ECN 453: Pricing and Price Discrimination 3

Nicholas Vreugdenhil

Plan

1. Non-linear pricing
2. Should price discrimination be legal?

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2. Should price discrimination be legal?

Non-linear pricing

- Consumers often decide not just *whether* to buy a produce but also *how much*.
- **Examples**
  - How many scoops of ice-cream?
  - How much electricity/water/gas to use?
- **Non-linear pricing**: when the price changes with the total quantity purchased.
  - e.g. first ice-cream scoop costs \$5, second costs \$2, third \$1,...

Figure: Getty Images

Non-linear pricing

- We will look at a particular form of non-linear pricing: **two-part tariffs**
  - We will begin by studying the case with homogeneous consumers (i.e. identical consumers who all have the same demand curve).

- A two-part tariff is in the form:

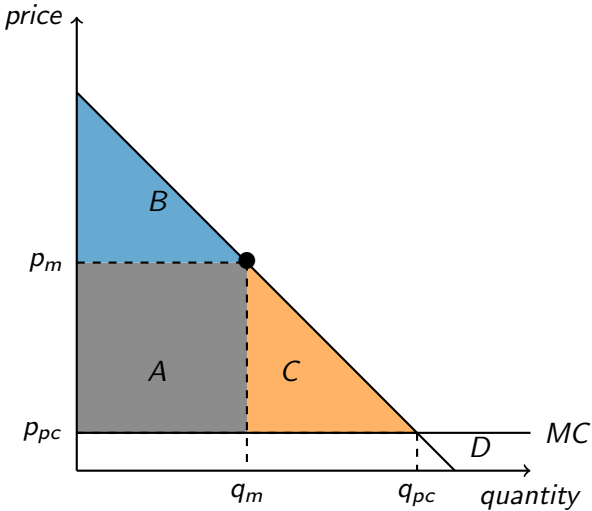
$$\text{two-part tariff} = f + pq$$

  - f: fixed part (e.g. golf club membership)
  - p: variable part (e.g. greens fee you pay every time you play golf)
  - q: quantity

- The **price per unit** (i.e. average price) is $p + f/q$ and decreases as quantity q increases.

- We will see how a two-part tariff can be more profitable for a seller than a single price.

Non-linear pricing: how should the seller choose f and p?



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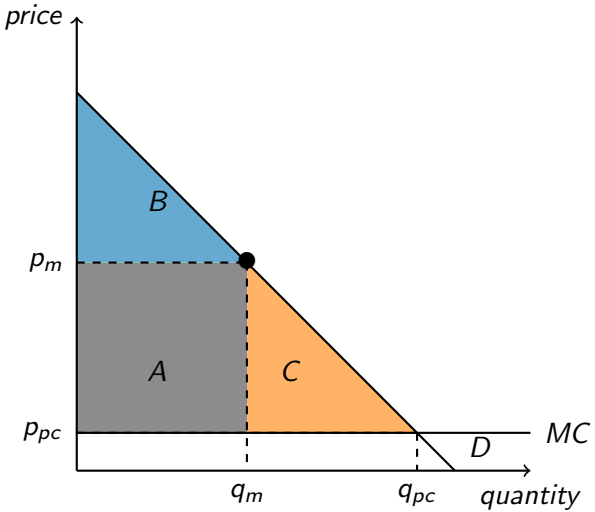
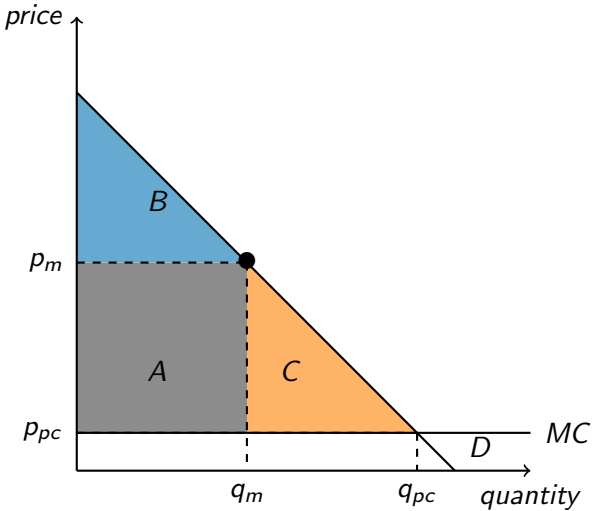


- First, find optimal f given a particular price p (e.g. $p = p_m$, the monopoly price)
  - Recall that area B is the consumer surplus for a particular price p (denote this $CS(p)$).
  - It is optimal to set $f = CS(p)$.
  - Why? If $f > CS(p)$ then noone will buy.
  - If $f < CS(p)$ then the seller is leaving money on the table.
- Recall that area A is the seller's (variable) profit.
- So, the seller's total profits = A + B.

Non-linear pricing: how should the seller choose f and p?



- We still need to optimally choose the variable part p.
- In the previous slide we saw that optimally choosing the fixed part f results in the total profit = A + B.
- So, let's choose p to make the area A + B as big as possible.
- This happens at $p = p_{pc}$ i.e. the perfect competition price.

Non-linear pricing: how should the seller choose f and p?

- The **optimal two-part tariff** (with identical consumers) is:
- Set $p = p_{pc}$ (the perfect competition price)
- Set $f = CS(p_{pc}) = \text{A} + \text{B} + \text{C}$ (i.e. consumer surplus under perfect competition)
- Note: areas A, B, C displayed on the previous slide

Non-linear pricing: efficiency and equity

- Who were the winners and losers from moving from uniform pricing (i.e. the monopoly price) to a two-part tariff?

Non-linear pricing: efficiency and equity

- Who were the winners and losers from moving from uniform pricing (i.e. the monopoly price) to a two-part tariff?
  - **Winner:** the sellers; profits increased from A to $A + B + C$.
  - **Loser:** consumers; consumer surplus decreased from B to 0.
- Overall, the two-part tariff is more **efficient**.
  - Total surplus increases from $A + B$ to $A + B + C$. In fact, it completely eliminated all of the (inefficient) dead-weight-loss of the monopolist (area B).
- However, this came at the cost of **equity**: consumer surplus was reduced to 0.

Non-linear pricing: example on p138

- **Example:**
- Demand for each individual is given by: $q = 15 - 2.5p$
- $MC = 0$
- **Questions:**
- What is the optimal price and profit if the seller can only charge a per-unit price?
- What is the optimal two-part tariff?

Non-linear pricing: example on p138

- **Question:** What is the optimal price and profit if the seller can only charge a per-unit price?

- **Solution:**
  - Rearrange demand in terms of price: $p = 6 - q/2.5$
  - Get MR using 'twice the slope' trick: $MR = 6 - \frac{2}{2.5}q$
  - Set MR=MC and solve for optimal q: $6 - \frac{2}{2.5}q = 0$, so $q = 7.5$
  - Get price from demand: $p = 6 - 7.5/2.5 = 3$.
  - Profit=$3.5 = 22.5$

Non-linear pricing: example on p138

- **Question:** What is the optimal two-part tariff?
- **Solution:**
  - Charge a price equal to marginal cost: $p = 0$.
  - Set a fixed fee equal to consumer surplus at $p = 0$.
  - This is: $f = \frac{1}{2}(15 \times 6) = 45$ (i.e. CS is the area under the demand curve and above MC)
  - Profit per consumer is now \$45, double the profit under per-unit pricing.

Non-linear pricing: case with heterogeneous consumers

- This case is also considered in the textbook, but we will not consider it in this class.

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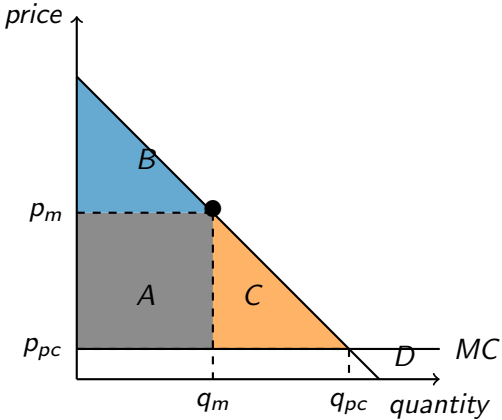
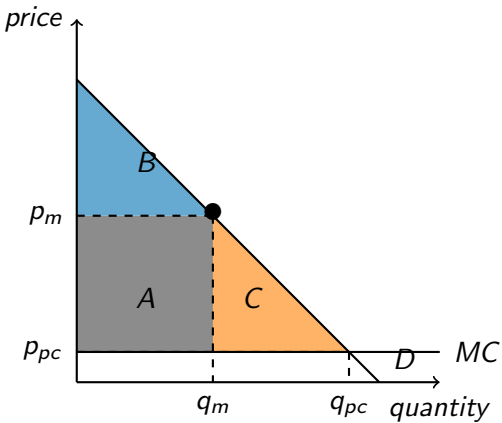


- The non-linear pricing figure from the previous section also depicts the welfare effects of moving from uniform pricing to perfect price discrimination.

Should price discrimination be legal?



- The non-linear pricing figure from the previous section also depicts the welfare effects of moving from uniform pricing to perfect price discrimination.
- Allowing price discrimination typically:
  - Increases total surplus ($A + B \rightarrow A + B + C$)
  - Reduces consumer surplus ($B \rightarrow 0$)
    - Note: it is possible to construct examples where consumers to be better off under price discrimination, but in most of the cases we will see they are worse off.
  - Results in more consumers being served ($q_m \rightarrow q_{pc}$)

Should price discrimination be legal?

- Whether to allow price discrimination often comes down to an **equity-efficiency tradeoff**.

Should price discrimination be legal?

- Whether to allow price discrimination often comes down to an **equity-efficiency tradeoff**.
  - By *efficiency* I am referring to the reduction in dead-weight-loss (or, equivalently, the increase in total surplus).
  - By *equity* I am referring to the typical reduction in consumer surplus from price discrimination (although, as mentioned in the previous slide, sometimes price discrimination will result in an increase in consumer surplus and so there will be no equity-efficiency tradeoff).
  - Policymakers may still want to prevent pricing strategies that are efficient for equity reasons.
- Ultimately an empirical question about whether there is an **equity-efficiency tradeoff** (and where there is this tradeoff, it's up to society how we want to trade off these two competing objectives).

Case study: net neutrality

- ISP (internet service providers) own fiber optic connections.
- Should they be allowed to charge different prices for different uses?
- Net neutrality: no price discrimination (all data has the same price)
- Can you explain what the equity-efficiency tradeoff might be here?

Case study: net neutrality

- ISP (internet service providers) own fiber optic connections.
- Should they be allowed to charge different prices for different uses?
- Net neutrality: no price discrimination (all data has the same price)
- Can you explain what the equity-efficiency tradeoff might be here?
- Efficiency: price discrimination may allow for a more efficient allocation of limited bandwidth (e.g. ensuring bandwidth for an important Zoom call vs watching TV)
- Equity: may place some forms of content at a competitive disadvantage (e.g. how will Wikipedia pay? What about small companies?) - Netflix historically was pro-net-neutrality

Other issues

- There are many other adjacent public policy issues to price-discrimination that are becoming increasingly more important

- E.g. price discrimination requires data on consumer elasticities - what is the value of this data and do consumers have a right to privacy?

Summary of key points*

- Know that non-linear pricing is a pricing strategy where prices change with the quantity demanded.
- Know how to compute the optimal two-part tariff for homogeneous consumers (and the corresponding effects of a two-part tariff on profits, consumer surplus, etc)
- Know that price discrimination often involves an equity-efficiency tradeoff for policymakers.

*To clarify, all the material in the slides, problem sets, etc is assessable unless stated otherwise, but I hope this summary might be a useful place to start when studying the material.

Ex. 6.12. RawDeal

- Sushi bar. MC=0.1, demand (for each consumer) is $q = 20 - 10p$.
- **Questions:**
- What is the optimal price per sushi unit?
- Consider an all-you-can-eat policy. What is the optimal price per consumer? What is the profit vs pricing per unit?
- What is the optimal two-part tariff for sushi (i.e. fee at the door plus a price per sushi piece)?

Ex. 6.12. RawDeal

- Sushi bar. MC=0.1, demand (for each consumer) is $q = 20 - 10p$.
- **Questions:**
- What is the optimal price per sushi unit?
- A: p=1.05, (profit = 9.025)
- Consider an all-you-can-eat policy. What is the optimal price per consumer? What is the profit vs pricing per unit?
- A: f=20, profit=18 (higher than before)
- What is the optimal two-part tariff for sushi (i.e. fee at the door plus a price per sushi piece)?
- A: p=0.1, f=18.05