≤1.5x

and this price would satisfy both the parties to the transaction!

ASYMMETRIC INFORMATION

→ only the sellers know the <u>actual quality</u> of the used cars

 \rightarrow the buyers correctly anticipate only the <u>average</u> <u>quality</u> of the used cars

SUPPLY CURVE

Suppliers= agents of type 1

Assume:

- 0≤x≤2
- Uniform distribution of cars within this range.

(FIGURES)

How many cars are supplied on the market at each price p?

Given their utility function the sellers are willing to supply all those cars whose quality index *x* is such that:

 $x \leq p$

(FIGURE)

The supply function *S* is:

$$S(p) = p\frac{N}{2}$$

μ = average quality of cars supplied at the price p:

$$\mu = \frac{0 + x(MAX)}{2}$$
That is:

$$\mu = \frac{p}{2}$$

NOTICE: the presence of "bad cars" together with "good cars" lowers buyers' perception of the average quality: it is no longer identical to the price, but it is only P/2.

 \rightarrow Mechanism of adverse selection

The average quality of the cars offered on the market decreases as price decreases ($\mu = \frac{p}{2}$) (μ depends on p) SUMMING UP:

On the supply side,

- for every price *p*, all cars whose quality *x* is less than or equal to *p* are supplied on the market
- Given the assumption of uniform distribution of the quality:

S(p)=pN/2 (area of the rectangle)

• with an index of average quality equal to:

$$\mu = \frac{p}{2}$$

DEMAND CURVE

 Buyers only know the average quality of cars offered (μ)

- The total demand (D) is:
 D = D₁ + D₂
- Y₁ and Y₂ = the income used to buy used cars only

<u>Agents of Type 1</u> will use Y_1 to buy a used car if: $p \le x$

- only the average quality is known:

$$\begin{cases} D_1 = \frac{Y_1}{p} \text{ if } p \le \mu & \text{i.e. if } \frac{p}{\mu} \le 1 \\ D_1 = 0 \text{ if } p > \mu & \text{i.e. if } \frac{p}{\mu} > 1 \end{cases}$$

<u>Agents of Type 2</u> will use Y_2 to buy a used car if: $p \le 3/2 x$

- only the average quality is known:

$$\begin{cases} D_2 = \frac{Y_2}{p} & \text{if } p \le \frac{3}{2}\mu & \text{i.e. if } \frac{p}{\mu} \le \frac{3}{2} \\ D_2 = 0 & \text{if } p > \frac{3}{2}\mu & \text{i.e. if } \frac{p}{\mu} > \frac{3}{2} \end{cases}$$

NOTICE: the demand of each group of agents depends not only on the price, but also on the average quality

 $D_1 = D_1 (p; \mu),$ $D_2 = D_2 (p; \mu).$ Given Y_1 and Y_2 Total demand:

$$D(p,\mu) = D_1(p,\mu) + D_2(p,\mu)$$

Three cases:

1) $D(p,\mu) = \frac{(Y_1 + Y_2)}{p} \quad if \quad \frac{p}{\mu} \le 1$ both groups will demand used cars \rightarrow 2) $D(p,\mu) = \frac{Y_2}{p} if \ 1 < \frac{p}{\mu} \le \frac{3}{2}$ \rightarrow only agents of Type 2 will demand used cars 3) $D(p,\mu) = 0 \ if \ \frac{p}{\mu} > \frac{3}{2}$

 \rightarrow no group will demand used cars

THE EXISTENCE OF EQUILIBRIUM

Does an equilibrium exist?

REMEMBER:

$$u = \frac{p}{2}$$

price changes \rightarrow the average quality of the supplied cars changes $\rightarrow D_1$ (p; μ) and D_2 (p; μ) change

it is not possible to analyze the effects of price changes in a situation of "other conditions being equal"

GRAPHICAL ANALYSIS

• The only equilibrium of this market is the one that provides NO exchanges

• Failure of the market

Perfect information

the quality of each car is perfectly known by both sellers and buyers

=> exchange are guaranteed!!!

Asymmetric information

=> failure of the market

<u>Asymmetric information</u>:

- The price depends on the average quality
- The sellers of good cars will leave the market

→ bad cars scare away good cars!!!

Circular relationship between quality and price generated from the inefficiency due to asymmetric information

SUMMING UP:

- When in a market the quality of each product or service offered is not evident to the eyes of the buyer, the price must necessarily be the same for products of good and of bad quality.
- The market price cannot therefore satisfy those who offer goods of high quality.
- For producers of high quality goods can therefore be convenient not to enter the market.
- They are systematically driven out from the market by the presence of producers of poor quality goods.

This mechanism can lead to the disappearance of the market, as in the case of the model of Akerlof.

Insurance market

• Life/health insurance.

at the average premium:

→ sick people scare away healthy people!!!

• Automobile insurance:

at the average premium:

→ bad drivers scare away good drivers!!!

In presence of adverse selection prices may influence the quality of the agents

Adverse selection and credit markets

Stiglitz-Weiss (1981) "Credit rationing in markets with imperfect information", American Economic Review, n. 71.

Interest rates fixed by banks may influence the quality of costumers

Asymmetric information: lenders ration credit instead of increasing interest rates.

=> market failure

(the price mechanism fails to bring about equilibrium in the market)

<u>Credit rationing may emerge in equilibrium</u>.
 Credit rationing = among (seemingly identical) loan applicants, some receive the loan and others do not.

WHY???

Imperfect information between lenders and borrowers

High interest rates could attract only more risky investments.

Highly risky investments:

- if successful, gives to the investors such profit margins to offset the costs due to the high interest rates;
- may also increase bank's costs due to their probability of default.

So:

- As the interest rate on the loan increases, the probability of repayment may decline.
- The "bank-optimal" interest rate may be lower than the market-clearing interest rate.

The expected return by the bank may increase less rapidly than the interest rate and may decrease beyond the "bank-optimal" rate.



FIGURE 1. THERE EXISTS AN INTEREST RATE WHICH MAXIMIZES THE EXPECTED RETURN TO THE BANK