Price Discrimination: Part 1

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"The textbook monopolist is a wasteful agent."

1 Pricing tactics

- Pigou's (1920) taxonomy of **price discrimination**:
  - First-degree (or perfect) price discrimination:
    - The producer discriminates across sold units and consumers — captures the whole consumer surplus.
  - Second-degree price discrimination:

    * Per-unit prices of the good differ, but these prices are the same for all consumers (e.g., quantity discounts).

  – Third-degree price discrimination:

    * Per-unit prices of the good are the same for a given consumer, but different consumers pay different prices (e.g., student discounts).

- **Commodity bundling**

2 Price discrimination

Definition 1 *A producer* price-discriminates *when two units of the same physical good is sold at different prices, either to the same consumer or to different consumers.*

- Note that the definition includes the quantity discount case ("buy 3 pay for 2").

- The possibility of price discrimination is closely linked to the possibility of arbitrage.

2.1 Arbitrage

- Transferability of the commodity (between consumers).

- Transferability of demand (between offered bundles).

3 Perfect price discrimination (1st degree)

- The monopolist succeeds in capturing the entire consumer surplus.

Version 1

- Each consumer demands one unit of the monopolist good,

- Consumer i's willingness to pay for the good is v_i.

- The monopolist observes v_i and offers to sell a unit of the good to consumer i at the (individual) price $p_i = v_i$, leaving the consumer just indifferent.

Version 2

- Assume there are a large number of identical consumers with downward sloping demand curves.

- Assume that the monopolist has a constant marginal cost c. (Fig. 1)

1. The monopolist can make a take-it-or-leave-it offer to sell q^c units to consumer i at the total price $A + B$. The consumer is just willing to accept.

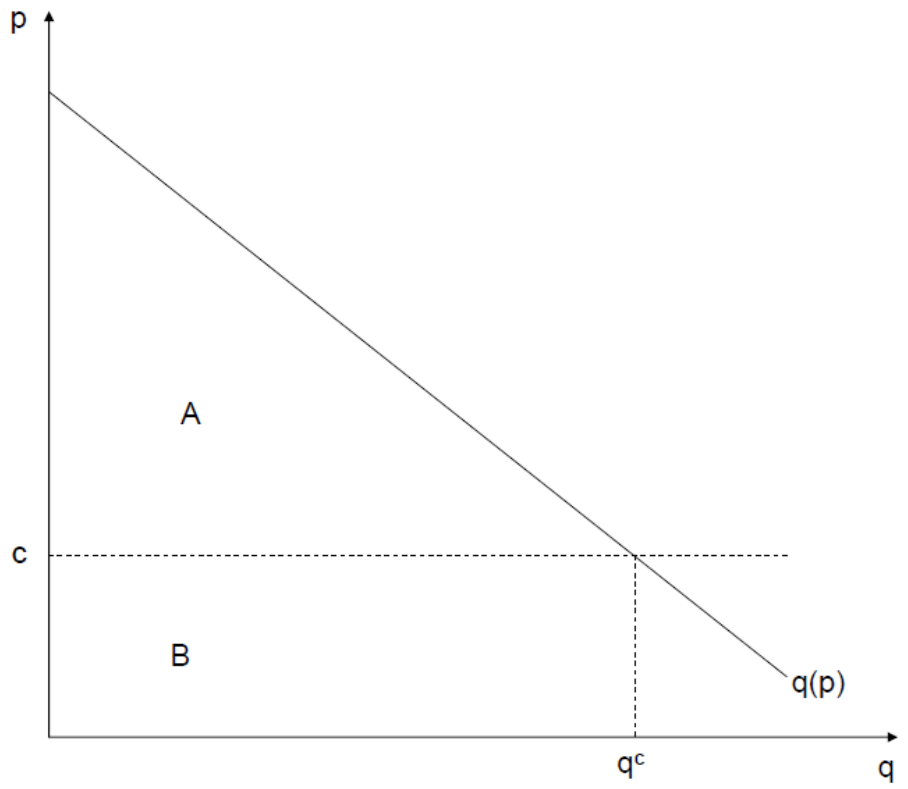
   or

2. The monopolist can set an access charge of A and then charge the price $p^c = c$ for each unit sold. The consumer accepts to pay the access charge and buys q^c units.

- Perfect price discrimination gives the maximum possible profits to the monopolist, but it also *requires a lot of information*; he has to know the individual demands, and he must be able to prevent resale of the good

- Examples?

Fig 1



4 Multimarket price discrimination (3rd degree)

- Multimarket price discrimination refers to a situation where the monopolist can divide the market into m groups (or market segments) on the basis of some observed information and can charge a different prices to the different groups.

- Requires that arbitrage between the groups is not possible.

4.1 Analysis

- Assume
  - two market segments with inverse demands equal to $p_1(q_1)$ and $p_2(q_2)$ respectively.
  - The firm has a general cost function $C(q_1 + q_2)$, where q_i is the amount sold in market i, $i = 1, 2$.

- The firm solve maximizes the total profits from the two market segments.

$$\max_{q_1, q_2} \{p_1(q_1) q_1 + p_2(q_2) q_2 - C(q_1 + q_2)\}.$$

- The optimal solution involves setting the marginal revenue in each market segment equal to the marginal cost:

$$MR_1(q_1) \equiv p_1(q_1) + p_1'(q_1)\, q_1 = C'(q_1 + q_2),$$

$$MR_2(q_2) \equiv p_2(q_2) + p_2'(q_2)\, q_2 = C'(q_1 + q_2).$$

- Note that this implies that $MR_1(q_1) = MR_2(q_2)$.

- Note also that the marginal revenue can be expressed in terms of the demand elasticity

$$\begin{aligned} MR_i(q_i) &= p_i(q_i) + p_i'(q_i)\, q_i \\ &= p_i(q_i)\left[1 + p_i'(q_i)\frac{q_i}{p_i(q_i)}\right] \\ &= p_i(q_i)\left[1 - \frac{1}{|\varepsilon_i(q_i)|}\right]. \end{aligned}$$

where

$$\varepsilon_i(p_i) = \frac{dq_i}{dp_i}\frac{p_i}{q_i}.$$

- But then $MR_1(q_1) = MR_2(q_2)$ implies that, across the two markets,

$$p_1\left[1 - \frac{1}{|\varepsilon_1|}\right] = p_2\left[1 - \frac{1}{|\varepsilon_2|}\right],$$

  from which it follows that the monopolist sets a higher price in the market segment with least price elastic (sensitive) demand:

$$p_1 > p_2 \Leftrightarrow |\varepsilon_1| < |\varepsilon_2|.$$

- Intuitively, if there two groups of beer consumers, heavy drinking guys and their female companions, the monopolist will charge the guys more (does this explain *ladies' nights*?)

5 Spot the discrimination

- Concert ticket price below equilibrium level
- Disneyland (entry fee + prices per ride)
- Bulk discounts in supermarket
- Student or senior prices for books, travel etc
- Cable or phone compay pricing packages
- Different prices for lunch or dinner at same restaurant

6 Welfare aspects of perfect- and multimarket price discrimination

Perfect price discrimination

- Perfect price discrimination leads to an *efficient allocation* (the good is produced whenever the marginal willingness to pay exceeds the marginal cost).

- It does, however, have distributional effects (profits rather than consumer surplus).

Multi-market price discrimination

- Multi-market discrimination increases the monopolist's profits; however, the impact on aggregate efficiency is not clear.

- Does multi-market price discrimination lead to a more efficient allocation than non-discrimination?

- Sources of inefficiency under multi-market price discrimination:

  1. *Output inefficiency*: price exceeding marginal cost implies "too low output".

  2. *Consumption inefficiency*: Since consumer pay different prices, each consumer's marginal willingness to pay is not the same.

- If the monopolist does not discriminate, then only the first source of inefficiency is present, but this source *may then be more severe*. Figs. 2 and 3.

- The discriminating monopolist sets a price p_1 in market 1 and price p_2 in market 2. This causes a total deadweight loss equal to the sum of B and C.

- The non-discriminating monopolist sets a (single) price p and causes a deadweight loss equal to A.

- We cannot unambiguously say which deadweight loss ($B + C$ or A) is larger.

- General rules of thumb:
  - If discrimination increases total output, then discrimination may be good for efficiency.
  - If non-discrimination leads to a price such that some group does not buy at all, then discrimination may be good.
  - The closer imperfect price discrimination is to perfect price discrimination, the more likely it is that price-discrimination leads to a more efficient outcome. In other words, the better the signal allows the monopolist to sort consumers, the more likely it is that price-discrimination is good for efficiency.

Fig 2

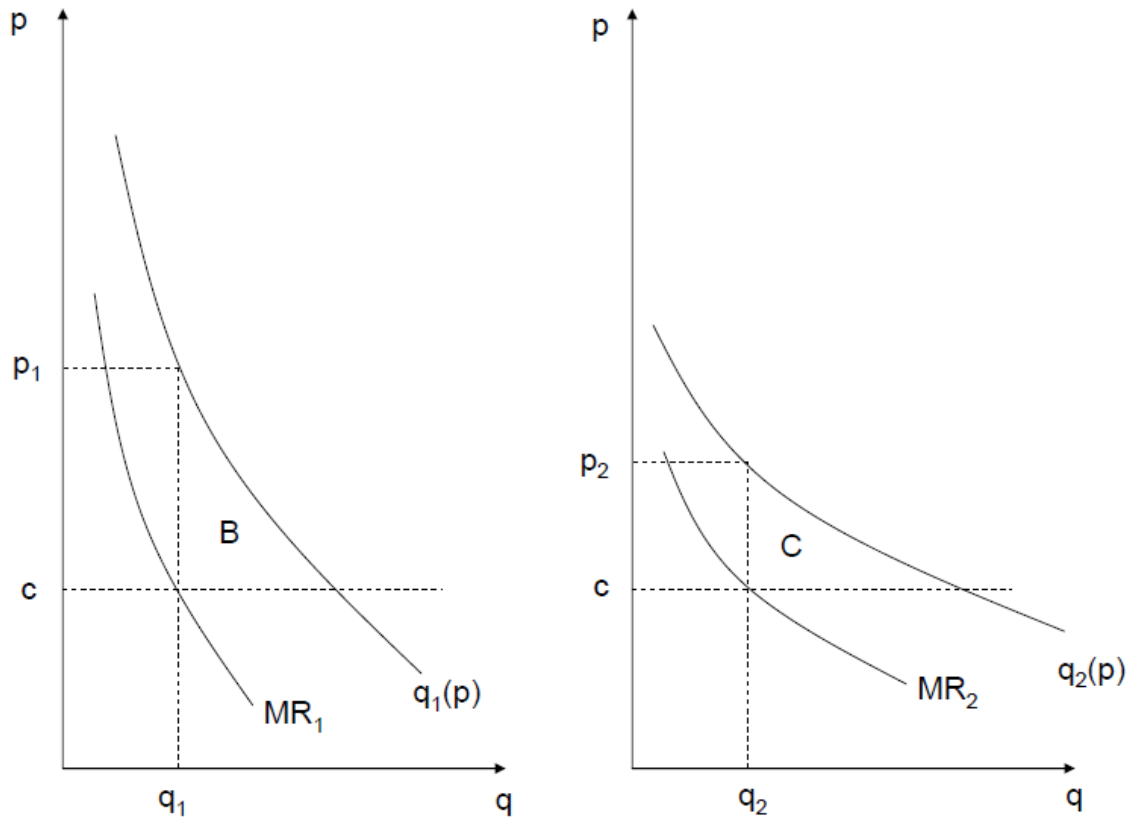
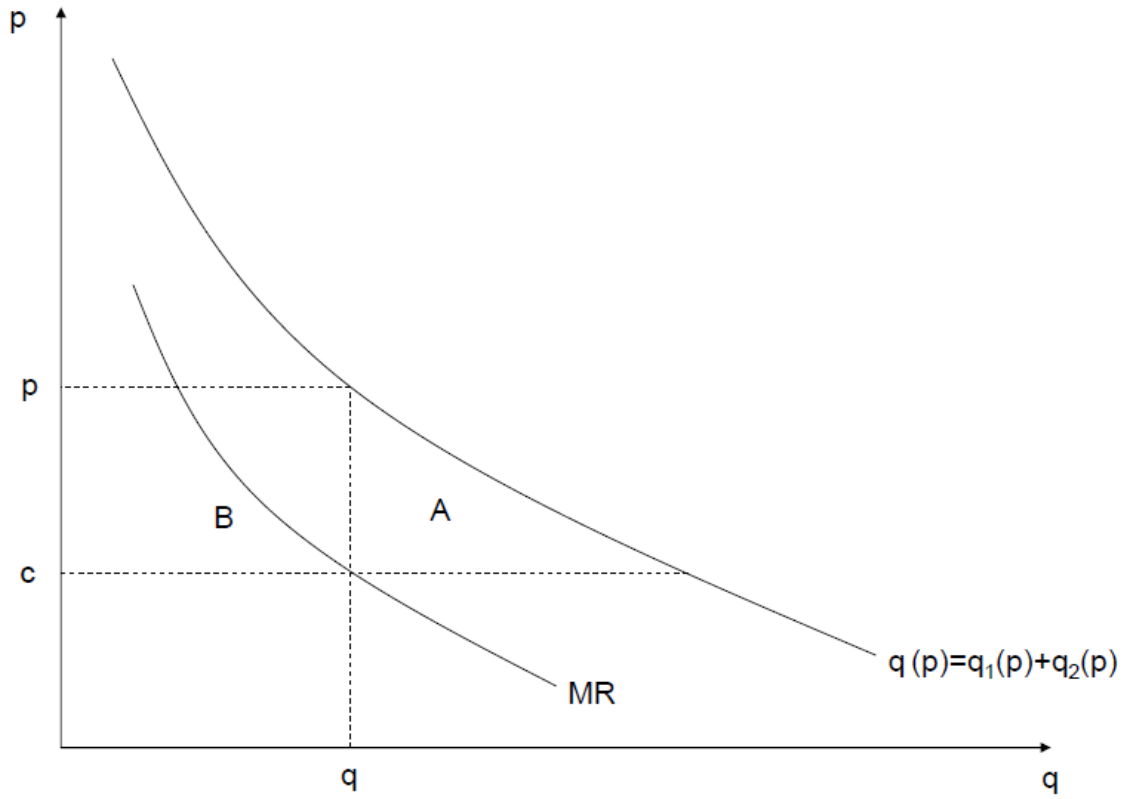


Fig 3



7 Screening: Introduction

- Suppose that the monopolist *does not receive any* signal of the consumer's demand (i.e. he cannot observe age etc.); he cannot tell the consumers apart—he only knows that there is heterogenous demand.

- Does this mean that the monopolist cannot do better than to charge a single price to all?

- The answer is in general no – provided that arbitrage can be prevented.

- So what can he do? He can:

  - Offer a menu of bundles to choose from.

  - Take into account the possibility of "personal arbitrage".

- This will typically involve quantity-discounts. But we leave this for next lecture...

8 What to remember from this lecture

- What is price discrimination. How arbitrage can limit the scope for price discrimination.
- Forms of perfect price discrimination.
- Multimarket price discrimination and the inverse elasticity rule.
- Efficiency aspects of perfect and multimarket price discrimination.
- The problem of screening and the transferability of demand.