

EXTERNALITIES (CONTINUED)

NEGATIVE EXTERNALITIES : NUMERICAL EXAMPLE

ASSUME THAT THE STEEL FIRM FACES THE FOLLOWING MB AND MPC CURVES :

$$MB = 300 - Q.$$

$$MPC = 20 + Q.$$

ASSUME THAT THE FISHERY FACES THE FOLLOWING MD CURVE :

$$MD = 40 + 2Q.$$

• STEEL FIRM PRODUCES AT Q WHERE

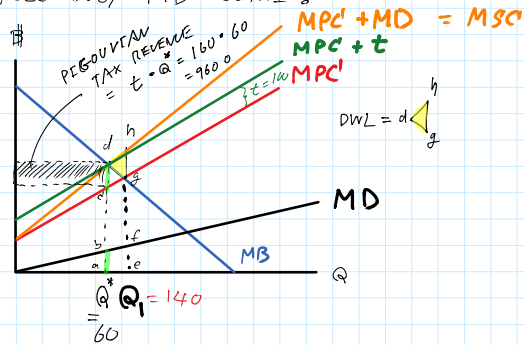
$$MB = MPC$$

$$300 - Q_1 = 20 + Q_1$$

$$2Q_1 = 300 - 20$$

$$2Q_1 = 280$$

$$Q_1 = 140$$



• FROM SOCIETY'S VIEWPOINT, SOCIALLY DESIRABLE LEVEL OCCURS AT Q WHERE

$$MB = MSC$$

$$MB = MPC + MD$$

$$300 - Q^* = 20 + Q^* + 40 + 2Q^*$$

$$4Q^* = 300 - 20 - 40$$

$$4Q^* = 240$$

$$Q^* = \frac{240}{4} = 60$$

$$MSC = 60 + 3Q$$

• LET'S COMPUTE DWL :

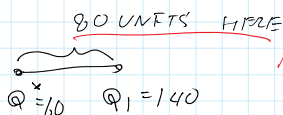
$$DWL = \frac{1}{2} \times \text{base} \times \text{height}$$

$$= \frac{1}{2} \times (MSC|_{Q_1} - MB|_{Q_1}) \times (Q_1 - Q^*)$$

$$= \frac{1}{2} \times (60 + 3(140) - (300 - 140)) \times (140 - 60)$$

$$= \frac{1}{2} \times (480 - 160) \times 80$$

$$= \frac{1}{2} \times 320 \times 80 = \underline{\underline{12,800 \text{ PAIT}}}$$



ITS TOTAL BENEFIT < IS TOTAL COST THAT IS SPENT TO MAKE THIS 80 UNITS

THE FACT THAT $Q_1 > Q^*$ GENERATE THIS AMOUNT OF LOSS TO SOCIETY AS A WHOLE.

PUBLIC RESPONSE TO CORRECT NEGATIVE EXTERNALITIES

Externalities and Property Rights



Ronald Harry Coase was a British economist and author. He was for much of his life the Clifton R. Musser Professor Emeritus of Economics at the University of Chicago Law School, where he arrived in 1964 and remained for the rest of his life.

Ronald H. Coase
United Kingdom
University of Chicago
Chicago, IL, USA
(1910-2013)

"The Problem of Social Cost,"
Journal of Law & Economics,
3, (October 1960)

HOWEVER, RONALD H. COASE LOOKED AT THE NATURE OF THE PROBLEM DIFFERENTLY. (FROM A.C. PIQUE)

COASE SAID " THE ROOT OF EXTERNALITIES' PROBLEM ACTUALLY ORIGINATES FROM

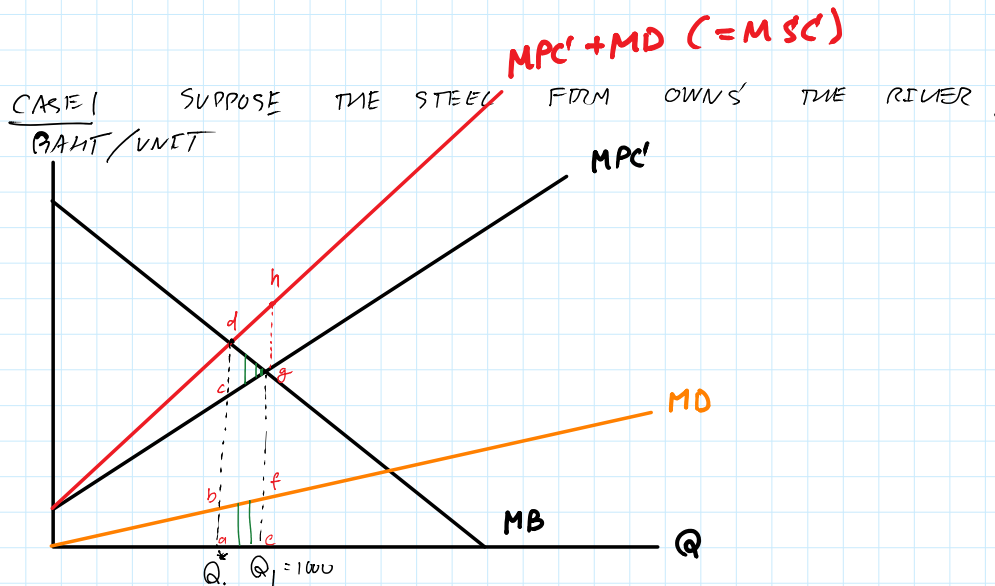
" ILL-DEFINED PROPERTY RIGHTS "

(IN OUR STORY, IT MEANS THAT PROPERTY RIGHTS OVER THE USE OF THE RIVER IS NOT WELL-DEFINED: RIVER BELONGS TO

WHO ← STEEL FIRM ?
FISHING FIRM
NO MATTER WHO OWNS THE RIVER

COASE'S THEOREM :

IF PROPERTY RIGHTS ARE ESTABLISHED (OR WELL-DEFINED) & TRANSACTION COSTS (OF BARGAINING) ARE SMALL, THE TWO PARTIES CAN BARGAIN AND RESOLVE THE EXTERNALITY PROBLEM BY THEMSELVES AND REACH THE EFFICIENT OUTPUT LEVEL (Q^*).



FACT #1 ORIGINALLY, THE STEEL FIRM PRODUCES $Q = Q_1$ (WHERE $MB = MPC$)

HOWEVER, THE SOCIALLY DESTROYABLE OUTPUT LEVEL IS

$$Q = Q^* \text{ (WHERE } MB = MPC + MD \text{)}$$

FROM FISHERY'S VIEWPOINT, SHE PREFERRED $Q = 0$. (WHY?)

$$P/C' \quad MD = 0.$$

FACT #2

AS STEEL FIRM OWNS THE RIVER, BARGAINING PROCESS WILL START FROM $Q = Q_1$.

FISHERY FIRM WILL "BRIBE" TO STEEL FIRM AS LONG AS

$$MD \geq MB - MPC'$$

= MAXIMUM AMOUNT OF MONEY FISHERY IS WILLING TO "BRIBE" THE STEEL FIRM TO CUT HIS STEEL PRODUCTION
 = MINIMUM PAYMENT THE STEEL FIRM WOULD ASK FOR

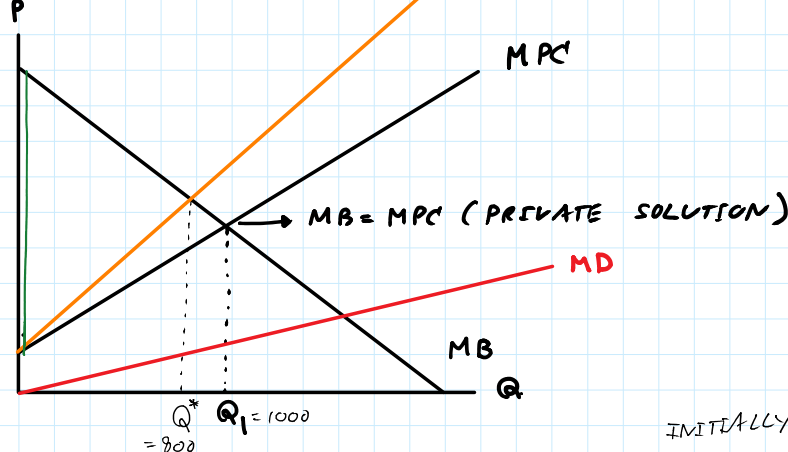
THE BARGAINING STOPS WHERE $MD = MB - MPC'$

WHICH IS EXACTLY AT $Q = Q^*$!

↓ SOCIALLY DESTROYABLE OUTPUT LEVEL OF STEEL.

CASE 2

WHEN FISHERY OWNS THE RIVER ...



FACT #1

AS FISHERY OWNS THE RIVER, SHE WOULD PREFER STEEL FIRM TO PRODUCE NO STEEL ($Q = 0$).

(SO, NOW, POINT OF DEPARTURE BEGINS AT $Q = 0$)

STEEL FIRM WILL BRIBE FISHERY TO ALLOW FOR PERMISSION TO PRODUCE AS LONG AS

$$MB - MPC' \geq MD$$

= MAXIMUM AMOUNT OF MONEY STEEL FIRM IS WILLING TO "ACCEPT"
 = MINIMUM AMOUNT OF MONEY FISHERY IS WILLING TO "ACCEPT"

TO "PAY" TO FISHERY
 THE BARGAINING STOPS WHERE $MB - MPC' = MD$ WHICH IS AT, AGAIN, Q^* !!! (AMAZING RESULT!)

NOW WE GET THIS CONDITION:

$$MB - MPC' = MD$$

$$MB = MPC' + MD$$

OR

$$MB = MSC' \quad ***$$

EFFICIENCY CONDITION WE FOUND EARLIER!

COASE THEOREM:

IF PROPERTY RIGHTS ARE WELL ESTABLISHED

TRANSACTION COST IS REASONABLY SMALL

THE TWO PARTIES CAN REACH AT "THE SOCIALLY EFFICIENT LEVEL" OF PRODUCTION, REGARDLESS OF WHO OWNS THE RIVER.

OK... SO FAR

PUBLIC RESPONSE TO SOLVE EXTERNALITIES

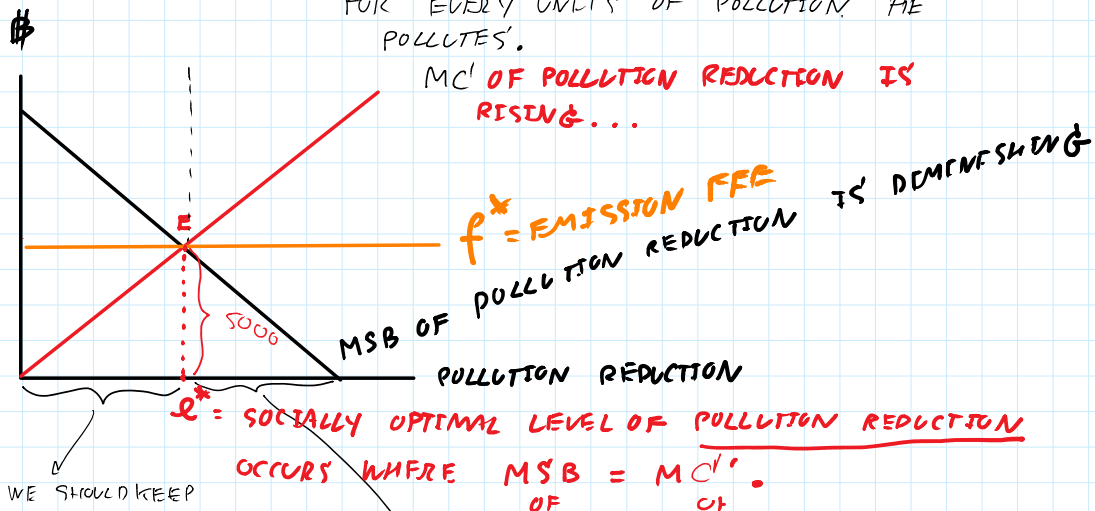
PIGOUVIAN TAX

PRIVATE RESPONSE TO SOLVE EXTERNALITIES

COASE THEOREM

NOW, LET'S LOOK AT ANOTHER PUBLIC RESPONSE TO SOLVE THE EXTERNALITIES.

EMISSION FEE: FEES CHARGED TO THE POLLUTERS FOR EVERY UNIT OF POLLUTION HE POLLUTES.



WE SHOULD KEEP REDUCING POLLUTION AS LONG AS $MSB > MSC$

THE MOST PROFITABLE LEVEL OF POLLUTION REDUCTION OCCURS WHERE $MSB = MC'$.

OF POLLUTION REDUCTION OF POLLUTION REDUCTION

WHEN $MC' > MSB$, IT IS NOT WORTHWHILE TO REDUCE FURTHER

NOW, IF YOU WANT THIS FIRM TO ARRIVE AT $e = e^*$, YOU CAN...
 INTRODUCE "EMISSION FEE" AND MAKE IT EQUAL TO MSB EVALUATED AT $e = e^*$.

MR. NUT WILL KEEP REDUCING HIS POLLUTION AS LONG AS MARGINAL COST OF REDUCING POLLUTION (MC') IS CHEAPER OR LOWER THAN PAYING THE FEE OF 5000 BAHT/UNIT OF POLLUTION.

IN SHORT, HE WILL HAVE AN INCENTIVE TO REDUCE POLLUTION AS LONG AS $MC' \leq f^*$.

NOTICE THAT HE WILL NOT WANT TO CUT POLLUTION MORE THAN e^* (WHY?)