

## Chapter 6 & 7.1-7.4: Price discrimination

**First-degree price discrimination** or **personalized pricing** is when the firm charges each consumer his highest amount she would be willing to pay. This is called the reservation price of the consumer. First-degree price discrimination is the most perfect form of price discrimination.

First-degree price discrimination is more possible in theory than in the practice. When it is possible it allows a monopolist to produce the maximum output possible. Consumers do not lose or gain from this because each one of them pay its own reservation price. There is no output restriction in this market but the output increase of the monopolist causes output restrictions in other markets. Even though there is output restriction in other markets, the total welfare increases.

We will now focus on two common types of nonlinear pricing schemes. Both schemes are used to increase the profit of the monopolist.

- **Two-part pricing.** In this pricing scheme the firm charges a fixed fee plus a price per unit. This pricing strategy consists of two things:
  - A fixed fee, like a membership fee. This fee entitles the consumer to buy the good or service but is independent of the quantity the buyer purchases.
  - A price or usage fee that is charged for each unit the consumer purchases. This pricing strategy is often used in clubs. They charge an annual fee for membership and a per unit fee for to use of particular services of the club.
- **Block pricing.** In this pricing schema the firm bundles the quantity that he is willing to sell with the total charge wished to be set for that quantity. There are two simple things that determine this pricing strategy:
  - Set the number of units offered to each consumer type equal to the amount that the type would buy when there would be competitive pricing.
  - Set a fixed charge for each consumer type at the total willingness to pay for the quantity you identified in part 1.

**Second-degree price discrimination** or **menu pricing** is when the firm cannot distinguish between different types of consumers, but designs products in such a way that output is divided in lots.

Each lot being sold at the highest price at which the whole lot will be purchased. Second-degree price discrimination enhances the ability of the monopolist to convert the consumer surplus into profit but does this less effective than first-degree price discrimination.

Businesses use fixed price structures and product characteristics in such a way that they can gain information about the mind construction of the utility-maximizing consumers. So they can find out what the upper limit is that a consumer would pay for a particular type of product. Usually when a new product is introduced the price is high but over time the price will fall and stabilize. If the production of the product will increase the marginal cost will decrease and thus the firm can charge a lower price. A reason for this price to drop in time can be *intertemporal price discrimination*.

An example: there are two groups of consumers, techies  $N_t$  and others  $N_e$ . Techies get utility  $\alpha_t$  and

others  $\alpha_e$  and there are two time periods. Techies want to buy the latest cellphones so for this product  $\alpha_t > \alpha_e$ . A cell phone is a durable good and therefore each consumer buys at most one. If a techie buys a cell phone in period 1 his net discounted utility is:

$$\alpha_t + \frac{\alpha(t)}{1+r} - p_1 = \frac{2+r}{1+r} \alpha_t - p_1 \quad \diamond \quad \text{the reservation price is } R_{t1} = \frac{2+r}{1+r} \alpha_t$$

The reservation price for non-techies is calculated with the same formula:

$$R_{e1} = \frac{2+r}{1+r} \alpha_e$$

The price that techies are willing to pay is higher than the price of non-techies. So in the first period techies will probably be able to buy the cell phones at the reservation price of non-techies.

If a firm sets a price to maximize value to sell to all consumers, its value will be:

$$V_1 = \frac{2+r}{1+r} \alpha_e (N_t + N_e)$$

Because techies can buy at a lower price than they would be willing to pay they enjoy consumer surplus:

$$S_{t1} = \frac{2+r}{1+r} (\alpha_t - \alpha_e) N_t$$

When we sum up the firm's value and the techies' consumer surplus we get the net social

$$\text{welfare: } NSW_1 = \frac{2+r}{1+r} (\alpha_t N_t - \alpha_e N_e)$$

Techies will buy in the first period if the net surplus they get by doing so is at least as great as the discounted surplus from waiting one period. If the price in the first period is higher than the reservation price of non-techies the techies will not buy in the first period. They will wait until the second period when prices are reduced. Both consumer surplus and NCW would be greater without intertemporal price discrimination. So intertemporal price discrimination is privately profitable but socially harmful.

Of some products there are different qualities of the same product. For instance, in a train a firm can offer seats in the first or second class. Each class has its own price so that consumer can choose. A train company can choose to offer only one class but it can also choose to offer both classes.

**Horizontal product differentiation** is a strategy in which a firm offers a variety of products in response to different consumer tastes.

**Vertical product differentiation** is when a firm responds to differences in consumers' willingness to pay for quality of a product by offering different qualities of the same product.

A consumer market can be differentiated by geographic location. Consumers are willing to pay more for a product that is marketed close to their geographic location. When products are differentiated by location we are speaking of the **spatial model of product differentiation**.

The cost of travel can be seen as a physical or utility cost that the consumer incurs if he must purchase a good that is distant from her most preferred type. We will now look at a monopoly with horizontal product differentiation. Assume there is a consumer that lives a distance 'x' from the center where he can buy the product. The price V for this consumer is equal to;

$$V = p + tx$$

In this formula, t\*x is the traveling cost. The price V for the consumer is the price of the good plus the traveling cost of the consumer. These consumers are indifferent between buying the product and not buying at all. Suppose that there are N consumers in the market, then the total demand for the monopolist is for instance:

$$Q = 2xN = (2N / t) * (V - p)$$

Now suppose that the monopolist faces marginal cost, c, and set-up cost, F, for each retail outlet. With a single outlet the maximum price the monopolist can charge is:

$$p = V - (t/2)$$

The profit function for the monopolist with one single retail outlet is:

$$\pi = N * (V - (t/2) - c) - F$$

When there are two retail outlets then the maximum price the monopolist can charge changes into:

$$p = V - (t/4)$$

Profits then change into:

$$\pi = N * (V - (t) - c) - 2F$$

The monopolist maximizes profits with respect to the number of retail outlets, n, by setting:

$$n^* = \sqrt{tN/2F}$$

The firm has the incentive to set up many retail outlets to provide each consumer with products close to them. They do this because this eliminates the high price for the consumer. When every consumer buys the product, the total consumer valuation placed on the monopolist is equal to NV. To calculate the consumer surplus we have to subtract the product price and transaction cost from this:

$$CS(N, n) = NV - Np(N, n) - T(N, n)$$

This leads to aggregate profit and total surplus equal to:

$$\pi = Np(N, n) - Nc - nF$$

$$TS(N, n) = NV - Nc - T(N, n) - nF$$

When the monopolist controls delivery it will charge every consumer the consumer's reservation price  $V$  it is using a policy called **uniform delivered pricing**.

When there is vertical product differentiation, all consumers agree that higher quality is better. However, they do differ in their willingness to pay for this quality. When a monopolist only offers one type of the product and quality is costly, then it often chooses a product with a quality that is very low.

The firm must choose price and quantity such that each different consumer will purchase the quality of the good that fits with their type. When the market size increases, the quality of the goods will increase due to economies of scale.