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Lecture 18

Advanced pricing

Industrial Economics

Second Degree PD

Self-selection

- A seller may want to offer ***different packages***, each ***directed*** to one consumer type
  - the actual product is ***differentiated*** (mostly vertically) to ***attract*** specific types of consumers
- Consumer ***self-selects*** the ***version*** of the product that
  1. Is affordable (satisfies ***IR***) and
  2. Maximizes utility (satisfies ***IC***)
- ***Example:*** two ***gym membership*** options, one with unlimited access and one with morning access only
- Self-selection has the same optimal pricing ***feature***
  - usuals derive no surplus – enthusiasts derive a some surplus

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Self-selection model

Setup

- Two consumers with ***utility functions*** u_E and u_R such that
  $$u_E(q) > u_R(q) \quad \forall\, q > 0 \quad \text{(assumption 1)}$$
- The seller offers ***only two bundles:***
  1. One of ***low*** quantity q_L at price p_L indented for the R-type
  2. One of ***high*** quantity q_H at price p_H indented for the E-type
- The ***goal*** is to make each consumer to ***voluntarily*** buy the bundle ***intended for their type***
  - thus, ***extract*** as much CS as possible
- We need to setup ***two incentive problems*** with IR and IC for self-selection for each type

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Self-selection model

Incentives - IR_R

Usuals (R)	Enthusiasts (E)
Buy the L-bundle iff $p_L = u_R(q_L) \quad (IR_R)$	Buy the H-bundle iff $u_E(q_H) - p_H \geq 0 \quad (IR_E)$
Not buy the H-bundle iff $u_R(q_L) - p_L \geq u_R(q_H) - p_H \quad (IC_R)$	Not buy the L-bundle iff $u_E(q_H) - p_H \geq u_E(q_L) - p_L \quad (IC_E)$

- From $\boldsymbol{IR_R}$
  - If the seller prices L with $p_L < u_R(q_L)$, loses money
  - If the seller prices L with $p_L > u_R(q_L)$, R will be priced-out
- So, IR_R is ***binding*** and thus,
  $$p_L = u_R(q_L) \quad (IR_R)$$

Self-selection model

Incentives - IR_E, IC_R, IC_E

Usuals (R)	Enthusiasts (E)
Buy the L-bundle iff $p_L = u_R(q_L) \quad (IR_R)$	Buy the H-bundle iff $p_H \leq u_E(q_H) \quad (IR_E)$
Not buy the H-bundle iff $p_H \geq u_R(q_H) \quad (IC_R)$	Not buy the L-bundle iff $p_H \leq u_E(q_H) + u_R(q_L) - u_E(q_L) \quad (IC_E)$

- Then, $\boldsymbol{IR_E}$ can be solved w.r.t. p_H
  $$p_H \leq u_E(q_H)$$
- $\boldsymbol{IC_R}$ can also be written as
  $$p_L - p_L \geq u_R(q_H) - p_H \quad \Rightarrow \quad p_H \geq u_R(q_H)$$
- Finally, $\boldsymbol{IC_E}$ can be solved w.r.t. p_H
  $$p_H \leq u_E(q_H) + u_R(q_L) - u_E(q_L)$$

Self-selection model

Redundancies

Usuals (R)	Enthusiasts (E)
Buy the L-bundle iff $p_L = u_R(q_L) \quad (IR_R)$	Buy the H-bundle iff ~~$p_H \leq u_E(q_H) \quad (IR_E)$~~
Not buy the H-bundle iff ~~$p_H \geq u_R(q_H) \quad (IC_R)$~~	Not buy the L-bundle iff $p_H \leq u_E(q_H) + u_R(q_L) - u_E(q_L) \quad (IC_E)$

- Because $u_R(q_L) - u_E(q_L) < 0$, IR_E is ***non-binding***
  - because it is satisfied automatically when IC_E is satisfied
- From IC_E and IC_R we can ***deduct*** that
  $$u_R(q_H) \;\leq\; p_H \;\leq\; u_E(q_H) + u_R(q_L) - u_E(q_L)$$
  - the seller will select the ***upper bound*** for p_E to ***maximize profits***

Equilibrium

- At the ***equilibrium*** only the IR_R and the IC_E are ***binding***

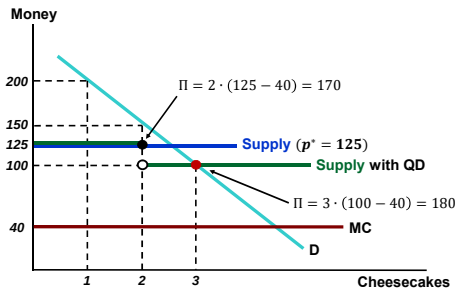
$$p_L = u_R(q_L)$$
$$p_H = u_E(q_H) - [u_E(q_L) - u_R(q_L)]$$

- The usuals:
  - Need to be able to marginally ***afford*** L
  - Do not need to be ***discouraged*** from buying H
- The enthusiasts:
  - ***Discouraging*** them to not buy L, automatically makes H ***affordable***
- The quantity in the bracket is the ***information rents***

Quantity discounts

- Quantity discounts is an ***instance*** of second-degree PD
- The firm gives ***better prices*** to those who buy ***more***
  example: 1.5 liter coke is cheaper per liter than the 330ml can
- ***Self selection*** lies in the fact that the choice of quantity is made ***ex-ante***
- Enthusiasts will buy ***high*** quantity
  they will pay ***less on average*** but ***more in total***
- Usuals will buy ***smaller*** quantity
  they will pay ***less in total*** but ***more on average***
- ***Other motivations:*** cost efficiency, risk handling

*Quantity discount – example



Reverse quantity discounts

- In some rare instances buying several smaller packages ***costs cheaper*** than buying the same quantity in bulk
  examples: Merci™ chocolates, bouquets of flowers
- This is because of the existence of a ***separating equilibrium*** between E and R
- For bouquets of ***roses***:

$$u_E(3 \times 15) < u_E(1 \times 45)$$

Based on a case study by: Severina M., E. Stepanova, K. Podkholzina (ICEF, 2017)

Block pricing

- Block pricing is another way of ***second-degree*** PD
- The seller charges different prices for ***different blocks*** of quantities of the good
  example: 8 first salsa lessons cost 2400, next 8 lessons cost 2700
- Those who select to buy quantities toward the upper blocks ***reveal high preference*** for the product
- ***Prices*** are ***usually increasing*** in blocks
- The method is effective in profit maximization but also in ***saving resources***

Coupons and rebates

- Coupons and rebates are ***self-selection mechanisms***
- Users enjoy a ***discount*** but their use involves ***costs***
  effort, time, hassle, uncoolness
- Initially, most are willing and planning to use them
- In the end, only those who truly exhibit ***lower willingness*** to pay for the product use them
  only 20 – 30% of consumers finally use them
- Firms can get those with relatively elastic demand to purchase a good that ***would not normally buy***

*Data for coupons

Elasticity of demand is ***lower*** for non-users of coupons and rebates

Product	Non-Users	Users
Toilet paper	-0.6	-0.7
Hot dogs	-0.6	-0.8
Cooking oil	-1.2	-1.3
Shampoo	-0.8	-1.3
Cat food	-0.5	-1.1

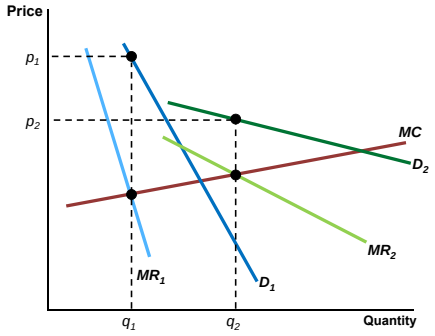
Intertemporal price discrimination

- Consumers are grouped according to their ***time preference*** in consuming the product
  - ***Enthusiasts:*** Inelastic demand – want the product ASAP
  - ***Usuals:*** More elastic demand – can wait for price to go down
- When the product is released ***price is high***
- Once this market of enthusiasts ***has been exploited***, the price is ***lowered*** to ***appeal*** to the general public

  examples: books, movies, gadgets
- The two markets are ***separated*** with respect to ***time***

  thus, we have ***dynamic segregation***

*Intertemporal PD – graph



Peak-load pricing

- For some products demand is ***uneven*** in time

  high at "peak" periods - ***low*** at "slow" periods
- ***Examples:*** air-travel and hotels, electricity, taxis,
- Additionally, ***capacity constraints*** may also cause ***MC to be higher*** at peak periods
- The firm may charge ***higher prices*** during peak periods
  - ***Profit maximization:*** charge more when they ***need*** you more
  - ***Save resources:*** the price difference may ***even out*** demands
  - ***Increase efficiency:*** charge price closer to each period's ***true MC***

"Special-edition" pricing

- The seller can take advantage of enthusiasts by releasing ***two versions*** of the product
  - The normally priced ***"basic" version***
  - A slightly better but much more expensive ***"special-edition"***

  example: Motorola RazR D&G limited edition

  example: the rose-gold Asus laptops
- Enthusiasts will self-select to buy the ***expensive version*** as their utility increases faster than price
- Usual people do not really want to pay much and will buy the ***cheaper version***

Intertemporal special edition

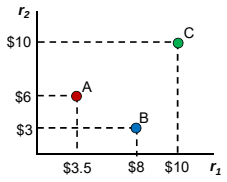
- Quite often special edition is ***combined*** with intertemporal PD
- The approach of the ***publications*** industry
  - First, release expensive ***special edition*** (hard-cover)
  - After a few months, release cheaper ***basic version*** (paperback)
- The approach of the ***entertainment*** industry
  - First, release ***cheaper*** basic version of the DVD / videogame
  - After a few months, release ***expensive*** version (with extras)

Bundling

- Bundling is ***forcing*** consumers to buy two or more different products ***together*** to gain a ***pricing advantage***
- Car purchasing
  - bundles of extras such as ***park-assist*** with ***leather*** interior
- Vacation Travel
  - bundling ***hotel*** with ***air fare***
- Cable television
  - ***sports*** and ***fashion*** channels bundled together

Reservation prices

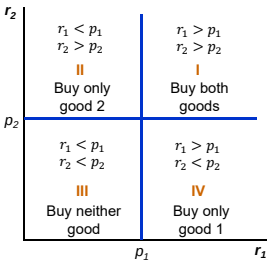
- Usually, consumers have ***different*** combinations of ***reservation prices*** for two goods
  - r_1 is reservation price for good 1
  - r_2 is reservation price for good 2
  - Goods 1 and 2 are not bundled (at this stage)
  - Consumers A, B and C



Purchase decisions

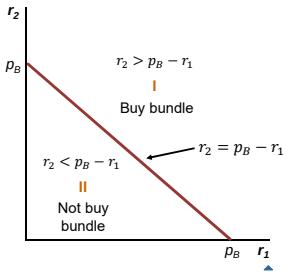
Separate purchases

Consumers buy ***each good*** i iff $p_i \le r_i$

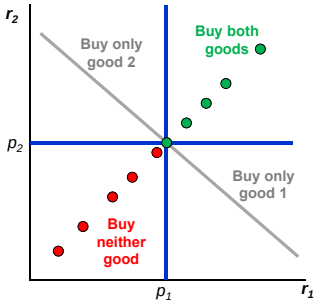


Bundling

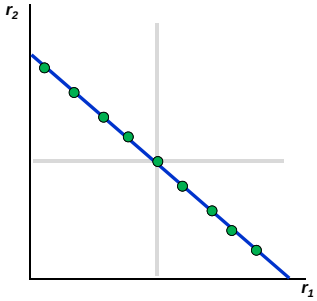
Consumers buy the ***bundle*** iff $p_B \le r_1 + r_2$



Positively correlated demands



Negatively correlated demands



Bundling effectiveness

- The effectiveness of bundling ***depends*** on two parameters
  1. The existence of ***different types*** of consumers
     - consumers must valuate the goods ***differently***
  2. The ***degree of negative correlation*** between the demands for the goods by every consumer
     - consumers who have ***relatively high*** valuation for one good must have ***relatively low*** valuation for the other one

Mixed bundling as PD

- Some goods are sold ***both*** as a bundle and individually
- Of course, it must be the case that $p_1 + p_2 > p_B$
- There are ***two groups*** of consumers:
  1. Balanced consumers: those who have sufficient willingness to pay for ***both products***
  2. Corner consumers: those with ***high*** reservation for one product and ***low*** for the other
- Then, the bundle is ***intended*** for the balanced consumers and the individual products are ***intended*** for corner consumers

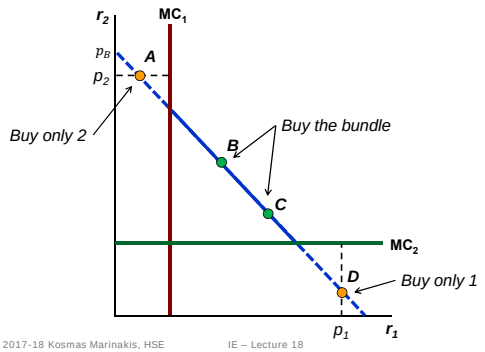
Optimality of mixed bundling

- It is optimal for corner consumers to be given the ***option*** to buy their favorite product ***individually*** in two cases:
  1. The reservation price of their less valued product does ***not exceed MC***

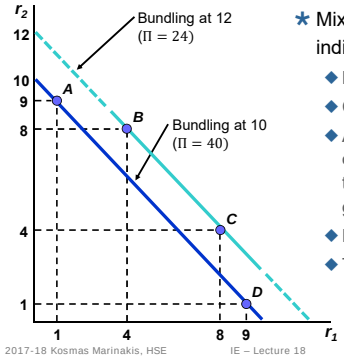
     not efficient to force them buy a product for which $r < MC$
  2. The correlation of demands between products is ***somewhat "concave"***

     offering only the bundle would ***price out*** many corner consumers

Mixed vs. pure bundling with MC



Mixed bundling with concave correlation

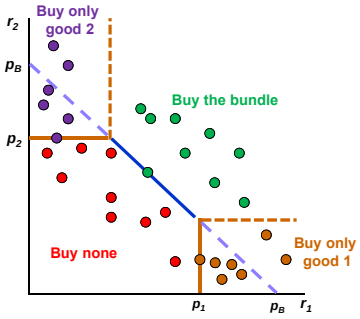


- Mixed bundling at $12 or individual prices of $9
  - B buys bundle ($12)
  - C buys bundle ($12)
  - A has total reservation of 10, so, does not want the bundle, buys only good 2 ($9)
  - D buys only good 1 ($9)
  - Total profit: $42

Mixed bundling with data

- ***Real firms*** use market ***surveys*** to estimate reservation prices
- The ***goal*** is to design a ***pricing strategy*** from the survey results
- The following ***example*** illustrates how a company will ***interpret*** the data to conduct mixed bundling

Mixed bundling in reality



*Dynamic pricing

- When the seller ***acquires information*** for the buyer's willingness to pay by observing past behavior
  - How many times ***bought before*** – at what prices
  - How many times ***visited*** the store
  - How many times ***inquired*** for price
- ***Examples:*** car sales, online ticket sales

Thank you!

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