

MARKET POWER AND PRICING: APPLICATIONS

- I. Bundling
- II. Oligopoly
- III. Cartels
- IV. Information goods (if time permits)
  - A. Pricing policy
  - B. Product policy

**I. Bundling**

What does a firm do when customers have heterogeneous demands, but it cannot charge different prices to each group? Consider the following example:

	Reservation price: group A	Reservation price: group B
Jackets	130	50
Pants	20	100

There are two groups of customers (of equal size, say 50 each), some who are willing to pay a high price for jackets and a low price for pants, others have exactly the opposite preference. If the goods are sold separately, the firm will charge 130 for jackets and 100 for pants. (I am assuming costs are zero to make things easier to follow.) Why? If they cut the price of jackets to 50, the gain in sales ( $2500 = 50 \times 50$ ) will be offset by the loss in revenue from customers buying at 130 ( $4000 = 80 \times 50$ ). The same logic dictates a price of 100 for pants. Thus  $TR = 130 \times 50 + 100 \times 50 = 11500$ .

Now consider the following radical idea: sell jackets and pants together as a suit. Further sell them for 150! Now group A and group B both are willing to pay a bit more to get the combination and  $TR = 150 \times 100 = 15000$ .

Obviously, by ignoring costs I have played a little fast and loose with the figures here, but I have done that to emphasize the basic point. If there are two groups with *negatively correlated demands*, then bundling can be used to get members of each group to pay a little bit more per transaction and generate much higher revenues because of the vast increases in the quantities of each item sold.

Sometimes it makes sense to sell goods both separately and bundled, a practice known as *mixed bundling*. To see the logic, consider another simple example (this time with costs included) based on restaurant pricing.

	Reservation price: group 1	Reservation price: group 2	Reservation price: group 3	Cost
Appetizer	5	6	0	3
Dinner	10	8	10	5
Dessert	0	6	5	2

Best strategy for a la carte pricing is appetizer for 5, dinner for 10, and dessert for 5. Then group 1 generates 7 in profit (2 on appetizer, 5 on dinner), group 2 generates 5 in profit (2 on appetizer, 3 on dessert) and group 3 generates 8 in profit (5 on dinner, 3 on dessert), with total profits of 20.

Best strategy for a three-course dinner is to charge 15, generating profits of 5 for each person, total profits of 15. From the owner's standpoint, a la carte makes more sense.

But if you could only get those group 2 people to order dinner! To see the brilliance of mixed bundling, let's keep the a la carte prices as they were, but now let's also make dinner available at 19. At this pricing structure, groups 1 and 3 go a la carte, but group 2 goes for the whole meal. Profits are 7 on group 1, 9 on group 2, and 8 on group 3 for a total of 24.

What is different between this example and the first one?

- 1) Demands are not all that different; everyone wants to pay 8-10 for dinner and 2 out of 3 want dessert, appetizer.
- 2) Dinner costs are nontrivial

Implications of bundling for IT industries:

- 1) If MC very low (e.g., software), then this practice makes lots of sense. Firm can gain many customers with modest increase in price, but because of low (or sometimes zero) marginal costs, profits increase. As a result we see office software suites and now privacy/security suites.
- 2) Entry barriers likely to increase because entrants now must pay up-front development costs of the bundled product vs. a single product. Much more expensive to develop a spreadsheet, a word processing program, and presentation graphics than to develop just one.

Final point, closely related to Microsoft case: *Tying* is the practice of requiring products to be bought in combination. Text is pretty clear on this. It can be a scheme to protect a brand name (only Lexus parts on sale at the parts counter at the Lexus dealer) or it can be a mechanism for price discrimination (e.g., must buy computer cards from IBM).

## II. Oligopoly

The distinctive features of industry structure are number of firms, product differentiation, entry barriers, and information about market conditions. In perfect competition there are infinitely many firms producing identical products with no entry barriers and no secrets. In monopoly there is a single firm producing a single product (or product line) with entry barriers. Some monopolists are very open on what they produce and charge (e.g., professional sports); others are not (e.g., Microsoft).

Oligopoly falls between these two extremes:

1. There are a few firms, few enough that each is affected by actions taken by the others
2. There may or may not be product differentiation (steel, breakfast cereals are both oligopolies)
3. There are significant barriers to entry

4. There is usually very imperfect information about prices and quantities sold by competing firms

(Aside: you may note we skipped monopolistic competition. This is situation where there are many firms, different products, no entry barriers, and good information about market conditions. In short run, the firm in such an industry behaves like a monopolist. In the long run firms enter until economic profits are zero.)

Most major industries in the US (and elsewhere) are characterized by this market structure. What makes it most interesting is that all decisions now have a strategic element. Each firm's decisions on pricing, output, capacity, promotion, and product will have an impact on every other firm. The tricky part is doing this in a way to create a sustainable advantage for your firm.

One important goal of a firm in an oligopolistic industry is to maintain (and possibly increase) entry barriers. We have talked about this subject before in the context of monopoly. Some entry barriers tend to happen "naturally"

- economies of scale: firm must have large market share to produce at min AC
- learning curves: firms that enter first have lower AC than firms that enter later
- patents and intellectual property protection
- large capital requirements, especially in situations where the commitment consists largely of costs that become sunk costs once made (e.g., pharmaceutical); this means AC of firm already in business likely to be below AC of entrants

Other entry barriers can be created by strategic actions taken by the firm. Some examples:

- Excess capacity: if existing firms can increase output by a fairly large order of magnitude with existing capacity, this is a real threat to potential entrants. How can they grab market share, knowing that (1) this would create even more excess capacity among existing firms and (2) these firms have the ability to ramp up production and cut prices?
- Strategic assets: the same principle applies here as with learning curves and patents. Firms that have "something special," whether it be a great management team, good employee relations, or a great supply-chain system, have a cost advantage over other firms in the same market and potential entrants. So why should an entrant take them on?
- Access to distribution channels: entrant must win over distributors to get established; ordinarily this requires payments of some type, thereby reducing profitability
- Fierce reputation: firms can always threaten to meet new entry with fierce price cutting. Of course this is a bit like telling a street criminal who has stuck a pistol in your ribs that you are going to shoot yourself if he doesn't leave pronto. Why would a firm that presumably has already made profit-maximizing decisions all of a sudden want to take self-destructive action when a new entrant looms off in the distance. Talk is cheap, but one way of going beyond talk is to take advantage of the uncertainty involved in the situation. The new entrant does not know if you will roll over or fight. The solution: develop a reputation of being a firm that is likely to fight. Which means you have to do it once in a while. Think of it as an investment in entry deterrence.

- Branding: this is similar to patenting, no one can use the good name of McDonalds (without lawyers, guns and \$) in the fast food business. Any new entrant must spend heavily to overcome existing consumer loyalties.

A final category, which might be strategic in some situations (if you anticipated the potential and lobbied like crazy to make it happen):

- Government: can limit entry directly via regulation, or indirectly via patents, policies that require large scale for entry (e.g., ability to meet FDA requirements in pharma, ability to meet environmental standards).

Managers in oligopolistic industries must do more than set output schedules at profit maximizing levels and know the right price to charge. They must (1) be able to anticipate the reaction of other firms in the market and (2) make strategic moves to gain competitive advantage.

To guide management decision making, we need some type of rule that allows the firm to make decisions while taking the reactions of other firms into account. In perfect competition firms were doing the best they could when they set output where  $P=MC$ . In monopoly firms were doing their best when they set output where  $MR=MC$  and set price off the D curve. In these situations, firms were in equilibrium, meaning that they had no incentive to change what they were doing as long as the underlying conditions (demand, cost) stayed the same. This notion can also be applied to an oligopolistic market, where we can define “best” conditional on what other firms are doing. This is the concept known as *Nash equilibrium*, named after John Nash, a Princeton mathematician and economist who later won the Nobel Prize in economics.

Nash equilibrium: each firm is doing the best it can, given what its competitors are doing

This means that if other firms do not change their behavior, your firm will not. And if your firm does not change its behavior, they will not either. Hence the notion of equilibrium, or balance. Of course, there is a wide range of possible ways to explain how you and your rivals will coexist. Let’s consider one extreme case – the cartel, where you all get together and fix prices and allocate market segments among yourselves and agree not to compete. (Reminder: firms pay big fines and people go to jail for this; today’s papers all report about the vitamin-makers case.) Then we will start building some tools in future weeks to help us deal with the more common (and ambiguous) situations where firms have to make intelligent guesses about the intentions of their rivals.

### III. Cartels

A cartel is a formal arrangement where producers explicitly agree to set prices and output. Most tend to be international, since US antitrust laws do not encourage this behavior. They need to control most of a market, but do not need to control all of it. OPEC has functioned quite well (at times) without the explicit cooperation of Mexico or the big oil companies based in the US.

Cartels tend to be most successful when (1) demand is inelastic and (2) the cartels have an effective means to keep members from cheating and preventing entry by nonmembers. The first point is pretty obvious; hard to raise prices very much if demand

is elastic. To understand the second point, realize that if one producer can shade the price a little, it is likely to be able to gain a lot of customers from its fellow conspirators. But once one firm cheats, others respond in kind and it does not take long for the whole thing to unravel.

Examples of successful cartels: OPEC, Intl Bauxite Assn, Mercurio Europeo (mercury)  
Examples of unsuccessful ones: tin, coffee, tea, cocoa

OPEC successful because (1) demand inelastic, (2) political solidarity among key members, (3) supply inelastic.

#### **IV. Information goods (if time permits)**

It is often said that today we live in an information economy. What exactly does that mean? First, it includes goods that are produced and sold to provide information. Examples include books, newspapers, magazines, movies, telecom, databases, and news. Some of these goods are bought and sold just like any other commodity; others are provided for “free” by media such as television or the web. Second, it includes goods and services sold to manage information, including computer hardware and software, network access and infrastructure, and consulting services.

The economics of information goods are unique on both the demand and the supply side. On the demand side, there often are sizable network externalities, meaning that the value to any given customer is a function of the number of customers. Examples include computer operating systems, VHS format for videotapes, and the layout of keyboards.

On the cost side, information is costly to produce but very cheap to reproduce. This has the following repercussions:

- Huge economies of scale; cost per unit falls at all ranges of output
- Almost all costs are fixed and sunk. The first print of “Harry Potter” cost over \$100 million dollars. If the movie had turned out to be a total turkey, the studio can cut back some on advertising and prints, but these savings will be small in comparison to the sunk production costs. Same logic applies to software, e.g., Windows XP.
- MC is constant and very low, sometimes close to zero (a blank VHS tape or CD costs less than \$1, software and music can be downloaded).
- Firms must be very concerned about protecting their intellectual property (bootleg copies of “Potter” are already for sale in China).

These unique demand and supply characteristics are not compatible with a competitive market structure. To see why, look at Shapiro and Varian’s example of CD phone books. Nynex initially had a monopoly and enjoyed monopoly profits for awhile, being able to sell the disks for \$10k. But the information was very easy to copy and resell. Competition forced  $P=MC$ , less than \$20, even before the web made this type of service freely available.

There are two types of market structures that are sustainable for an information good: monopoly (e.g., operating systems for PCs) or oligopoly based on differentiated goods (e.g., publishing, entertainment, applications software). This means that to be

successful, a firm in an information industry must either differentiate its product (e.g., West legal publishing) or achieve cost leadership (e.g., Reuters).

#### *A. Pricing policy*

Given a position where the seller has some monopoly power, prices charged to consumers are likely to vary as long as the seller can split the market by demand elasticity. Both 1<sup>st</sup> and 3<sup>rd</sup> degree price discrimination schemes can be implemented for information goods. The former is called personalized pricing; the latter, group pricing.

*Personalized pricing* Information technology is already helping firms do this in traditional industries. Examples include mail-order catalogs (where inserts with special offers vary by zip code) and supermarkets (where purchase of Alpo can generate a coupon for Purina). The web takes this type of pricing to another level. The trick, just as in conventional retailing, is to know something about your customer. This can be done by

- Tracking clickstreams and using that info to determine content of page (banner ads, suggestions from Amazon.com)
- Special offers by e-mail to customers who register (and thereby reveal vital info about gender, age, and ZIP code)

Other pricing advantages of the web:

- Running special promotions to measure consumer demand; marketing research is now much cheaper, e.g., can offer discounts to see what response is
- Knowing that you can adjust prices on real-time basis in case there is surplus or shortage
- Auctions which can be business to consumer (even airline seats), not just trading Beanie Babies on eBay

*Group pricing* Earlier in the course we showed how firms will want to charge different prices to different groups of customers, based on their price sensitivity (elasticity). This concept is used for information goods in the following ways:

- Charge different prices in different countries and customize product by language, culture to make the prices stick. Pindyck and Rubinfeld is much cheaper abroad than it is here, but how good is your Spanish?
- Site licenses meet the needs of organizations that want standardized software to be shared by their employees. Pricing can be based on particular characteristics of the organization, e.g., number of users, workstations, servers, locations, etc.
- Charging lower prices for upgrades than new installations keeps your current customers locked-in

#### *B. Product policy*

Product design can be used to segment the market by willingness to pay. The general point is to design a version with all conceivable features for the group with least elastic demand (e.g., professional users) and a stripped down version for the group with the most elastic demand (e.g., home users). This practice is not unique to software. It has been used for decades in publishing (hardback → paperback) and more recently in film (first run → Blue Ridge/Spectravision → video → HBO → network TV). In these examples the price is gradually lowered over time until the market is saturated.

Information goods can be designed so that they vary along the following dimensions:

1. Delay: premium customers get their information first (sports betting, FedEx overnight)

2. User interface: high-powered search capability for premium users (Dialog has DialogWeb and DataStar)
3. Convenience: you get those free minutes after business hours; households tolerate the inconvenience for the savings
4. Image resolution: pros want more pixels per square inch than amateurs
5. Speed: slow down cheaper versions to justify price gap (Mathematica, printers)
6. Features: Quicken charges more for Deluxe version; Encarta costs more for on-line downloads
7. Technical support: free version of Netscape does not include this

Result: high price for high-end version; low price for low-end version. A strategic issue that the producer must worry about is that the two versions compete with each other. To keep high-end users paying the higher price, they must be convinced that the price differential is matched by a quality differential. This means that firms better not get too greedy in pricing the high-end product and they need to think hard about what features match with which end of the market in designing the low-end product (which is done by removing features from the high-end product).

Reminder of underlying economics: without price discrimination, the low-end buyers would not have access to these goods.