Asymmetric Information

- hidden information problem or "pre contractual opportunism"

- hidden action problem or "post contractual opportunism" "moral hazard"

Hidden information

G. Akerlof 1970 QJE "the market for Lemons"

A SECON-HAND CAR MARKET WITH ASYMMETRIC INFORMATION BETWEEN BUYERS AND SELLERS

MARKET FREQUENCY

100 buyers

100 sellers

cars
- H HIGH QUALITY $\pi_H = 1/2$
- L LOW QUALITY $\pi_h = 1/2$

$p_H^S = 2000$ seller's reservation price of H

$p_L^S = 1000$ " " " " L

buyers' reservation prices:

$$p_H^d = 2400 \qquad p_L^d = 1200$$

$$E(p^d) = \pi_H \cdot p_H^d + \pi_L \cdot p_L^d = 1800$$

$$E(p^d) < p_H^S \Longrightarrow \text{ADVERSE SELECTION}$$

ADVERSE SELECTION IS THE PROCESS BY WHICH THE EXCESSIVE FREQUENCY OF LOW-QUALITY GOODS MAKES HIGH-QUALITY GOODS LEAVE THE MARKET
THIS CAUSES AN ENDOGENOUS CHANGE IN FREQUENCY OF H AND L TYPES:

$$\Rightarrow \quad \pi_H = 0 \qquad \pi_L = 1$$

$$\Rightarrow \quad E(p^d) = p_L^d$$

Insurance

H high risk profile π_H risk of bad event

L low risk profile π_L

f_H frequency of H agents

f_L " " L "

$\pi_L < \pi_H$

average probability of 'bad event' $= \bar{\pi} = f_H \cdot \pi_H + f_L \pi_L$

suppose premium $\gamma = \bar{\pi}$

$\pi_L < \bar{\pi} \rightarrow$ THE LOW-RISK AGENT CHOOSES K < D

$K < D$ even if risk averse

$\pi_H > \bar{\pi} \rightarrow$ THE HIGH-RISK AGENT CHOOSES K = D

$K = D$ even if risk neutral

The insurance company has a portfolio of contracts such that frequency of H contracts of the portfolio is $\frac{K_H}{K_H + K_L} > f_H$

THE PROBABILITY THAT A BAD EVENT OCCURS IN THE POPULATION OF AGENTS BUYING INSURANCE IS HIGHER THAN THE PROBABILITY OF A BAD EVENT IN THE ENTIRE POPULATION OF AGENTS

an insurance company fixing $\gamma = \tilde{\pi}$ goes bankrupt

THE INSURANCE COMPANY IS AWARE OF THE PROBLEM AND WILL FIX A PREMIUM CORRESPONDING TO THE HIGH-RISK PROFILE:

$\gamma = \pi_H \longrightarrow$ adverse selection

the low-risk agents L leave the market OR BUY ONLY VERY SMALL AMOUTS OF INSURANCE

aS IN THE CASE OF CAR INSURANCE, THE GOVERNMENT MAY DECIDE TO ADOPT A POLICY OF

mendetory insurance

BEING FORCED BY LAW,

H and L agents buy insurance

$k = 0 \implies \gamma = \pi$

NOW THE INSURANCE COMPANY CAN FIX A PREMIUM CORRESPONDING TO THE AVERAGE PROBABILITY OF A BAD EVENT IN THE ENTIRE POPULATION, WITHOUT GOING BANKRUPT

one solution to adverse selection is: signalling

L low productivity type

H high prod. type

labour market

W_L^R

W_H^R

reservation wages

$W_H^R = W_L^R = W^R$

if

a_H $y_H = a_H L_H$

a_L $y_L = a_L L_L$

$a_H > a_L$

$W_H > W^R$ S_H

$W_L > W^R$ S_L

Fixed labor supply

FOR SIMPLICITY, WE ASSUME HERE THAT H AND L HAVE THE SAME RESERVATION WAGE. THEY DECIDE TO WORK IF THEY ARE OFFERED A WAGE NOT LOWER THAN THE RESERVATION WAGE (PARTICIPATION CONSTRAINT)

FREQUENCY OF TYPE H

$$\pi_H = \frac{S_H}{S_L + S_H}$$

$$\pi_L = \frac{S_L}{S_L + S_H}$$

FREQUENCY OF TYPE L

with no asymmetric information

ON THE ASSUMPTION THAT THE FIRM IS A MONOPSONIST ON THE LABOUR MARKET, IT WILL OFFER THE LOWEST POSSIBLE WAGE MEETING THE WORKER'S PARTICIPATION CONSTRAINT

$$W_L = W^R = W_H$$

worker's participation constraint

$$W_L \geq W_L^R = W^R$$

$$W_H \geq W_H^R = W^R$$

WITH NO ASYMMETRIC INFORMATION H AND L AGENTS ARE INDUCED TO SIGN DIFFERENT CONTRACTS:

IF AN AGENT OF TYPE H PRODUCES IN 1 HOUR OUTPUT a_H (OR HIGHER) GETS A WAGE = $W_H = W^R$

WH = 0 OTHERWISE

IF AN AGENT OF TYPE L PRODUCES IN 1 HOUR OUTPUT a_L (OR HIGHER), GETS WAGE = $W_L = W^R$

WL = 0 OTHERWISE.

THIS TYPE OF CONTRACT IS Take it or leave it

(1) SINCE THE WAGE IS NOT LOWER THAN THE RESERVATION WAGE, THE H AND L WORKER IS WILLING TO SIGN THE CONTRACT. THUS THE CONTRACT MEETS THE PARTICIPATION CONSTRAINT.

(2) THE WAGE THE WORKER GETS BY EXERTING HER FULL PRODUCTIVITY POTENTIAL IS HIGHER THAN THE WAGE SHE GETS OTHERWISE. THEREFORE IT IS IN THE INTEREST OF THE L WORKER TO PRODUCE aL AND IT IS IN THE INTEREST OF THE H WORKER TO PRODUCE aH. THE CONTRACT MEETS THE "INCENTIVE COMPATIBILITY CONSTRAINT".

(3) WITH ASYMMETRIC INFORMATION THIS CONTRACT IS NO LONGER AVAILABLE BECAUSE A HIGH PRODUCTIVITY WORKER HAS NO INCENTIVE TO SIGN: BY SO DOING HE WOULD GET THE SAME WAGE OF THE LOW PRODUCTIVITY WORKER BUT HAS TO PRODUCE A LARGER OUTPUT.

HE IS THEREFORE BETTER OFF BY SIGNING THE CONTRACT OFFERED TO THE LOW PRODUCTIVITY WORKER BECAUSE BY SO DOING HE GETS THE SAME WAGE, BUT CAN PRODUCE THE REQUIRED OUTPUT IN A FRACTION OF ONE HOUR (HE IS MORE PRODUCTIVE) AND CAN REST FOR THE REMAINING TIME

TO AVOID THIS PROBLEM, THE HIGH-PRODUCTIVITY WORKERS MAY TRY TO SIGNAL THEIR TYPE H THROUH THE COSTLY SIGNAL OF EDUCATION

education as signal :

② education is costly and more costly for low quality agents

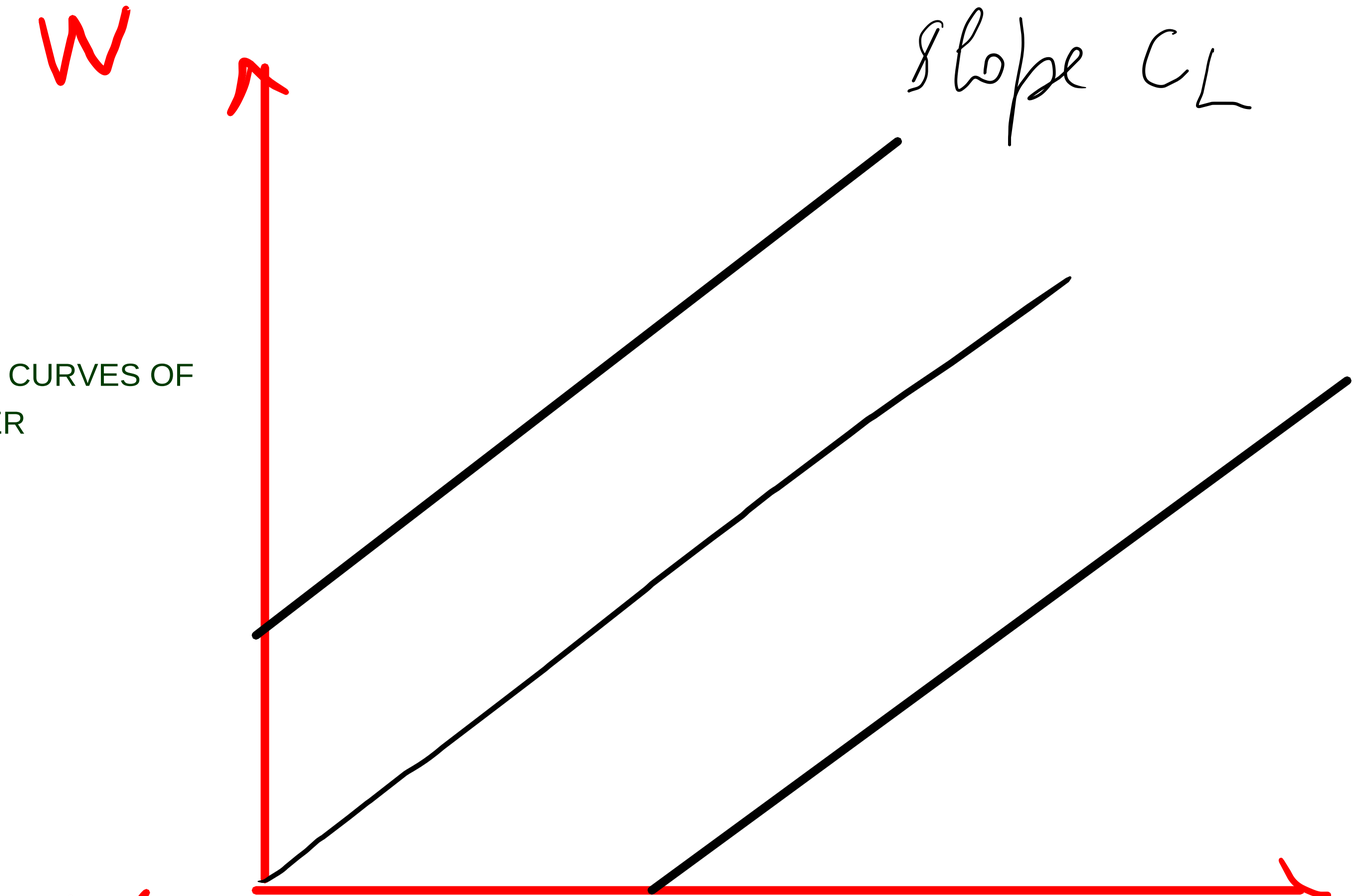
c_H

WORKER'S UTILITY $u(e, w) = w - e\,c$ c_L

e = education c effort cost of education

$c_L > c_H$

INDIFFERENCE CURVES OF TYPE L WORKER



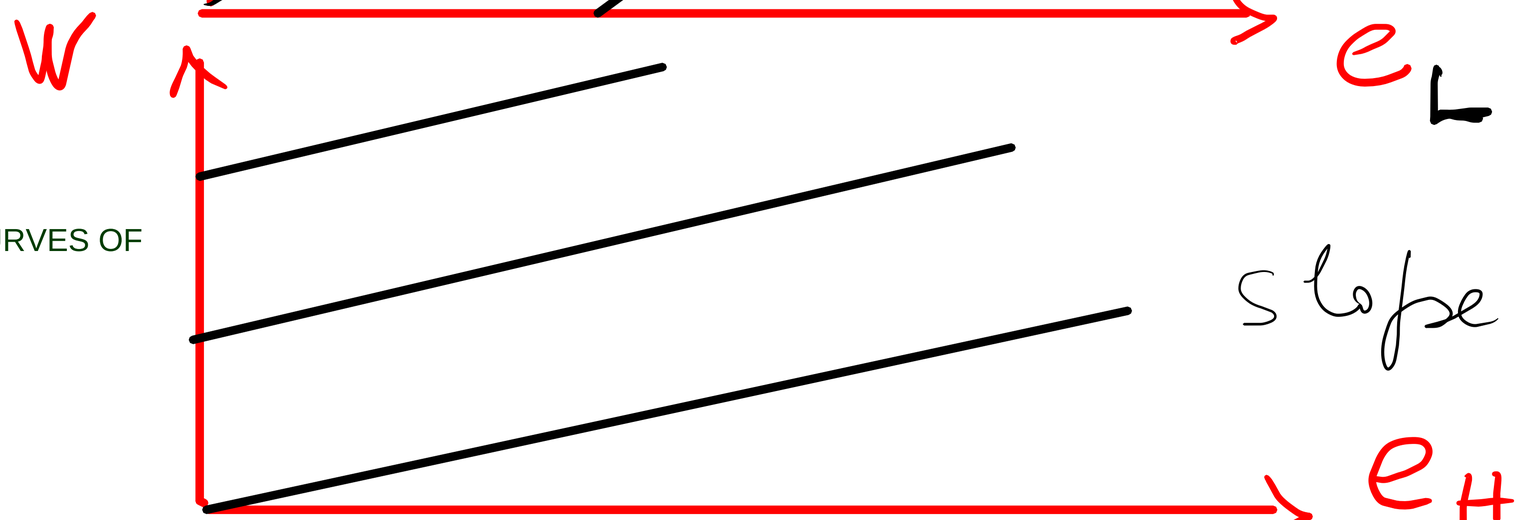
$$u = w - C_L \cdot e$$

$$\frac{\partial u / \partial e}{\partial u / w} = - C_L$$

$$MRS = - \frac{MU_e}{MU_w}$$

$$MRS = + c$$

INDIFFERENCE CURVES OF TYPE H WORKER



$$C_L > C_H$$

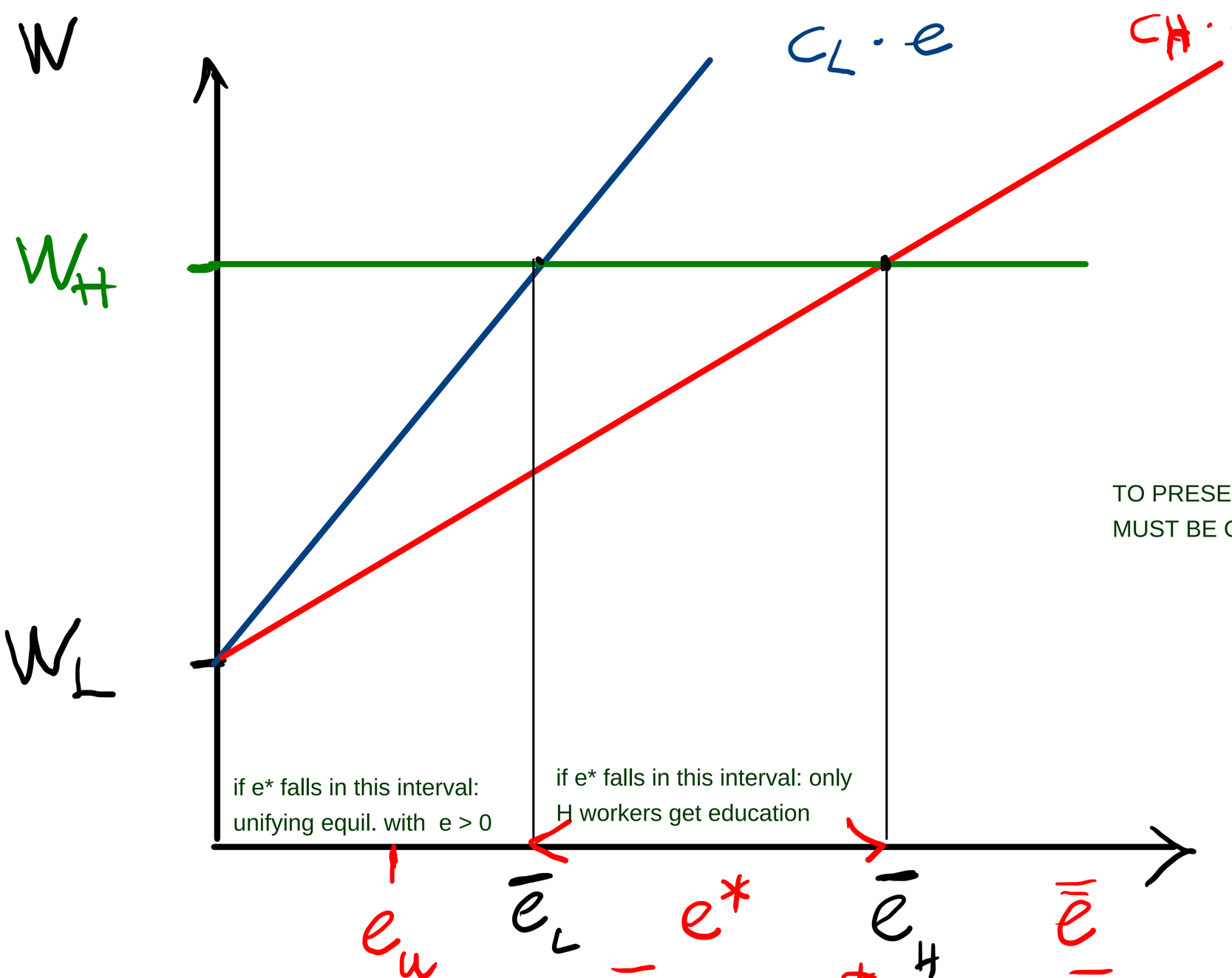
(2)

firms offer wage W^H to workers with education e^* (OR HIGHER).

if $e < e^*$ THEN $W = W^L < W^H$

IN THIS WAY, FIRMS ARE TYING TO CONVINCE THE H WORKERS TO USE THEIR FULL PRODUCTIVE POTENTIAL

under what conditions will e^* separate the market?



if the threshold education e* belongs in the interval

$u = w - c_L e$

$u = \text{constant}$

$w - c_L \cdot e = u$

$c_L \cdot e = w - u$

$w = c_L \cdot e + u$

TO PRESERVE WELFARE UNCHANGED, HIGHER EDUCATION MUST BE COMPENSATED BY HIGHER WAGE EARNING

$\bar{e}_L$ max education for L

$\bar{e}_H$ max educat. for H

e

e^*

then we have separating equilibria through signalling

separating equilibrium
through signalling if
and only if:

$$\bar{e}_L < e^* \leq \bar{e}_H$$