# **Industrial Organization- micro 3 2019: Price discrimination in oligopoly**

Price discrimination is a mechanism whereby a monopolist can effectively shift surplus from the consumer sector. With perfect price discrimination a <u>monopolist</u> would be able to extract all the consumer surplus, and in this way price discrimination would stimulate the profits of the monopolist .

This mechanism does not carry over to market structures with competing firms. We will demonstrate this within the framework of a standard Hotelling duopoly model.

#### Assumptions

- Consumers with common valuation v are uniformly distributed on a characteristics space, which we take to be the unit interval [0,1].

- Let firm A be located at 0 and firm B at 1.

- Each consumer pays a constant inconvenience cost t proportional to the distance of the chosen supplier from the consumer-specific ideal location, which corresponds to the consumer's ideal variety.

- Production takes place at constant marginal cost normalized to zero.

- The consumers hold such a high valuation for the products offered that each consumers buys from one or the other of the suppliers.

Perfect Price Discrimination: A firm can observe a consumer's location x ( $x \in [0,1]$ ), and set the consumer-specific price contingent on this address.

Firm A will be able to capture a consumer located at x if

$$p_{A}(x) + t x \leq p_{B}(x) + t (1-x),$$

where  $p_i(x)$  denotes the price firm i (i=A,B) charges to consumer x.

The equilibrium with perfectly discriminatory prices are given by  $p_A^D(x) = \max(t(1-2x),0)$ and  $p_B^D(x) = \max(t(-1+2x),0)$ .

We illustrate this price equilibrium in Figure 1. The associated equilibrium profits would be  $\pi_i^{D} = \frac{t}{4} \ (i=A,B) \text{ for each of the two duopolists.}$ 



Figure 1: Equilibrium Prices with Perfect Price Discrimination

We now compare the equilibrium with perfectly individualized prices to the associated configuration with uniform prices.

Within the framework of the Hotelling model, the equilibrium with uniform prices is

$$p_i^U = t$$

and the associated equilibrium profits are  $\pi_i^{\nu} = \frac{t}{2}$  (*i*=*A*,*B*) for each of the competitors (see Fig 2)



Figure 2: Equilibrium Prices with Uniform Pricing

Consumers, for example, at location  $x = \frac{1}{2}$  enjoy a net benefit of  $B^U = p^U - \frac{t}{2} = v - \frac{3t}{2}$  with

uniform pricing. The benefit is clearly higher,  $B^{D} = v - p^{D} \left(\frac{1}{2}\right) - \frac{t}{2} = v - \frac{t}{2}$ , in the

discriminatory price equilibrium. In fact, any consumer with characteristics 0 < x < 1 pays a strictly lower price under price discrimination, and hence favours the practice of price discrimination. A ban on price discrimination would force the consumers to pay the higher equilibrium prices that will occur in a uniform pricing regime and thereby shift surplus from consumers to producers.

Discriminatory pricing essentially enlarges the set of strategic pricing options available to competing firms. With individualized prices firms are able to fine-tune prices with respect to buyer characteristics. When competitors stick to uniform prices, deviating to discriminatory pricing rules typically generates a strategic advantage to a given seller. However, when all sellers realize the strategic potential of price discrimination and apply discriminatory pricing, the overall intensity of competition is increased in the whole market. In consequence, all competitors in the industry are hurt by lower margins, whereas the consumers benefit. Thus, with oligopolistic competition the availability of schemes for individualized prices catch firms in a classical "prisoner dilemma" trap. A commitment not to price discriminate would benefit all the firms collectively, but each individual firm will have a strategic incentive to deviate and introduce a discriminatory pricing scheme. For that reason, discriminatory pricing schemes will represent the non-cooperative industry equilibrium.

#### **Behaviour-Based Discrimination**

One might argue that the informational requirements for perfect discrimination are unrealistically demanding and therefore not relevant for real-world applications. However, by tracking purchase histories and <u>conditioning offers on those histories</u>, sellers can effectively approximate perfect price discrimination. The longer histories are recorded, the closer will equilibrium pricing based on purchase histories resemble perfect price discrimination.

<u>General conclusion</u>: Strategic price discrimination, no matter whether we focus on perfect or behaviour-based discrimination, leads to more intense competition in oligopolistic industries than uniform price schemes.

## **Monopolistic competition**

An industry where the product appears in many varieties

One firm produces one variety, Consumers value variety, buy all varieties

Each firm has a U-shaped average cost curve (=a fixed cost + increasing marginal cost)

Each firm can treat its demand as independent.

Firms set MR=MC

### BUT:

Loss means exit, profit means entrants. An entrant picks a unique variety to produce Inevitably, the demands of all firms shift down as the number of firms increases.

# The equilibrium

All active firms make zero profits

For each firm: average cost AC = P price at the optimal output level



Quantity

Firms produce at a suboptimal level. They have 'excess capacity'

What industry would have such features? Think of retailing, shops close to each other...maybe lunch restaurants...