# Lecture 8: Price Discrimination

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Lecture 8: Price Discrimination

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- ▶ In real life, firms often have different prices for different consumers/units

- ▶ We will explore some of these now

- ▶ In a competitive market such exotic pricing schemes could never arise since $p =$ marginal cost

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► Suppose the firm can observe all characteristics of the consumer

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- ▶ Demand curve illustrates the willingness to pay for the $q$-th unit of the product

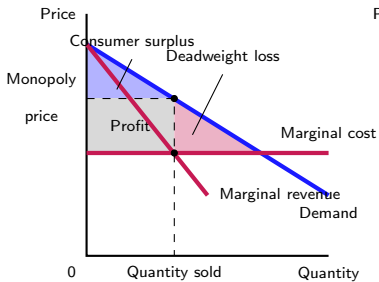- ▶ Firm can extract all of the surplus of the consumer. How?

▶ Firm will price at $p(q)$ for the $q$-th unit and continue to produce until $p(q) = MC(q)$

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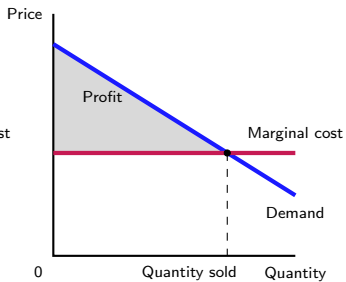- ▶ Firm gets all of the consumer surplus as his profits:

$$\Pi = \int\limits_{0}^{q^*} (p(q) - c'(q))dq = \int\limits_{0}^{q^*} p(q)dq - c(q^*),$$

where $q^*$ is the quantity at which $p(q^*) = c'(q^*)$.

(a) Monopolist with Single Price    (b) Monopolist with Perfect Price Discrimination

- ▶ Firm can do this is because it knows the exact demand curve of each consumer

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- ▶ Amazon tries to estimate everyone's demand curve

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► Suppose that a bar has a monopoly in a community

► Each drink costs $c$ dollars to provide

► Consumers have diminishing marginal returns on the alcohol consumed

This bar would produce $q$ at price $p(q)$ such that

$$p'(q)q + p(q) = c$$

if it were only able to charge one price

► Many bars have a cover charge (an entry fee)

► Does this increase profits?

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$$f \leq \int\limits_0^{q^*} (p(q) - p(q^*))dq,$$

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- ▶ For a fix $q^*$, the monopolist will always charge an entry fee of

$$f = \int_0^{q^*} (p(q) - p(q^*))dq.$$

▶ What is then the profit maximizing price and quantity given this entry fee?

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▶ The first order condition is:

$$p(q) - c = 0$$

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then all consumers will come to the bar

▶ The entry fee is:

$$\int_0^{p^{-1}(c)} (p(q) - c)dq$$

- Quantity produced is efficient


- Consumer surplus is 0

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▶ Under both first price discrimination and two-part tariff, the firm is able to extract all of the consumer surplus

▶ What is the difference between first degree price discrimination and two-part tariff?

▶ Let's see with an example

$$p_A = 2 - \frac{1}{4}q_A$$
$$p_B = 8 - q_B$$

Marginal cost of production of 1

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  - ▶ Price of 1 to all consumers

  - ▶ Entry fee of 2 for consumer $A$ (consumer surplus when $p = 1$)

  - ▶ Entry fee of $49/2 = 24.5$ for consumer $B$ (consumer surplus when $p = 1$)

► What if monopolist doesn't know who is who

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$$P = \frac{16 - Q}{5}$$

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- ▶ if $p \leq 2$

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$$P = \frac{16 - Q}{5}$$

- ▶ if $p > 2$

$$Q = q_A + q_b = 8 - p$$

$$P = 8 - Q$$

$$Q(p) = \begin{cases} 16 - 5p \text{ if } p \leq 2 \\ 8 - p \text{ if } p \geq 2 \end{cases}$$

$$P(Q) = \begin{cases} \frac{16-Q}{5} \text{ if } Q \geq 6 \\ 8 - Q \text{ if } Q \leq 6 \end{cases}$$

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    - ▶ FOC: $\frac{16-Q}{5} - \frac{Q}{5} = 1$
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- ▶ If $Q \leq 6$

  - ▶ FOC: $8 - Q - Q = 1$

- We are unsure where the monopoly will maximize

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- If $Q \geq 6$
    - FOC: $\frac{16-Q}{5} - \frac{Q}{5} = 1$
    - $Q = \frac{11}{5} = 2.2$
    - Cannot be a solution

- If $Q \leq 6$
    - FOC: $8 - Q - Q = 1$
    - $Q = 3.5$

- ▶ We are unsure where the monopoly will maximize

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- ▶ FOC: $p(q) + qp'(q) - 1 = 0$

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    - ▶ FOC: $\frac{16-Q}{5} - \frac{Q}{5} = 1$
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    - $Q = \frac{11}{5} = 2.2$
    - Cannot be a solution

- If $Q \leq 6$
    - FOC: $8 - Q - Q = 1$
    - $Q = 3.5$
    - $P = 5.5$
    - Is the solution

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    - ▶ Everyone enters the bar. Tariff=2 and profit equal to 4

- What if monopolist doesn't know who is who

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    - Price equal to 1

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    - Tariff $\geq 2$, but $\leq 24.5$

▶ What if monopolist doesn't know who is who

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        ▶ Only $B$ enters the bar. Tariff=24.5 and profit equal to 24.5

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    - ▶ Only $B$ enters the bar. Tariff=24.5 and profit equal to 24.5

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    - ▶ No one enters the bar

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    - Only $B$ enters the bar. Tariff=24.5 and profit equal to 24.5

  - Tariff $\geq 24.5$

    - No one enters the bar

    - Zero profit