

# Asymmetric Information: Adverse Selection and Moral Hazard

# Asymmetric Information

- asymmetric information or incomplete information
- adverse selection: life insurance
- moral hazard: car insurance, fire insurance
- “hidden information” versus “hidden action”

- an object (a used car) with value

$$v \sim \mathcal{U}[0, 1]$$

is offered by the seller (based on Akerlof (1970))

- valuations are for seller

$$u_s = \theta_s v$$

and for buyer

$$u_b = \theta_b v$$

with

$$\theta_b > \theta_s$$

- suppose value of object, say quality  $\theta$ , is complete information
- if trade occurs for object with value  $\theta$  at price  $p$  then the net utility is

$$p, \quad \theta_b v - p$$

- if trade does not occur then net utility is

$$\theta_s v, \quad 0$$

- in consequence trading is always pareto-optimal and as trade has to be voluntary

$$\theta_s v \leq p \leq \theta_b v$$

- suppose value of object, say quality  $\theta$ , is only known to seller
- by contrast, buyer only knows prior distribution  $\theta \sim \mathcal{U}[0, 1]$
- we ask is there a price at which trade occurs
- suppose at a price  $p$  trade would occur, what properties would the price have to induce trade?

# Trade under Incomplete Information

- seller sells if

$$\theta_s v \leq p$$

and thus by selling the object he *signals* that

$$v \leq \frac{p}{\theta_s} \quad (1)$$

- buyer buys the object if

$$\theta_b \mathbb{E}[v] \geq p \quad (2)$$

- he knows that (1) has to hold, he forms a conditional expectation, that

$$\theta_b \mathbb{E}[v | p] \geq p \Leftrightarrow \theta_b \frac{p}{2\theta_s} \geq p \quad (3)$$

# Market Failure under Incomplete Information

- thus for the sale to occur

$$\theta_b \geq 2\theta_s.$$

- thus unless, the tastes differ substantially, the market breaks down completely
- market mechanism in which a lower prices increases sales fails to work as lowering the price decreases the average quality, lower price is “bad news”.
- market may not disappear but display lower volume of transaction than socially optimal

- a continuum of identical consumers:

$$u = \theta v - p$$

- the monopolist can provide low and high quality:

$$v = \{0, 1\}$$

at cost

$$0 < c_0 < c_1.$$

# Socially Efficient Allocation

- the monopolist selects price and quality simultaneously
- assume that

$$\theta > c_1$$

so that it is socially efficient to produce the high quality good

- assume that the consumers do not observe quality before purchasing
- claim: an equilibrium in which the monopolist sells and provides high quality cannot exist

# Heterogeneous Information

- some consumers are informed about the quality of the product, say a fraction  $\alpha$
- if the informed consumers are buying then the uninformed consumer are buying as well
- when is the seller better off to sell to both segments of the market:

$$p - c_1 \geq (1 - \alpha)(p - c_0)$$

or

$$\alpha p \geq c_1 - (1 - \alpha)c_0$$

- we can then make two observations
- high quality is supplied only if price is sufficiently high, “high price can signal high quality”.
- a higher fraction,  $\alpha$ , of informed consumers favors efficiency as it prevents the monopolist from cutting quality
- the informational externality favors government intervention as individuals only take private benefit and cost into account.

- we considered “hidden information” or “hidden action” models
- asymmetry in information may reduce or end trade completely
- in contrast to the canonical model of goods, i.e. “search goods”, where we assert the quality by inspection
- we considered “experience goods”, where the quality can only be ascertained after the purchase
- the situation is only further exacerbated with “credence goods”

- there is room for a third party, government or other institution, to induce pareto improvement
- an improvement in the symmetry of information lead to an improvement in the efficiency of the resulting allocation
- look for optimal or equilibrium arrangements to reduce the asymmetry in information, either through:
  - costly signalling
  - contracting to avoid moral hazard, or
  - information extraction through a menu of contract (i.e. mechanism design).