

These pages are a direct copy of a Zoom lecture on 11/19/20. They show how to solve the permit trading makeup exam. An error in Firm 2's profit function in the Zoom lecture (marked in red in the Zoom lecture) has been corrected here.

Makeup Permit Trading Exercise

Product price $P = 40$

Odd firm costs $C(Q) = Q + 3(A)^2$

Even firm costs $C(Q) = Q + A^2$

Odd marginals $MC(Q) = 1$ $MAC = 6A$

Even marginals $MC(Q) = 1$ $MAC = 2A$

Permits Buy $P_x = 36$

Sell $P_x = 26$

How much will firms produce?

Old firm marginal cost $\leq 1 + 1^2_x = 37$

so firm will produce at capacity

because $37 < 40$ Therefore

$$Q = 20$$

Some analysis for even firms

Will odd firm be a buyer or seller. To sell a permit the firm must abate 11.

$MAC_1(11) = 66 < 26$ so firm odd will buy permits

Intuitive analysis. Firm odd will abate until $MAC(A) = 36$, $6A = 36$, $A = 6$, firm odd will buy $X = 4$ permits

More formal analysis is to work from the profit function

$$\Pi_1(a, x) = pQ - Q - P_x X - 3(Q - 10 - X)^2$$

$$Q = 20$$

$$\Pi_1(x) = P \cdot 20 - 20 - P_x X - 3(10 - X)^2$$

$$\frac{\Delta \Pi}{\Delta X} = -P_x - 6(10 - X) \stackrel{\text{set}}{=} 0$$

\Rightarrow

$$6(10 - X) = 36$$

$$(10 - X) = 6$$

$$X = 4$$

Intuitive analysis for even firm. Even firm sells.

So even firm abates until MAC is equal to selling price

$$MAC(A) = 2A = 26$$

$$A = 13$$

So firm even sells 3 permits

More formal analysis for
even. Profit function

$$\Pi_2(x) = P_2 20 - 20 + P_x X - (20 - 10 + X)^2$$

$$\frac{\Delta \Pi}{\Delta x} = P_x - 2(10 + X) \stackrel{\text{set}}{=} 0$$

$$= P_x - 2(10 + X) \stackrel{\text{set}}{=} 0$$

$$= P_x - 20 + X = 0$$

$$P_x - 20 = 2X$$

$$6 = 2X$$

$$X = 3$$

Grading slip odd

Buyer # 101

Seller # 0

Price per permit 36

Buyers name Whomsoever

Sellers name Instructor

Permits 6

Production report

Firm # 101

Name Whomsoever

Quantity produced 20

Permits on hand 14

Abatement 6

Permits bought 4

Total paid $4 \times 36 = 144$

Permits sold 0

Total received 0

Net revenue -144

Grading slip

Buyer number 0

seller 11 102

Price per 26

Buyer name Instructor

seller name Whomsoever

permits 3

Production report

Exam # 102

Name of student Mounasir

Quantity 20

Permits 7

Abatement 13

Permits bought 0

Bard 0

Permits sold 3

Received 78

Net revenue 78