

# Adverse Selection

is a market process in which buyers or sellers of a product or service are able to use their private knowledge of the risk factors involved in the transaction to maximize their outcomes at the expense of the other parties to the transaction.

Consider a simple labor market

## Workers

Number of workers  $N$

Distribution of workers across types is given by lottery  $L$

Type of worker:  $\theta$

- Workers differ only in their productivity. This denotes the number of units of output the worker will produce if hired by the firm.
- Low productivity:  $\theta_L$
- High productivity:  $\theta_H$
- $\theta_L \leq \theta \leq \theta_H$

Reservation wages

- This is the minimum wage that a worker will accept to work for a firm.
- $r(\theta)$

## Firms

- many identical firms produce the same output
- Offer some wage  $w$
- They produce an identical good that sells for \$1
- Maximize profits  $\pi$
- Set of workers that accept employment  $\Theta(w) = \{\theta: r(\theta) < w\}$ 
  - Notice that when workers are offered a wage equal to at-home production, they choose to stay home

# Competitive Equilibrium

## Definition

A competitive equilibrium with **observable** worker type consists of a set of workers that accept employment  $\theta^*$  and some wage rate  $w^*$  such that.

- $w^* = \theta$
- $\theta^* = \{\theta: r(\theta) \leq \theta\}$
- Why aren't workers offered a wage lower than their productivity level?

A competitive equilibrium with an **unobservable** worker type consists of a set of workers that accept employment  $\theta^*$  and some wage rate  $w^*$ .

- $\theta^* = \{\theta: r(\theta) \leq w^*\}$
- $w^* = E[\theta | \theta \in \theta^*]$
- Why aren't workers offered a wage lower than their combined expected productivity level?

Steps to find CE

1. Consider a plausible set of employed types
2. Find the expected productivity of that set
3. Would the set of types that accept employment under the CE wage be the same set you specified in the beginning
4. Repeat for all plausible sets of employed types

### Example

Find the competitive equilibrium if types are not observable for the following labor market.

Types:  $\theta_1 = 5$ ,  $\theta_2 = 10$ ,  $\theta_3 = 15$

Lottery:  $p(\theta = \theta_1) = 1/3$ ,  $p(\theta = \theta_2) = 1/3$ ,  $p(\theta = \theta_3) = 1/3$

Reservation wages:  $r(\theta_1) = 3$ ,  $r(\theta_2) = 7$ ,  $r(\theta_3) = 20$

### Finding CE

1. Consider the case in which all workers accept employment

$$\theta = \{\theta_1, \theta_2, \theta_3\}$$

2.  $E(\theta|\theta) = 1/3 \cdot 5 + 1/3 \cdot 10 + 1/3 \cdot 15 = 30/3 = 10$

If a firm offers a wage equal  $E(\theta|\theta)$ , the high types would not accept the job offer.

Therefore, no CE in which all types are employed.

1. Consider the case in which workers with the highest reservation wage are not employed

$$\theta = \{\theta_1, \theta_2\}$$

2.  $E(\theta|\theta) = 1/2 \cdot 5 + 1/2 \cdot 10 = 15/2 = 7.5$

If a firm offers a wage equal to  $E(\theta|\theta)$ , the high types would not accept the job offer, but both type 1 and type 2 would. Therefore, we found the following CE.

$$\theta^* = \{\theta_1, \theta_2\} \text{ and } w^* = \$7.5$$

1. Consider the case in which workers with only the lowest reservation wage are employed.

$$\theta = \{\theta_1\}$$

2.  $E(\theta|\theta) = 5$

If a firm offers a wage equal to  $E(\theta|\theta)$ , only the type 1 worker accept employment.

Therefore, we found a CE.

$$\theta^* = \{\theta_1\} \text{ and } w^* = \$5$$