

Chapter 12

2nd Degree Price Discrimination



Introduction

- This presentation covers 2nd degree price discrimination
 - Block pricing
 - Two-part tariffs
 - Menu pricing and versioning



2nd Degree Price Discrimination

- 2nd degree price discrimination refers to pricing schemes that induce buyers to sort themselves into groups receiving different average prices based on what they choose to buy
 - These are also called “nonlinear” pricing schemes
- Examples include block pricing, 2-part tariffs, and menu pricing



What is Block Pricing?



- Under a block pricing scheme, there is a constant price per unit for prescribed quantity ranges, but prices differ **across** quantity ranges.
 - Example: Electricity may be priced so that your first 1000 kilowatts per month will have one price, and all subsequent kilowatts will have another price.
 - Your textbook uses the term "block pricing" a bit differently, essentially equating menu pricing and block pricing.

What is a 2-Part Tariff?



- A 2-part tariff involves pricing that combines a fixed fee with a separate marginal price
- Examples:
 - State-fair pricing: pay an entrance fee to get into the fairgrounds, then pay an extra fee for each ride
 - A golf club might charge a monthly fee and additional fees for each round of golf played.
 - Remember the Polaroid camera? You paid a fixed fee for the camera, and a marginal price for each package of film.

What is Menu Pricing?



- Under menu pricing, the buyer can choose from a variety of options over quantity and price you pay
 - These typically involve quantity discounts
- Examples:
 - Choosing between a cell phone plan with 400 minutes for \$40 or 800 minutes for \$60
 - USC students might choose 10 meals per week for \$1000 per semester or 16 meals per week for \$1200 per semester
 - Large, medium, and small drinks at a restaurant

Nonlinear Pricing in General



- These schemes offer the same options to all individuals
- Individuals may choose different quantities or packages, with the result that average price per unit differs across individuals
 - The result often appears to take the form of a quantity discount—individuals who buy more pay a lower price per unit.
 - The price/per unit may vary nonlinearly with quantity purchased, hence the term nonlinear pricing.

Block Pricing



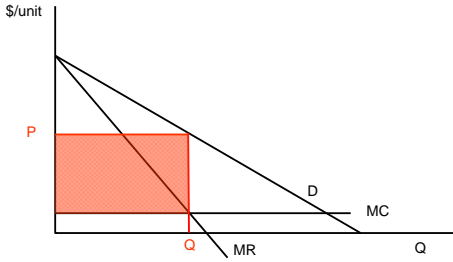
- A monopolist who charges a single price leaves consumers with surplus
- If a monopolist could only charge different prices for the highly-valued and less highly valued units, it could increase profit
 - If a monopolist can monitor usage, and charge different fees based on quantity purchased, this becomes a possibility

Identical Buyers

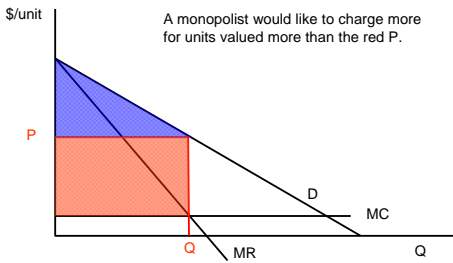


- Momentarily assume all buyers have identical demand curves, with the shape of the demand curve known by the monopolist

A Single Price Monopoly

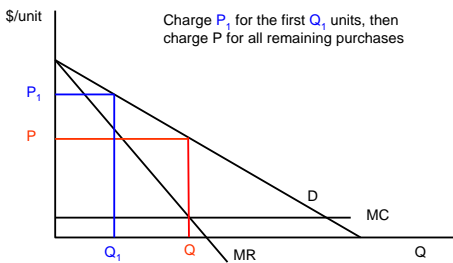


Charge More?



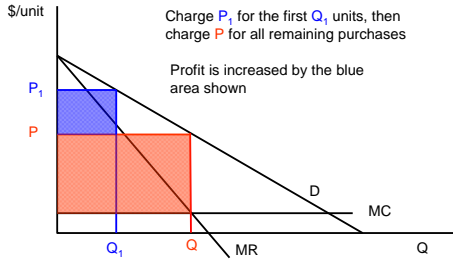
A monopolist would like to charge more for units valued more than the red P.

An Imperfect Solution



Charge P_1 for the first Q_1 units, then charge P for all remaining purchases

An Imperfect Solution



An Imperfect Solution



- The pricing scheme shown does not achieve the full profit possible under 1st degree price discrimination
 - We did not solve to find the best block pricing scheme, just one that improves on a single price
 - With more blocks, and an optimal plan, we might approximate 1st degree price discrimination
- Advantages:
 - If buyers differ from each other, and the seller **cannot** distinguish buyers by type, it turns out that such schemes can still improve over ordinary monopoly
 - This scheme is not so obviously discriminatory—since each buyer has the same purchase options

Example



Suppose a monopoly has demand (from each customer) and cost given by:

$$P = 100 - Q$$

$$MC = 20$$

The ordinary single-price monopoly solution is:

$$P = 60$$

$$Q = 40$$

$$\pi = 1600$$

Example



Now consider this block pricing scheme. Price equals \$75 for the first 25 units, and is equal to \$50 for all subsequent units. This results in:

$$Q_1 = 25$$

$$Q_2 = 25$$

$$\pi = 75 \cdot 25 + 50 \cdot 25 - 20 \cdot 50 = 1875$$

Profits (per customer) are higher under this block pricing scheme than under the ordinary single price monopoly solution.

Two-Part Tariff



- A two-part tariff is a similar pricing scheme
 - Instead of varying price over output ranges, the seller charges a fixed fee plus a constant marginal price.

Two-Part Tariff and Arbitrage



- Everyone pays the same marginal price under a two-part tariff
- Sometimes a two-part tariff is feasible when other nonlinear pricing schemes are not
 - A two-part tariff does not require the seller to be able to track the quantity bought by each customer, nor does it require that resale be prevented.
 - Under block pricing, sellers must be able to prevent buyers who have reached a lower priced block from reselling to those who have not.

Two-Part Tariff: All Customers Alike



- If all customers have identical demand curves, and if the seller knows the demand curve, a result equivalent to 1st degree price discrimination could be achieved

Diagram: All Customers Alike

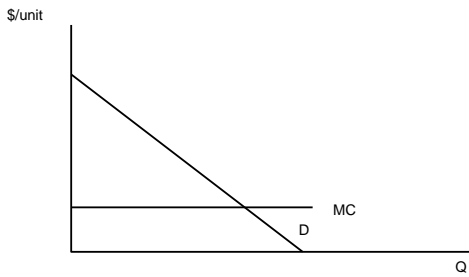


Diagram: All Customers Alike

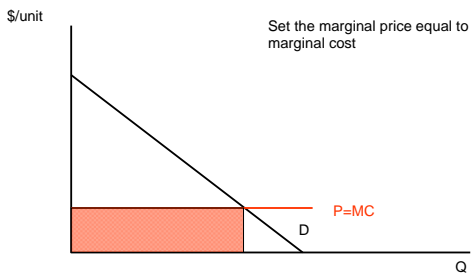
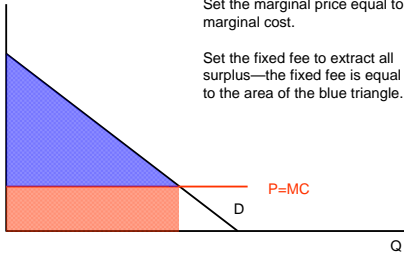


Diagram: All Customers Alike



\$/unit



Set the marginal price equal to marginal cost.

Set the fixed fee to extract all surplus—the fixed fee is equal to the area of the blue triangle.

Two-Part Tariff Again: Two Buyer Types

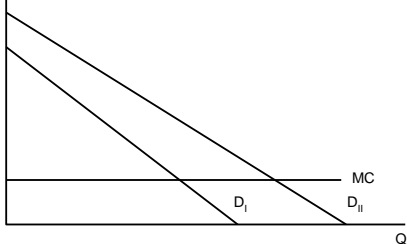


- Now assume that there are two types of customers
- The seller knows the demand curves for each type
- The seller cannot distinguish customers by type

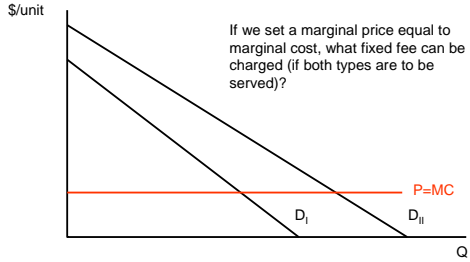
Two-Part Tariff: Two Demand Types



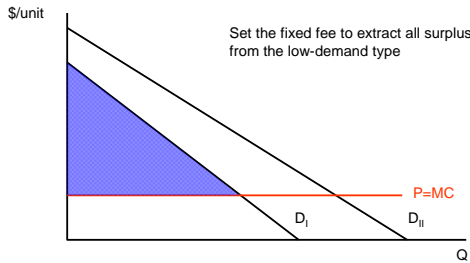
\$/unit



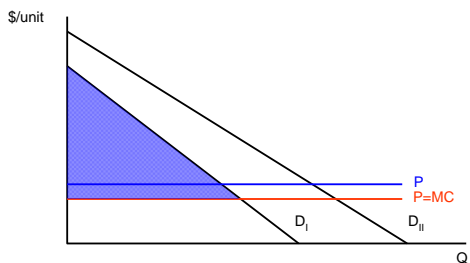
Two-Part Tariff: A Guess



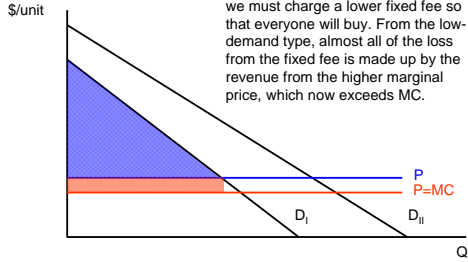
Two-Part Tariff: A Guess



Consider a Higher Marginal Price

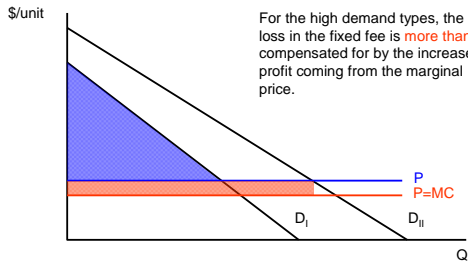


Consider a Higher Marginal Price



If we charge a higher marginal price, we must charge a lower fixed fee so that everyone will buy. From the low-demand type, almost all of the loss from the fixed fee is made up by the revenue from the higher marginal price, which now exceeds MC.

What About High-Demand Types?



For the high demand types, the loss in the fixed fee is **more than** compensated for by the increase in profit coming from the marginal price.

A Result



- When customers differ, the optimal two-part tariff will have a marginal price that exceeds marginal cost
 - The preceding example showed that raising the marginal price above marginal cost resulted in a very small loss for low-demand types, but a notable increase in profit for the high demand types
 - So a price above marginal cost will normally increase overall profit.
 - Example: printer ink.

Another Result



- The marginal price under the two-part tariff will be lower than the price charged by an ordinary monopolist charging a single price (and no fixed fee)
 - Consider the ordinary monopolist—from the optimum, a small decrease in price has a negligible impact on profit (because the profit function is flat at the optimum)
 - However, under a two-part tariff, that same small reduction in price would again have a negligible impact on profit from the marginal price, but the marginal price reduction would permit a non-negligible increase in the fixed fee
 - So a marginal price **lower** than the ordinary monopoly price will prevail under the optimal two-part tariff

What is Menu Pricing?



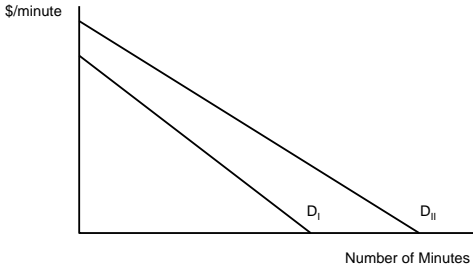
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- Examples:
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Menu Pricing

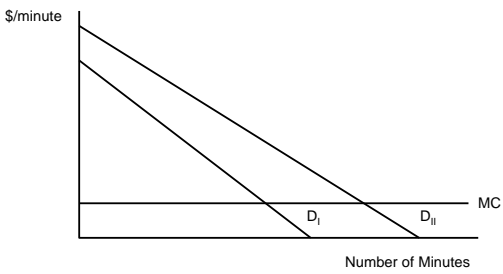


- Suppose that you are a monopolist selling mobile phone services
- Suppose that there are two types of customers:
 - Type I: Low demand
 - Type II: High demand
- You know what the demand curve for each type looks like, but cannot distinguish types *a priori*
- The problem: Devise plans (specific minutes-price combinations) to maximize profit
 - For this analysis, assume buyers know how many minutes they need.

Two Demand Types



Marginal Cost

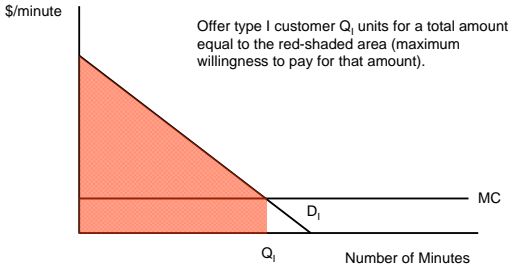


What if ... ?

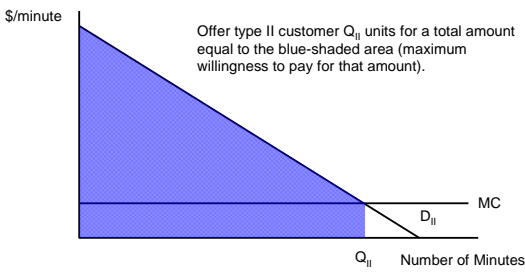


- Suppose, for a moment, that you CAN tell each customer's type
- You would engage in first degree price discrimination, offering each type a different quantity/price combination

What if ... ?



What if ... ?



Back to Menu Pricing



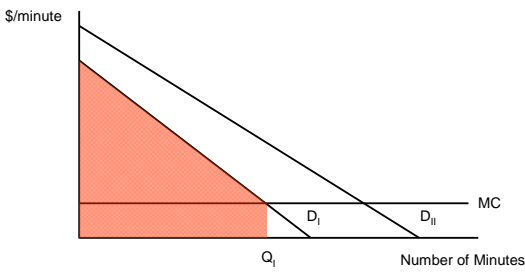
- If we could tell each consumer by type, we would implement the 1st degree price discrimination scheme described on the preceding slides
- However, we now return to the case where we cannot distinguish types.
- Instead, we will offer two price-quantity options, and let customers choose.

A Guess

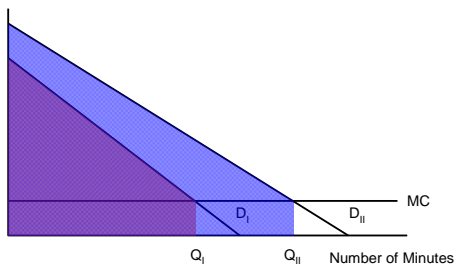


- We could just offer the same options identified by the 1st degree price discrimination scheme
 - The first option, intended for Type I buyers, is to offer Q_I units for an amount equal to the red area
 - The second option, intended for the Type II buyers, is to offer Q_{II} units for an amount equal to the blue area
- Under this scheme, each type would be left with zero surplus (if they choose the option we intend)

A Guess



A Guess

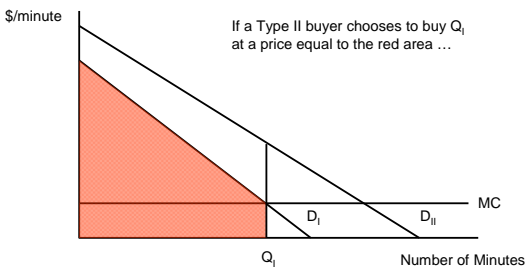


A Problem with our Guess

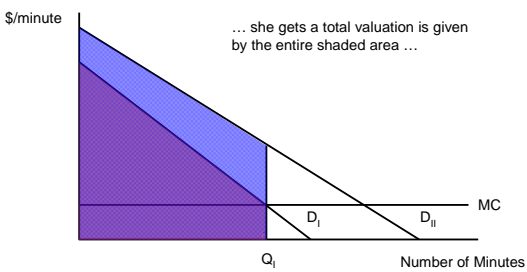


- Type I customers can do no better than the option we intended for them—they are just willing to buy the plan intended for them
- Type II customers would get zero surplus under the plan we intend for them, but what if they choose the alternative?

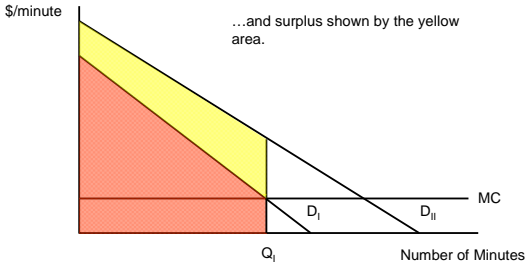
A Problem



A Problem



A Problem



The Proposed Scheme Doesn't Work



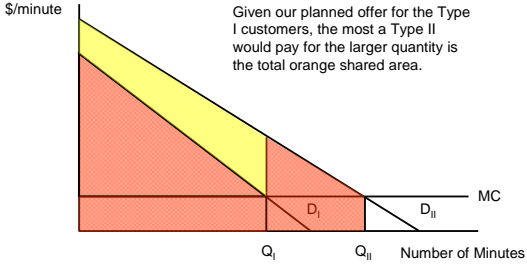
- The proposed scheme did not work, at least not as intended
 - Type II buyers would choose the plan intended for Type I buyers
- What can we do?

What Would Type II Pay?

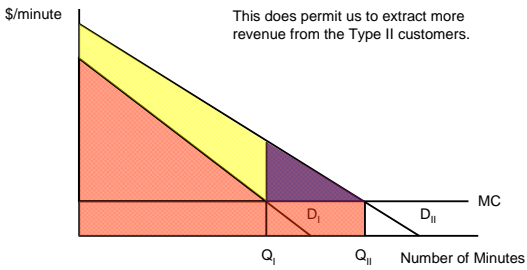


- What **would** a type II buyer be willing to pay for the option we intended?
- We must set a price so that he gets at least as much surplus under the intended plan as he would under the alternative plan
 - This requirement is called an **incentive compatibility constraint**.

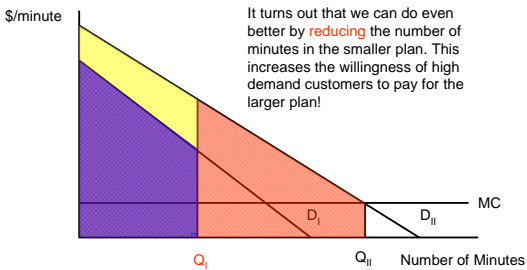
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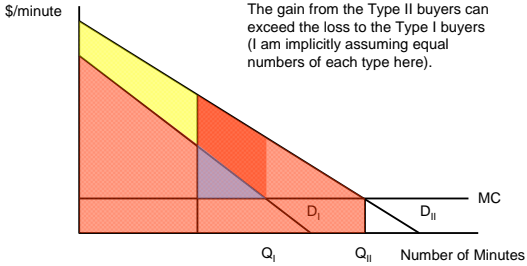
What Would Type II Pay?



A Better Plan



A Better Plan



Summary



- Menu Pricing
 - Permits us to get gain profit from “price discrimination” even when we cannot tell different types of customers apart, *ex ante*.
 - Menu pricing can explain why we often see quantity discounting, even when high quantities are not associated with lower per unit costs.

The End