3. Market Structure and Competition

The *structure* of a market refers to the number and characteristics of the firms in it.

Many industries or markets are dominated by a few firms. Other contain many sellers.

In some markets, products are homogeneous: sellers can meet the needs of consumers equally well:
metals, chemicals, extractive industries, farming

In other markets, products are heterogeneous: different customers may have preferences for different sellers:
include branded products

Interplay between market structure and competition:

- Highly concentrated oligopoly; two firms over 90% of sales.
- Faced with excess capacity, both firms willing to slash prices to protect market share, although generally have been unwilling to cut prices to get new business.
- Price wars → low prices and low profits.

3.1 Market Structure

3.1.1 Market definition Identifying the market or markets in which a firm operates is known as *market definition*:

> "that set of suppliers and demanders whose trading establishes the price of a good or service"

Thus two sellers are in the same market if one seller's production and pricing decisions materially affect the price the other seller can charge.

3.1.1.1 Qualitative approaches: Based on the idea that two products are in the same market if they are close *substitutes*.

Two products X and Y are substitutes if, when the price of X rises and the price of Y is unchanged, purchases of X fall and purchases of Y rise.

Products tend to be close substitutes when:

1. Same or similar *product performance characteristics*.
   That is, What does a product do for consumers?
   How do the attributes of two products overlap?
2. Same or similar *occasions for use*.
   When, where, and how a product is used.

3. Sold in the same *geographical market*. Different geographical areas if:
   a. sold in different locations
   b. costly to transport the goods,
   c. costly for consumers to travel and buy the products

The qualitative approach, although commonly used, has several shortcomings:

1. identifying substitutes based on product performance characteristics is subjective and imprecise.
   ∴ much debate about market definitions.
2. Difficult to calibrate the extent of substitution.
3. Difficult to assess the importance of transport costs in an individual's choices.

Case: Substitutes and Competition in the Post Office

Almost always the P.O. is a government-owned or -regulated monopoly.

New technology is reducing the importance of a universal postal service: mobile phones, TV, faxes, email, the Internet, etc.

Access to other forms of communication continues to grow.

Reasons given for government monopoly:

1. Universal, equal access.
2. Unnecessarily costly to have two organisations delivering mail to the same address (consider rural deliveries).
3. Control the monopoly to keep prices below monopoly levels.

Traditionally, post offices sometimes very inefficient (high *AC*), but in Australia since 1975 (when PMG's Dept split into Telecom and Australia Post, both later corporatised) such inefficiencies have been reduced.

In some countries the statutory monopoly doesn't extend to parcels or express mail delivery.

TNT, the Dutch P.O., the N.Z. P.O.

Competition from close substitutes: fax, phone (for bill payments), email.

Varied P.O. responses

3.1.1.2 Quantitative approaches to defining markets & identifying competitors

Four approaches:

1. Demand elasticities.
2. Residual demand curves.
3. Price correlations.
4. Trade flows.

3.1.1.2.1 Demand elasticities

If a firm raises its price, and as a result,

- loses most of its custom to other firms, then it has many competitors.
- keeps most or all of its custom, then it faces little competition.

The size of consumer reaction to changes in price is measured by the *own-price elasticity of demand* (see Lecture 1-17):

$$\eta_X = -\frac{\Delta Q_X / Q_X}{\Delta P_X / P_X},$$

where η_X is the own-price elasticity facing firm X, Q_X is the quantity (not sales revenue) sold by firm X, and P_X is the price.

Since ΔQ and ΔP — the changes in quantity and price — will be of opposite sign, the negative sign gives a positive measure of elasticity.

A high η_X does not necessarily imply many close substitutes: recall from Lecture 1-23 that a firm will always push up price until demand is elastic.

At that level, a further price rise would reduce sales volume (quantity, not revenue) without consumers switching to any close substitute.

But knowledge of substitutes → firms can assess changes in η_X and adjust their prices, as market conditions change.

e.g. Geelong cement producers

From experience, a firm may find that a 10% price rise, cet. par., results a 20% fall in sales, so $\eta_X = 2$.

From the mark-up formula (Lecture 1-23), if MC = \$10/unit, then

$$P = \frac{MC}{(1 - 1/\eta_X)} = \frac{10}{(1 - \frac{1}{2})} = \$20$$

will maximise the firm's profits.

If a new entrant appears and the firm believes its customers view its product as a substitute (maybe its sales fall slightly), then its η_X will probably have increased, and so it should lower its price, as the mark-up formula suggests.

A group of sellers can benefit from knowing η, the group η rather than the individual seller's η:

- if one seller with many substitutes raises its price, it will lose much business to substitutes.
- if the group raise their prices in concert, then the group η may be low (if there are no close substitutes) and they will increase their TR and their profits.
- Such pricing coordination (collusion) will harm consumers and impose a Dead-Weight Loss (Lecture 1-31) on society.
- It is illegal.

Identify substitutes by using the *cross-price elasticity of demand*:

> the % change in quantity of product Y in response to a 1% change in the price P_x of product X:

$$\eta_{yx} = \frac{\Delta Q_y / Q_y}{\Delta P_x / P_x}$$

When η_{yx} is positive, X and Y are substitutes.
When η_{yx} is negative, X and Y are complements.

Possible to measure cross-price elasticities: estimated that a 10% rise in the price of natural gas would lead to a 1.5% fall in the demand for electricity, a substitute, cet. par.: $\eta_{yx} = 0.15$.

3.1.1.2.2 Residual demand analysis

Consider the Geelong cement producers: if they could raise their prices collectively by only 1% before it became profitable for Melbourne cement producers to enter the market and compete business away from Geelong producers, then the Geelong area is not a well-defined geographical market.

If, by contrast, Geelong producers could profitably raise their prices by 15%, then Geelong does constitute a well-defined market.

If a market is well-defined, then the pricing decision of sellers within the market will not be constrained by the possibility that buyers will switch to sellers outside the market.

If pricing within is constrained, then the market definition is too narrow, and should include the "outsiders": the basis of *residual demand analysis*.

A difficulty: to assess by how much a group of firms acting together could raise the price profitably — may be no record, unless they have been colluding; past price rises together may have been in response to a common increase in taxes or in wage rates or in other costs.

If the group have raised their prices alone in the past because of such localised cost or tax effects and their TR rose, then can conclude that the group faces few substitutes and so constitutes a well-defined market

3.1.1.2.3 Price correlations

If two sellers are in the same market, then they should be subject to the same demand forces.

So a higher demand for one should also increase for the other, and both should increase their prices.

If two sellers are close substitutes, then their ΔPs should be highly correlated.

But the opposite may not hold:
may be difficult to determine whether products with high price correlations are competitors in markets for inputs (so they respond to common cost changes) or outputs or both.

Limited use in antitrust cases.

3.1.1.2.4 Trade flows

If the cost of transporting the product (or the buyer) from one area to another is prohibitively high, then identical products sold in different geographical markets will not be good substitutes, and not in the same market.

To identify a geographical market, can use government classifications, but can lead to errors, without knowledge of actual product or buyer flows.

Or: directly examine flows of goods and services across geographical regions to identify possible competitors:

- Not enough to survey one shop's customers to find out where they shop, because this ignores those who live nearby but shop elsewhere.
- Instead, a two-stage process:
    1. Ask its customers where they live: identify its *catchment area*, in which other similar shops will be substitutes.
    2. Survey all residents of the catchment area to ascertain who shop outside the area: if many do, then there is competition from outside the catchment area.

Method frequently used in antitrust cases. A geographical market for a product, and the competitors within, are properly identified if:

1. firms in that market draw most of their customers from that area,
2. customers living in the area must make most of their purchases from sellers in that market.

3.1.1.2.5 Other approaches

Define markets according to the Australian & New Zealand Standard Industrial Classification (ANZSIC), although this is used for classifying establishments (or organisations) that carry out similar economic activities, not products or markets.

The scheme uses a four-digit identifier, with each digit representing a finer degree of classification (17 Divisions, to Subdivisions, to Groups, to 465 Classes, the finest).

A Class must be economically significant: in Australia a minimum annual turnover of $200m or employment of 3,500.

But beware: paperboard tubes are listed under class 2615 (Other Paper Products) although their plastic substitutes fall under class 3434 (Manufacture of Plastics Not Elsewhere Classified). (These numbers are from the now-obsolete ASIC, as is the table on p. 3-14 below.)

Case: Coca-Cola's market

In 1986 Coca-Cola sought to acquire the Dr Pepper Company: the largest buying the fourth largest seller of carbonated soft drinks.

The FTC sought an injunction to block the merger on the grounds that it would violate the prohibition against any acquisition of stock or assets of a company that might substantially lessen competition.

C-C apparently sought the deal to acquire, and more fully exploit, the Dr P trademark. C-C's marketing skills and research ability cited as two factors that would allow this.

Perhaps because Pepsi-Cola had been trying, but abandoned, to buy Seven-Up.

The injunction was supported, and the merger abandoned.

"Proper market analysis directs attention to the nature of the products that the acquirer and the acquired company principally sell, the channels of distribution ..., the outlets they employ to distribute their products to the ultimate consumer, and the geographic areas they mutually serve."

Not only the end-user market but also the intermediate markets.

The FTC: the market was carbonated soft drinks: the merger would increase C-C's market share by 4.6% nationwide, and by 10 to 20% in many geographic submarkets (distribution channels). Given C-C's share of 40 to 50% already, the merger would significantly reduce competition.

C-C: the market: "all ... beverages including tap water" , and hence the merger would have a negligible effect on competition.

The judge determined that carbonated soft drinks was the product market for antitrust purposes: relying on the product's

- distinctive characteristics and uses,
- distinct consumers,
- distinct prices, and
- sensitivity to price changes.

Carbonated soft drink makers constrain each others' pricing decisions, but are unconstrained by other drinks — a well-defined market.

3.1.2 Measuring market structure

A quick characterisation of a market is *concentrated* (having just a few sellers) or unconcentrated.

Market structure: the number and distribution of firms in a market (Lecture 2-26). Most theories: market performance depends on characteristics of its largest firms, not the smallest or *fringe* firms.

A common measure is the *N-firm concentration ratio*: the combined market share of the *N* largest firms in the market.

obsolete ASIC code	Industry	Percentage of turnover accounted for by: Largest four	Largest eight	Largest twenty	Total number of firms
2190	Tobacco products	100	100	100	3
2163	Biscuits	95	99	100	23
2945	Steel pipes & tubes	92	95	99	37
2770	Petroleum refining	85	100	100	8
3231	Motor vehicles	84	95	100	32
2751	Chemical fertilisers	81	98	100	19
2454	Foundation garments	73	97	100	12
2642	Printing & publishing	71	81	92	183
346	Rubber products	69	77	86	158
2872	Ready mixed concrete	69	75	83	178
2122	Butter	58	84	100	19
2765	Soap & other detergents	48	60	81	114
3353	Refrigerators & household appliances	46	61	80	167
3482	Jewellery & silverware	15	25	43	198
2644	Printing & bookbinding	14	21	33	1506

Selected Australian Industries 1982–83
Caves et al., *Australian Industry*, 1987.

The table shows not-so-recent four-firm, eight-firm, and twenty-firm concentration ratios for selected Australian industries. in 1982–83, using the now-obsolete ASIC (see p. 3-11 above).

Another measure is the *Herfindahl index* (H.I.): the sum of the squared market shares of all firms in the market:

$$S = \sum_i (S_i)^2$$

e.g. a market with two equal firms in it has an H.I. of $.5^2 + .5^2 = .5$

The H.I. of a market with N equal-sized firms is $1/N$.

$\therefore$ The reciprocal of the H.I. is known as the *numbers-equivalent of firms*.

Ignore small firms since $.01 \times .01$ is negligible.

The H.I. changes with changes in the relative size of the largest firms, whereas the N-firm concentration ratio does not.

3.2 Linking Market Structure & Competition

Many models link market structure to the conduct (behaviour) and (financial) performance of its firms.

Lecture 1-23 to 1-28 discussed models of price determination:

> as a firm faces more elastic demand, the mark-up (or margin) between P and MC narrows.

Extreme: firms face horizontal demand curves of infinite elasticity, so that $P = MC$, and there is no DWL: an *efficient allocation* (Lecture 1-31).

With free entry and exit, all (economic) profits competed away, so that

$$P = MC = \min AC \text{ at } Q_{MES}$$

Other extreme: single seller or monopolist, and $P > MC$ and *inefficient* for two reasons:

1. a Dead-Weight Loss (DWL)
2. operating with $AC >$ min AC and $Q < Q_{MES}$.

Suggests firms face a continuum of pricing possibilities, depending on the nature of the competition they face:

Nature of Competition	Range of H.I.s	Intensity of Price Competition
Perfect competition	Usually < 0.2	Fierce
Monopolistic competition	Usually < 0.2	May be fierce or light, depending on product differentiation
Oligopoly	0.2 to 0.7	ditto
Monopoly	0.7 and above	Usually light, unless threatened by entry.

The H.I.s are suggestive only:

- Later we see fierce price competition with only two firms.
- In Lecture 6 we examine condition for a *contestable market*, where a single firm prices competitively.

Need to assess the particular circumstances of the competitive interaction of firms, and not rely solely on the H.I. or concentration ratios.

3.2.1 Perfect competition

(See Lecture 1-26 to 1-28.)

Many sellers of a homogeneous good and many well-informed buyers who costlessly shop around for the lowest price.

$\therefore$ a single market price, determined by the interaction of all sellers and buyers, beyond the control of any.

$\Rightarrow$ each firm faces an infinitely elastic (and horizontal) demand:

— sells nothing if its price is at all greater than the market, and

— throws money away if it sells below the market;

— its only decision is how much to produce and sell;

— chooses Q to set $MC(Q) = P$, (see Lecture 1-26).

From the mark-up formula (Lecture 1-23), the *percentage margin contribution* (PCM) = $(P - MC)/P$, so that the profit-maximisation condition can be written:

$$\text{PCM} = \frac{1}{\eta}$$

With perfect competition, $\eta = \infty$, so the PCM = 0.

Market conditions will tend to drive down prices when two or more of:

1. Many sellers
2. Consumers perceive the product to be homogeneous
3. Excess capacity exists

Markets for many metals and agricultural commodities, with fierce price competition and low (economic) profits as $P \sim MC$.

Most other markets are not literally perfectly competitive, but can exhibit fierce price competition at times.

3.2.1.1 Many sellers

"The industry is led by its dumbest competitors" — vainly seeking market share by price cutting.

But collusive high prices hurt buyers, so exist competition laws (antitrust, trade practices).

In practice, unusual for more than a handful of sellers to raise prices above *MC* for a sustained period:

1. The greater the number of sellers, the greater the difficulty of agreeing who cuts production to support higher prices
2. The greater the number of sellers, the greater the chance of one or more "cheating" on an agreement, once reached, and expanding production and sales.
   - — May trigger a price war.
   - — Small firms may cheat to capture economies of scale (Lecture 2-16) and learning economies (Lecture 2-21).
   - — Difficult for larger firms to agree on suitable punishment (why not lowering prices?)
3. In an industry with many sellers, likely to be a diversity of seller pricing preferences: a seller with low costs may prefer a low selling price, if the short-term benefits exceed the long-term costs of price instability.

   e.g. U.S. airlines flying under bankruptcy protection → price wars as *coups de grace*?

Case: The OPEC cartel

See Daniel Yergin's *The Prize* (NY: Simon & Schuster, 1991)

In 1960 OPEC was formed as a *cartel* to counter efforts by the oil majors to lower the prices they paid for oil imported into the industrialised countries.

In the 1980s OPEC explicitly tried to raise the price of oil by setting quotas to restrict their output; Saudi Arabia was the "swing producer" and cut its output to maintain prices, as agreed

Difficult to sustain: during the Iran-Iraq War, countries cheated, and prices fell. Further pressure from the "competitive fringe" producers, such as the North Sea producers → price falls.

In November 1985 the Saudis cried "Uncle" and — fed up with their production cutbacks to support the world price with others' cheating — on 1 January 1986 the world price of oil dropped in free fall from US$35/bbl to about $12/bbl.

Today, OPEC produces less than 50%, and apparently has negligible effect on world prices.

Other efforts to cartelise international commodities: copper, tin, coffee, tea, cocoa. Some with short-term success: bauxite, uranium. Diamonds, via De Beer's Central Selling Organisation, have had longer-term success, even with the Russians; will Argyle successfully break away?

3.2.1.2 Homogeneous product

Increased sales from three different sources after a price fall:

1. Increased sales to existing customers.
2. First-time sales to new customers, not previously buying at all.
3. Sales to customers who had switched from buying elsewhere to take advantage of the lower price.

Homogeneous product: no variance from one seller to another, and customers will switch to get a lower price, which intensifies price competition.

Shares of BHP, ounces of 24-karat gold are homogeneous.

Wheat, wool, coal — apparently homogeneous — but graded.

In cases where nearly all buyers can agree that a given good offers proportionately higher or lower value than another product, the threat of consumer switching forces prices to keep that fixed proportion.

3.2.1.3 Excess capacity

With production processes with high *FC*s (see Lecture 2-26) *MC* can be well below *AC* over a wide range of output; only when production equals capacity at Q_{MES} does *MC* equal and then exceed *AC*.

Annual Output	*TVC* $m/yr	*TFC* $m/yr	*TC* $m/yr	*AC* $/unit
10,000	1	12	13	1300
20,000	2	12	14	700
30,000	3	12	15	500
40,000	4	12	16	400
50,000	8	12	20	400

Plant has a capacity Q_{MES} of 50,000/yr, but has firm orders only for 10,000. Confident that at a price of $300/unit it can sell another 10,000 by stealing a major customer from one of its competitors.

Should it do so?

Yes, because ΔTR = $3m > ΔTC = $1m, so long as it can sell at $300 (or above an *AVC* of $100/unit).

In the long run, *P* must be above *AC*, or firms may exit the industry, unless the firm capacity is industry-specific, with very low or zero opportunity costs: remain.

Case: Pricing in the Airline Industry

The U.S. airline industry: frequent price wars and large financial losses. — losses tied to industry cost structure and the nature of competition?

Three kinds of costs:

1. Flight-sensitive costs; fixed once the schedule is set.
2. Traffic-sensitive costs; vary with the number of passengers. Only a small % of *TC*.
3. Fixed overhead costs; fixed before the schedule is set.

Airline is better off selling an empty seat at near *MC*, but below *AC*, than flying with empty seats.

Flights with different airlines almost homogeneous (what role do FF programs play here?).

Great pressures, esp. when demand is low, to fill planes with low, almost-*MC* fares.

Given that $MC << AC$, the airlines can lose much money: cover *MC*, but not *FC*.

Q: Local duopoly (two sellers) which is similar?.

3.2.2 Monopolistic competition

A market with two main features:

1. Many sellers, so no one seller can influence its rivals directly.
2. Differentiated products: slightly different, perhaps branded.

Sometimes there is consensus about which products are better (*vertical differentiation*), sometimes products just differ (*horizontal differentiation*), for instance, by geographical location or by colour.

Possible to think of any single measure in which products differ as "location".

If the gain from switching products is greater than the cost of doing so (reflecting the "distance" between products), then buyers will switch.

Unless:

- preferences are highly idiosyncratic, or
- buyers lack information about alternatives, or
- buyers see a relatively higher price as a proxy for quality.

3.2.2.1 Graphical depiction

If all firms set exactly the same price in a market of many (N) differentiated sellers, who are well informed. A typical seller will have $1/N$ of the market.

The demand curve facing each seller will be relative inelastic, and reflects not switching (since all sellers change prices together) but the Law of Demand (Lecture 1-16).

If, however, one seller lowers its price while the others don't, then it sells more, because:

- its existing customers demand more, and
- it steals customers who switch from other sellers.

In this case it faces a much more elastic demand curve, and the seller has much to gain by lowering its price, and the PCMs from profit-maximising behaviour will be fairly small (see p.3-18).

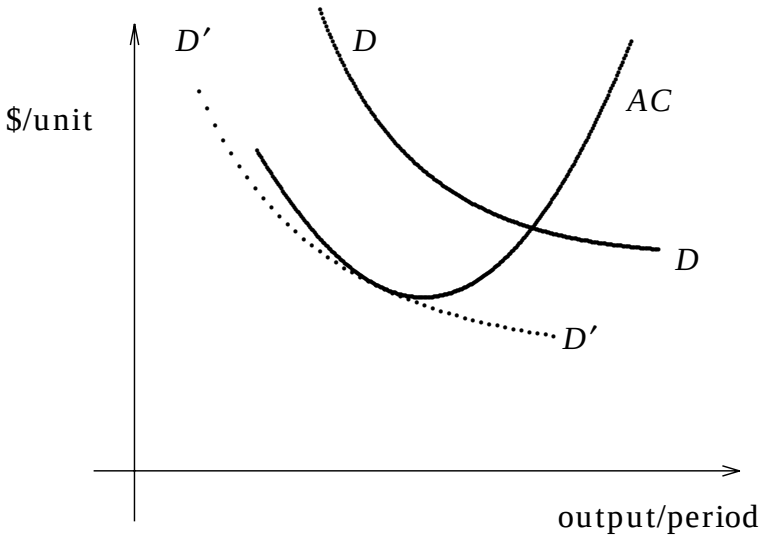
If there is little switching, the price elasticity of demand will be smaller, and the PCMs higher.

3.2.2.2 Entry

In differentiated product markets:

- each firm faces a demand curve with $\eta < \infty$;
- so they will set $P > MC$, and the resulting PCMs will help defray the *FC*s.
- If $P > AC$, then (economic) profits are positive.
- New entrepreneurs will be attracted to enter.
- Their entry will reduce P and erode market share, until profits are zero.

For any of the firms, the result will be:



Monopolistic Competition

3.2.3 Oligopoly

With only a few sellers the pricing and production decisions (strategies) of any one firm will affect overall industry price and production levels, and hence the performance of other firms: a strategic interaction.

Many models of *oligopolistic firm behaviour* (see Lectures 4 and 5).

3.2.3.1 Cournot quantity competition

Two companies produce identical output and so must charge identical price P.

They jointly facing a linear industry demand curve of

$$P = 10 - Q,$$

where Q is the sum of the two companies' outputs, $Q = Q_1 + Q_2$.

The two companies have identical and constant unit costs, $AC = MC =$ \$1/unit.

How much will each firm produce? Depends on what each expects the other to produce.

As *Cournot oligopolists*, each chooses an amount of output to maximise its profit, on the assumption that the other is doing likewise: they are not colluding, but competing. They choose simultaneously.

A Cournot equilibrium is two outputs Q_1^* and Q_2^* and a price P^* that satisfy:

1. P^* clears the market: $P^* = 10 - Q_1^* - Q_2^*$,
2. Q_1^* is Firm 1's optimal output given that is expects Firm 2 will choose Q_2^*, and
3. vice versa for Firm 2.

That is, each firm's expectation about its rival's output is fulfilled and correct.

Firm 1 determines Firm 2's reaction function:

"If I were Firm 2, I'd choose my output Q_2^* to maximise my Firm 2 profit conditional on the expectation that Firm 1 produced output of Q_1^e."

Firm 2's profit = Firm 2's TR – Firm 2's TC,

$$\max_{Q_2} \pi_2 = (10 - Q_2 - Q_1^e) \times Q_2 - Q_2$$

Thus $Q_2^* = \frac{1}{2}(9 - Q_1^e)$, which is Firm 2's *reaction function* as a function of its expectation of what Firm 1 will produce (Q_1^e).

Since the two firms are identical, Firm 1's reaction function is

$$Q_1^* = \tfrac{1}{2}(9 - Q_2^e).$$

Only one pair of outputs is simultaneously the best response to each other: where the firms' reaction functions intersect,
at $Q_1^* = Q_1^e = Q_2^* = Q_2^e = 3$ units.

So $Q^* = 6$ units, price P is then \$4/unit, and the profit of each firm is \$9.

Besanko's Table 8.5 shows that the firms need not be omniscient: trial-and-error adjustment will converge to the equilibrium above.

In the Cournot model of quantity competition, industry profit is not maximised: here Total Profit = \$18, but Monopoly Profit = \$20.25. (See Table below.)

As the number of firms in an industry with quantity competition increases, price and profits (both per-firm and industry) fall, and industry output rises (see Besanko Table 8.6).

The average PCM of a firm in a Cournot equilibrium given by

$$\text{PCM} = \frac{\text{H.I.}}{\eta}$$

The less concentrated the industry, the smaller the equilibrium PCMs.

Case: The Corn Wet Milling Industry

Until the 1960s a stable oligopoly, in which firms convert corn (maize) into corn starch and corn syrup, when several entrants appeared. Prices driven down, but by the early 1970s, as capacity utilisation rates and prices rose, competitive stability returned.

In 1972 came commercial high-fructose corn syrup (HFCS): firms had to decide whether and how to add capacity to supply the expected demand.

Eleven major competitors modelled as conjecturing about overall expansion of industry capacity, demand, and sugar (substitute) prices: analogous to the Cournot model.

Modelled a fulfilled-expectation expansion path: when each firm made its optimal capacity decision based on its expectations of the industry path, which did then actually occur.

The model predicted a moderate amount of additional capacity, which was quite close to the historical path.

3.2.3.2 Bertrand price competition

Each firm sets a price and stands ready to meet all the demand for its product at that price.

Its price is set to maximise its profit, given that it believes its rivals will do likewise.

The only equilibrium (where there is no incentive to undercut the other firm) is where each is selling at $P_1 = P_2 = MC_1 = MC_2 = \$1$/unit. This is identical to the competitive, price-taking case.

If MC_1 is greater than MC_2, then Firm 2 will capture the whole market at a price just below MC_1, and will make a positive profit; $Q_1 = 0$.

The firms' outputs are perfect substitutes, which intensifies competition.

Unstable, fierce competition is possible where:

- *FC* are high, or
- where there are capacity constraints

See Lecture 5.

3.2.3.3 Why are Cournot and Bertrand different?

Cournot can be thought of as choosing capacities first, and then competing as price setters.

With Cournot quantity competition, prices adjust more quickly than do quantities, which suggests high costs of inventory holdings.

With Cournot, rivals set prices less aggressively than in Bertrand price competition, since they expect that any price cut will be immediately matched.

With Bertrand, capacity is sufficiently flexible that any demand can be matched.

With Bertrand, rivals expected to be able to steal business.

See Lectures 4 and 5 for oligopolistic competition:

- over quality,
- over availability,
- over advertising, and
- where firms are ignorant of their rivals' choices, and
- where timing is influential.

3.2.3.4 Bertrand price competition with horizontal differentiation

When firms produce products that are close, but not perfect, substitutes, then it can be shown that equilibrium prices (with Bertrand price competition) are well above *MC*. Product differentiation softens price competition.

3.2.4 Monopoly

Monopoly power: "the ability to act in an unconstrained way."

A monopolist is a "single seller"; a *monopsonist* is a "single buyer".

Monopolies impose inefficiencies on society (see Lecture 1-29 to 1-31), but if they arise when a firm discovers a more efficient way of manufacturing a product, or creates a new product that fulfills unmet consumer needs, then consumers benefit.

Since innovation is risky, it will only occur if firms believe they can earn high profits if they succeed.

In these cases, restrictions on monopoly profits may prove costly in the long run. Patents provide temporary monopolies.

Consider our two firms jointly facing a linear industry demand curve of $P = 10 - Q$, where Q is the sum of the two companies' outputs, $Q = Q_1 + Q_2$.

They can collude and act as a monopolistic *cartel*. They each produce half of the monopolist's output and receive half the monopolist's profit.

From Lecture 1-23, the monopolist's output Q_M is such that $MR(Q_M) = MC$ = \$1/unit.

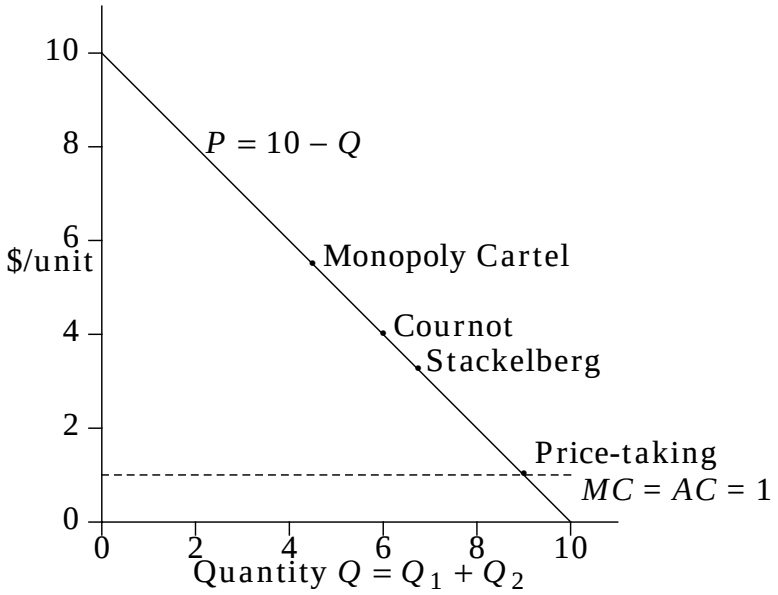
From Lecture 1-20, since the demand curve is linear, the MR curve is given by $MR = 10 - 2Q$, which results in Q_M = 4.5 units, P_M = \$5.5/unit, and $\pi_M = (5.5 - 1) \times 4.5$ = \$20.25.

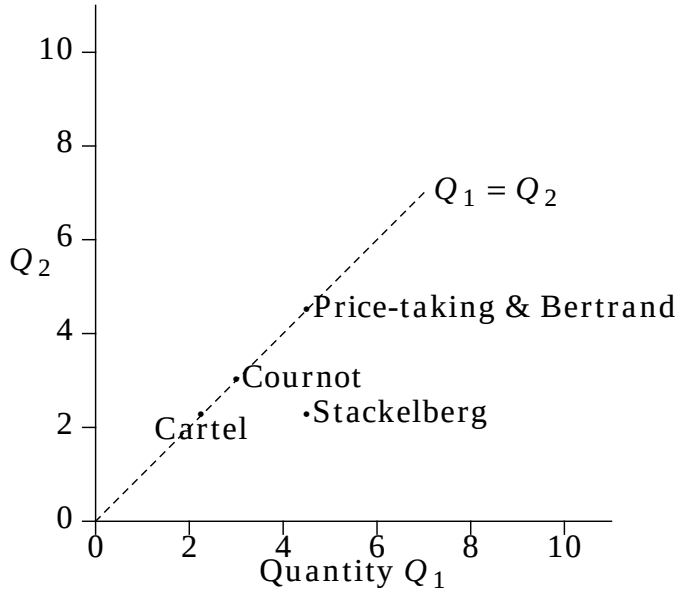
So each produces output $Q_1 = Q_2 =$ 2.25 units, and earns $\pi_1 = \pi_2$ = \$10.125 profit.

We can show the results in a Table and a Figure:

	Q_1	π_1	Q_2	π_2	P	Q
Price-taking	4.5	0	4.5	0	1	9
Cartel	2.25	10.125	2.25	10.125	5.5	4.5
Cournot	3	9	3	9	4	6
Stackelberg	4.5	10.125	2.25	5.063	3.25	6.75
Bertrand	4.5	0	4.5	0	1	9

(Stackelberg refers to quantity leadership, in this case by Firm 1, that we discuss in Lecture 5.)





3.3 Evidence on Structure & Performance

Is market structure related to the level of prices and profitability that prevail in a market, as suggested above?

3.3.1 Price & concentration

Compare price-cost margins across markets with different structure, to avoid the difficulty of different cost structures.

But price-cost margins may vary across markets for other reasons (which must be controlled for):

- regulation,
- product differentiation,
- the nature of the sales transactions,
- the concentration of buyers.

From Lecture 1-23, want the ratio of P to MC, but accounting cost data may provide only AC, not MC; moreover, definition of costs may be industry-specific.

$\therefore$ Focus on industry-specific studies to assess the relationship between concentration and price: geographically separate markets with different numbers of sellers.

With few exception, prices tend to be higher in concentrated markets, and can be substantial.

e.g. when top three retailers had 60% of the gasoline market, prices were about 5% higher than when they had only 50%.

In U.S. states that banned price advertising for such "professional services" as spectacles and retail chemist's prices, prices were higher than in states which allowed price advertising.

"How many firms must be in a market for price to approach competitive levels?"

Once there are three sellers in a market, price competition does not increase with more sellers: it's as intense as it can get.

Case: Price & Concentration in Local Hospital Markets

Does competition in health care markets result in lower or higher prices?

In the 1970 and early 1980s in the U.S., competition did not appear to reduce health care prices as happens in other markets; but recent studies suggest that both prices and costs *are* reduced with competition.

Previously, choice of hospital was made by patients and their doctors;

- not well informed about prices, and
- with insurance they were not concerned about prices.

∴ Low competitive pressures.

Recently, purchasing power has shifted from individual patients and their doctors to employers, Health Maintenance Organizations, and insurers.

- Motivated shoppers: keep savings.
- Skillful shoppers: much data.

∴ Especially in markets with empty beds (excess capacity), such factors have held down the rate of growth in hospitals' prices and costs.

3.3.2 Other studies of determinants of profitability

Lecture 2 considered the link between economies of scale (EOS) and market structure. Here, we have considered the link between market structure, competition, and profitability (performance).

Together, a link between EOS and profits.

These theoretical links have been confirmed: consistently, the same industries tend to be highly concentrated in all countries, which suggests that something like EOS determines market structure in all markets.

Industries in which the MES of production is large relative to the size of the market tend to be more concentrated than industries with low EOS.

Difficult, however, to demonstrate the link between concentration and profitability:

- comparing accounting profits across industries with different accounting conventions;
- if an industry were truly profitable, then entry would occur;
- or few firms may be a result of low profitability

Or examine the relationship between profits and EOS that might limit entry:

- EOS in production processes as reflected in large capital-to-sales ratios
- EOS in marketing as reflected in large advertising-to-sales ratios

In most cases, industry profits are higher when there are EOS: consistent with the notion that profits are high when industries are concentrated because entry is difficult.

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