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2. Industry Analysis

Porter's Five Forces provides a convenient framework for exploring the economic factors that affect the profits and prices of an industry.

Porter's analysis systematically and comprehensively applies economic tools to analyse an industry in depth:

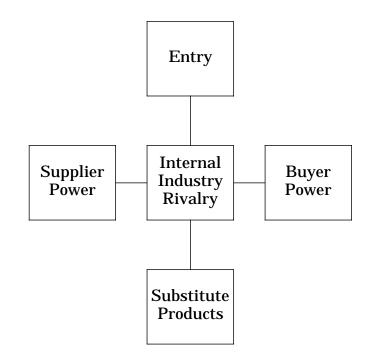
- How can the firm make profits?
- Opportunities for success and threats to success?
- A basis for generating strategic choices.
- Applies to service sectors as well as industrial.

Limitations of the framework:

- it does not address the size of demand or its growth
- it focusses on the entire industry, not on a particular firm
- it does not explicitly account for the role of government
- it is qualitative

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2.1 Porter's Five Forces



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2.2 The Economics of the Five Forces

2.2.1 Internal Industry Rivalry

This may occur via price competition, or via non-price competition. (See Lectures 3–5.)

Six factors favour price competition:

- market structure: many sellers
- no product differentiation: homogeneous
- the nature of the sales process: secretive, large, and lumpy
- · capacity utilisation: excess
- consumers (buyers) motivated, and capable: low switching costs

Even without apparent competitors, an incumbent firm may set competitive prices. See *contestable* markets in Lecture 6.

A history of coexistence with respect to price rivalry (because of *price leadership* and *signalling* — see Lecture 5), versus repeated price wars.

2.2.2 Entry

Firms attracted by (economic) profits.

Remember that Total Cost includes a normal return to capital, so positive accounting profits may not be sufficient incentive to entry.

Entry of new firms erodes profits by:

- · reductions in sales and shares, and
- reductions in market concentration, which →
 greater internal (industry) rivalry, and often
 reducing cost-price margins.
 (Remember the mark-up formula on page 1-20.)

Barriers to entry (see Lecture 6) may be structural or regulatory:

- economies of scale and scope (see §2.5 below)
- limited access to essential resources or channels of distribution
- patents
- need to establish brand identity, or overcome incumbents' brand identities
- other cost advantages, such as an incumbent's *learning economies* (see § 2.5.5 below)
- predatory pricing (selling below min *AC*)
- high capital costs
- · licencing costs

Exit barriers also serve as entry barriers, given the costs of exiting for risk-averse entrants who eventually fail.

A high rate of entry in the past may be continued.

Technological change may reduce entry barriers \rightarrow greater competition.

2.2.3 Substitutes

Substitutes steal share and intensify internal rivalry.

ECL 2-6

Like entrants, but new substitutes may reflect new technologies, whose unit costs *AC* may fall because of the *learning curve*.

New substitutes may pose large threats to established products, even if they seem harmless now.

e.g. Polaroid v. digital photography

How to determine whether a product is in the same market as existing products, a new entrant, or a substitute?

- Cross-price elasticity, measures the percentage change in demand for good B that results from a 1% change in the price of good A; identifies the substitutes faced by our product.
 - e.g. Pepsi and tap water?
- Residual demand curve analysis pricing decisions in a well-defined market will not be constrained by the possibility that consumers will switch to sellers outside the market: if pricing *is* so constrained, enlarge the market definition.

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- Price correlation if two sellers are in the same market, they should face the same demand forces, which will lead to correlated price movements.
 - Not a good method: may be hard to interpret if firms are colluding, their prices will move together.
- Trade flows identical product not sold in the same geographical area are not substitutes: must identify the customer catchment area.
- Competition among firms in an industry is captured by the *firm-level price elasticity of demand* (see p. 1-18).
- Threatening substitutes measured by the *industry-level price elasticity of demand*
- Others? Own-price elasticity of demand?

2.2.4 Supplier Power and Buyer Power

Suppliers of inputs (labour, materials, energy, equipment, certification, etc.) may be able to charge prices that extract profits (surplus) from their customers: *supplier power*.

ECL 2-8

No market power if the input supply industry is perfectly competitive, and prices are set by the interaction of supply and demand.

But suppliers may have market power:

- · if they are concentrated, or
- their customers are locked into continuing relationships with them because of relationship-specific investments (see §2.4 below).

Unions have raised wages when its employer industry is faring well, and may make concessions when things aren't good.

A supplier can thus extract much of the target industry's profits without destroying the industry firms.

"Power" is not the same as "importance." e.g. jet fuel is important, but from a competitive supply industry

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Buyer power is analogous: customers may be able to negotiate lower prices, and hence capture some of the profits.

Many buyers have some power, but the markets for output are price competitive, with price close to MC (see page 1-20.) The willingness of buyers to shop for best price is a source of internal rivalry in the industry, not buyer power.

In many industrial markets, fierce internal rivalry and buyer power can coexist: each transaction is the result of a bargain between a sales agent and a purchasing agent, and the contract price for identical products can vary significantly.

In this context, buyers may be powerful if:

- · there are few of them, and
- a seller is locked into a relationship with the buyer because of relationship-specific investments.

2.2.5 Strategies for Coping with the Five Forces

A five-forces analysis identifies the threats to industry profits that all firms in the industry must cope with.

ECL 2-10

Several ways:

- 1. Firms may *position* themselves to outperform their rivals, by developing a cost or differentiation advantage that somewhat insulates them from the five forces.
- Firms may identify an industry segment in which the five forces are less severe.
 e.g. Crown Cork & Seal served manufacturers of "hard-to-hold" liquids, a less competitive niche market → much higher rates of return.
- 3. Firms may try to *change the five forces*:
 - may reduce internal rivalry by creating switching costs, such as using its parts lest the warranty be voided, which creates a cost (the voided warranty) to those who switch and buy parts from another supplier
 - may reduce the threat of entry by pursuing entry-deterring strategies
 - may try to reduce buyer or supplier power by tapered integration (in which the firm both makes — vertical integration — and buys — market exchange: see §2.3 below).

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2.3 Make versus Buy: the Vertical Boundaries of the Firm

(Besanko Table 2.1, p.73)

Benefits and Costs of Using the Market:

Benefits

- Market firms can achieve economies of scale that in-house departments producing only for their own needs cannot. Specialisation.
- Market firms are subject to the discipline of the markets and must be efficient and innovative to survive. Overall corporate success may hide the inefficiencies and lack of innovativeness of in-house departments
- Avoids possible post-merger culture clash.

Costs

- Coordination of production flows through the vertical chain may be compromised when an activity is purchased from an independent market firm rather than performed in-house.
- Private information may be leaked when an activity is performed by an independent market firm.
- There may be costs of transacting (contracting) with independent market firms that can be avoided by performing the activity in-house.
- Long-term contracts may reduce flexibility and information on alternatives.

Some Make-or-Buy Fallacies:

- Firms should generally buy, rather than make, to avoid paying the costs necessary to make the product.
- Firms should generally make, rather than buy, to avoid paying a profit margin to independent firms.
- Firms should make, rather than buy, because a vertically integrated producer will be able to avoid paying high market prices for the input during periods of peak demand or scarce supply. (Use opportunity costs.)

2.3.1 Tapered Integration: Make & Buy (Besanko p.156)

A mixture of both:

- a manufacturer might produce some input itself and buy some;
- it might sell some of its product through an inhouse sales force and sell the rest through an independent rep

Several benefits:

- expands the firm's input and/or output channels without much capital invested: helpful for new and growing firms
- use information about the cost and profitability of its internal channels to help negotiate with the independents

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- use the threat to further use the market to motivate the performance of its internal channels
- may develop internal input supply capabilities to protect itself against *holdup* by independent input suppliers

A clear example of holdup (see Besanko p.116) is the impasse between Apple and the Mac clone makers over the price for licensing the MacOS 8 — the CEO of Power Computing has recently quit, and its forthcoming IPO is likely delayed.

But tapered integration may:

- not allow sufficient scale in the internal and external channels to produce efficiently
- lead to coordination problems over specifications and timing
- · lead to much higher monitoring costs

Alternatives to Make or Buy?

2.4 Rents and Quasi-Rents

(See Besanko pp.114-)

		\$ million/yr
(1)	Total Variable Costs (VC)	3.0
(2)	Ex ante opportunity costs of the	
	investment in the plant	2.0
(3)	Minimum revenue seller requires	
	to enter the relationship = $(1) + (2)$	5.0
(4)	Actual revenue	5.0
(5)	Seller's rent = $(4) - (3)$	0.0
(6)	Ex post opportunity cost of the plant	0.5
(7)	Minimum revenue seller requires	
	to prevent exit = $(1) + (6)$	3.5
(8)	Seller's quasi-rent = $(4) - (7)$	1.5

Seller will produce a good for a buyer:

- Total Variable Cost is \$3.0 m/year
- Plant investment of \$40.0 m up front.
- Minimum acceptable rate of return is 5% p.a.
 - ∴ annual ex ante opportunity cost is \$2.0 m
 - ∴ the minimum return to the seller must be \$5.0 m/year

The seller's *rent* is the difference between what it actually receives and what it must receive (minimum) to make it worthwhile to enter the deal

Before the deed (*ex ante facto*), it must receive at least \$5.0 m/year.

Its rent in this case is zero, which reflects that fact that competition to supply has been fierce. R.E. Marks ECL 2-15 R.E. Marks ECL 2-16

Suppose the plant is *buyer-specific:*

- Once the plant is built, it has few alternative uses.
- Its next best use is only \$0.5 m/year (its *ex post facto* opportunity cost).
 - ∴ the minimum the seller must receive not to exit = \$3.5 m/year.
- This is the TVC plus the ex post opportunity cost.
- If the seller received only \$3.25 m, then its earnings would only be \$0.25 m, which is less than its next best return of \$0.5 m/year.

The seller's *quasi-rent* is the difference between:

- a. the revenue the seller would actually receive under the initial terms, and
- b. the revenue it must receive to be induced not to exit after it has made its *relationship-specific* investments.

Here, its quasi-rent is \$1.5 m/year

Competitive bidding ex ante does not drive quasirents to zero when there are relationship-specific assets.

The buyer has more bargaining power, ex post, when there are relationship-specific assets.

The *holdup problem* occurs when a seller tries to exploit the relationship-specific investment to obtain a higher price.

2.5 Economies of Scale and Scope

(Besanko pp. 173-216)

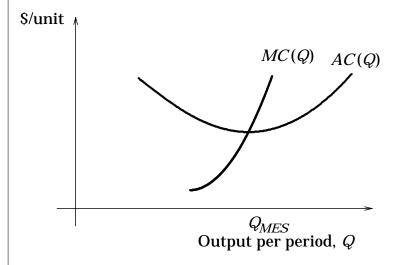
2.5.1 Economies of Scale

A production process for a specific good or service exhibits *economies of scale* over the range of output when Average Cost declines over that range.

For AC to decline as output Q increases, the Marginal Cost MC must be less than overall AC.

If AC is constant, then MC = AC and we say that production exhibits *constant returns to scale*.

If AC is increasing, then MC > AC and we say there are *diseconomies of scale*.



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2.5.2 Economies of Scope

Economies of scope exist if the firm achieves savings as it increases the variety of activities it performs, such as the variety of goods or services it produces.

Usually defined in terms of the relative total cost of producing a variety of goods together in one firm versus separately in two or more firms.

The cost implications are shown in the table:

$\overline{Q_X}$	$\overline{Q_{y}}$	$TC(Q_X, Q_y)$
100m	0	\$55m
0	600m	\$220m
100m	600m	\$245m
200m	0	\$60m
0	1200m	\$340m
200m	1200m	\$370m

 Q_x is the number of adhesive message note pads produced and Q_y is the number of tape rolls produced.

 $TC(Q_X, Q_y)$ is the Total Cost to the single firm of producing Q_X pads of adhesive messages and Q_Y rolls of tape.

Given that the firm has made the investment in developing the know-how for making tape, much of that knowledge can be applied to producing related products, such as adhesive message notes.

ECL 2-18

Given the up-front investment to produce tape, the additional investment needed to ramp up production of message notes is less than otherwise, and the additional costs to produce 100 million pads, on top of 600 million rolls of tape, is only \$25 million, instead of the \$55 million necessary from scratch.

Exploiting economies of scope is often know as "leveraging core competences", "competing on capabilities", or "mobilising invisible assets".

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2.5.3 Sources of Economies of Scale and Scope

- Indivisibilities and the Spreading of Fixed Costs
 - At the product level (scale).
 - At the plant and multi-plant level (scope).
 - Capital-intensive v. labour-intensive production (scale).
- Increased Productivity of Variable Inputs.
 - Increased specialisation.
- · Inventories.
 - Large firms carry smaller inventories as a percentage of sales than can small firms.
- The Cube-Square Law and the Physical Properties of Production.
- Marketing Economies.
 - Spreading advertising costs over larger markets.
 - Reputation effects and umbrella branding.
- R & D
- Purchasing Economies.
 - Cheaper in bulk.

2.5.4 Limits to Economies of Scale

Why not a single mega-firm? Well:

- Rising Labour Costs.
 - Larger firms pay more to their workers.
 - More likely to be unionised?
 - Lower worker turnover at larger firms.
- Incentive and Bureaucracy Effects.
- Spreading Specialised Resources Too Thin.
 e.g. The excellent chef.

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2.5.5 The Learning Curve

The importance of experience, or learning by doing.

Economies of scale: the cost advantages flowing from producing a larger flow of output in a given period.

The *learning curve* (or experience curve): the cost advantages flowing from accumulating experience and know-how.

A *progress ratio* is the ratio of average costs after and before cumulative production increases: AC_2/AC_1 , where AC_2 is the Average Cost at cumulative output Q_2 and AC_1 is the Average Cost at cumulative output Q_1 , where $Q_2 = 2Q_1$.

The median progress ratio is about 0.80, which means that for the typical firm doubling cumulative output reduces unit costs by about 20%.

Such learning and cost reductions may slow and eventually be exhausted.

Learning by doing applies to quality as well as to costs.

2.5.6 The Learning Curve v. Economies of Scale

The former: reductions in unit cost with accumulating experience and production. The latter: reductions in unit cost with a larger scale per period.

Learning economies can be substantial even when economies of scale are minimal:

Economies of scale can be substantial even when learning economies are minimal: e.g. simple capital-intensive activities, such as can manufacturing.

If a large firm has lower unit costs because of economies of scale, then any cutbacks in production will raise unit costs.

If lower costs are the result of learning, then cutbacks do not necessarily result in high unit costs.

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2.6 The Importance of Scale and Scope Economies: Firm Size, Profitability, and Market Structure

Economies of scale and scope provide large firms with an inherent cost advantage.

This encourages small firms to try to grow, but limits the numbers of firms that can successfully compete.

2.6.1 Scale, Scope, and Firm Size

Scale and scope economies give large firms an AC advantage over small firms.

In industries where buyers are price sensitive, large firms can pass along some of their AC advantage to consumers, which drives small (and therefore higher-AC) firms out of business or into niches.

If small firms are to match the low *AC* of large firms, they must grow, through:

- retained earnings,
- · increased equity,
- higher debt
- product portfolio management (Cash Cows v. Rising Stars etc.)
- new product development
- · geographical diversification
- mergers

Corporate mergers may be "synergistic": synergies are economies of scale waiting to be exploited — should a merger be permitted between two large firms which may create some market (or monopoly) power if the merger allows the new firm to achieve substantial efficiencies through economies of scale?

R.E. Marks ECL 2-25 R.E. Marks ECL 2-26

2.6.2 Market Share and Profitability

When economies of scale or scope exist, but only some firms have been able to exploit them, one would expect to find a positive correlation between a firm's market share and its profitability.

Market Share	ROS
< 10%	-0.16%
10%-20%	3.42%
20%-30%	4.84
30%-40%	7.60%
>40%	13.16%

Relationship Between Market Share and Pre-Tax Profit as Percentage of Sale (ROS). (Besanko Table 5.8)

For the 1970s, there was a correlation between market share and profitability.

But a mistake to conclude: *Post hoc, ergo propter hoc.* Correlation is not necessarily causality.

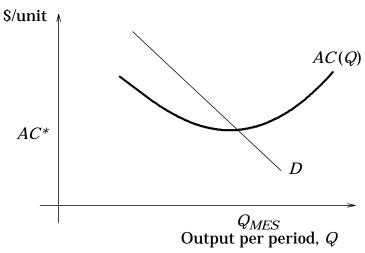
Indeed, the causality may flow from profitability to market share, not vice versa: wrong to believe that a charge for share would result in higher profits, especially when the share is "bought".

Impossible for all kids to be above average: share is a zero-sum game.

2.6.3 Scale, Scope, and Market Structure

Market structure refers to the number and size distribution of the firms in a market.

A key determinant: size of demand relative to the *minimum efficient scale* (MES) of production.



A single firm selling to the whole market can set any price above AC^* and make a profit. If another firm entered the market, it could not drive its costs down as low as the first firm unless it stole away some of its customers.

The most efficient configuration in this industry is for one firm to satisfy all market demand: if two firms split the market at a given price, they would have higher unit costs (AC) than if a single firm supplied the entire market at that price.

Often government-owned or regulated so that a single firm can utilise the economies of scale of lowest *AC* but not abuse its market power.

A rule of thumb for the number of firms that can fit into a market:

let AC^* be the average cost of production at Q_{MES} ; if D^* is the quantity of goods that will be bought when price $P = AC^*$, then the number of firms the market can accommodate is D^*/Q_{MES} .

If the market grows (D^* increases), then more firms can fit into it.

If the MES (Q_{MES}) increases (because of larger plants), then fewer efficient firms will fit into it, cet. par.

This implies: that industries with substantial economies of scale — industries with capital-intensive technologies — may come to be dominated by a few large firms.

Besanko's Table 5.9 shows the market shares controlled by the three largest firms in 12 different industries across six nations.

The higher the market shares of the largest firms, the more *concentrated* the industry.

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Three features emerge from Table 5.9:

- 1. Concentration can vary substantially by industry.
- 2. Concentration levels for a given industry appear comparable across nations.
 e.g. highly concentrated: cigarettes, glass bottles, refrigerators
 e.g. low concentrations: shoes, paints, fabric weaving
 - Suggests that the technology of production is a major determinant of market concentration: highest are capital-intensive, lowest generally not.
- 3. Markets in the U.S.A. tend to be less concentrated; markets in Canada and Sweden are more concentrated.

A much larger market and greater aggregate wealth in the U.S. means that demand is likely to be greater, and so more firms can enter the market, so that the largest firms have a smaller share of the market in the U.S.

Growing populations and incomes in Japan and Europe have allowed their manufacturers to achieve scale economies domestically. This has allowed them to compete on the basis of price with established U.S. firms.

Lower costs of transport and communications and lower tariffs and non-tariff barriers to trade have lowered the costs of international trade, enabling manufacturers access to global markets, further increasing their economies of scale.

The number of firms in a given market in a given country *increasingly depends on how many firms* can fit into the global market.

<i>Industry</i>	Largest four
Tobacco products	100
Petroleum refining	85
Ready mixed concrete	69
Refrigerators & appliances	46
Biscuits	95
Jewellery & silverware	15
Printing & bookbinding	14

Four-firm Concentration Ratios in Australian Manufacturing Industries 1982–83 R.E. Marks ECL 2-30

2.6.3.1 Exogenous v. Endogenous Fixed Costs and Market Structure

FC are not only technological (blast furnaces, jumbo jets, drugs testing programmes) or *exogenous*, beyond the firm's control.

Such things as R&D for product improvement and advertising for brand equity are under the firm's control — *endogenous* — so the firm could choose not to incur them before manufacturing.

The firm will incur these expenditures so long as the marginal benefits exceed the marginal costs of doing so.

For many food products (bread, margarine, soft drinks, pet foods, beer) John Sutton found, using the D^*/Q_{MES} rule of thumb, that one might expect to find many more firms in each food category than exist.

e.g. frozen foods: expect over 100 firms in the U.S. market, but every category dominated by a small number of firms.

Substantial *FC* in establishing brand-name recognition ("brand equity"), so that small to midsize firms make little headway.

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2.6.3.2 The Survivor Principle

The *survivor principle* borrows from evolution's "survival of the fittest" (Spencer, not Darwin).

Just as the fittest species survive in their natural niches, so the fittest firms (the most efficient, with optimum size) survive in their market environments.

Hence industries with significant economies of scale should be dominated by large firms, but ...

To assess the importance of a variety of firm characteristics, including size:

- 1. Classify the firms into the characteristic in question
- 2. Measure performance (e.g., market share, profits) of the firms over time.
- 3. Identify classes of characteristics that show improving performance.

For U.S. brewing (Besanko Table 5.10), a shift away from smaller breweries (ignoring microbreweries), because of increasing economies of scale:

- improvements in refrigeration \rightarrow easier transport \rightarrow large-scale, centralised brewing
- larger cost-effective bottling lines
- advertising has created a nationwide premium brand image

2.7 How Does the Magnitude of Scale Economies Affect the Intensity of Each of the Five Forces?

Barriers to Entry: Economies of scale (EOS) deter entry by forcing an entrant to make a large capital investment or incur large up-front costs and risk strong reaction from exiting firms or accept cost disadvantage.

Internal Industry Rivalry: EOS affect market size and concentrations, which in turn affect the nature of rivalry in the industry.

With EOS, only one or very few large firms will be able to produce at or above MES. Smaller firms will be at a cost disadvantage.

Competition tends to be fiercer when there are only a few firms in the industry. With this market structure, there can be little mistake concerning the relative power of individual firms, as well as who the industry leaders are.

Supplier Power: EOS affect the number of competitors that can compete successfully in any market. If EOS are high, then there are likely to be fewer players, increasing the power of the supplying industry over buyers.

As EOS decline in importance, the supplying industry will have more competitors, increasing the supplier power in downstream industries, which will have more choices and be less threatened by hold-up.

As EOS decline in importance, there will be more firms buying, and the selling industry will be able to play competing buyers against one another for the best deal.

Substitutes: One category of substitute products that deserves the most attention in the five-forces analysis is those that are subject to trends improving their price-performance tradeoff with the designated industry's product: if the manufacturer of a substitute product has achieved EOS, the substitute product will be offered at a much lower price point that the industry's product

e.g. while advertising by one firm in an industry may do little to bolster the industry's position against a substitute, heavy/sustained advertising by all industry players may improve the industry's collective position against the substitute.

2.8 Applying the Five Forces

2.8.1 U.S. Hospital Markets

Over the past fifteen years, U.S. hospital bankruptcies have increased to 1.5% p.a.

ECL 2-34

Internal Rivalry?

Define the market.

Other part sellers: substitutes.

Geographical markets

1980: Fierce internal rivalry or competition?

1996: Fierce internal rivalry or competition?

Entry?

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Magnitude of entry barriers?

Substitutes?

Supplier Power?

Who/What are the main suppliers to hospitals?

Who are the buyers?

Asset specificity? (Relationship-specific investments?)

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Buyer Power?

Who are the buyers?

Hospitals' responses?

Force	Threat to 1980	Profits 1996
Internal Rivalry	Low	High
Entry	Low	Medium
Substitutes	Medium	High
Supplier Power	Medium	Medium
Buyer Power	Low	High

2.8.2 Tobacco

Internal Rivalry?

Fierce internal rivalry?

The margin P/MC as a measure of rivalry.

Reasons?

Entry?

Magnitude of entry barriers?

Substitutes?

Supplier and Buyer Power?

Force	Threat to Profits
Internal Rivalry	Low
Entry	Low
Substitutes	Low
Supplier Power	Low
Buyer Power	Low

Recent developments outside the five-force framework?

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2.8.3 Photocopiers

History and development of today's technology.

Rivals?

Internal Rivalry?

Consumers: price, speed, reliability, service.

Margins: copiers, supplies

Market segments?

Entry?

Magnitude of entry barriers? R&D, service networks.

Substitutes?

Buyer Power?

Who are the buyers?

Dealers and manufacturers.

Supplier Power?

Force	Threat to Profits
Internal Rivalry	Medium to Low
Entry	Low
Substitutes	Low
Supplier Power	Low
Buyer Power	Medium (growing?)

2.8.4 Commercial Banking

History and development of today's industry.

Internal Rivalry?

Markets for mortgages, commercial loans.

Credit cards.

Deregulation.

Entry?

Magnitude of entry barriers?

Substitutes?

Supplier Power and Buyer Power?

Force	Threat to Profits
Internal Rivalry	High
Entry	High
Substitutes	High
Supplier Power	(Government)
Buyer Power	Low

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2.9 Comment on the following: All of Porter's wisdom regarding the five forces is reflected in the economic identity:

Profit = (Price - Average Cost) × **Quantity**

2.10 It has been said that Porter's five-forces analysis turns antitrust law — law intended to protect consumers from monopolies — on its head. What do you think this means?

R.E. Marks ECL 2-40

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