

Managerial Economics & Business Strategy

Chapter 7

The Nature of Industry



Overview

I. Market Structure

- Measures of Industry Concentration

II. Conduct

- Pricing Behavior
- Integration and Merger Activity

III. Performance

- Dansby-Willig Index
- Structure-Conduct-Performance Paradigm

IV. Preview of Coming Attractions

Industry Analysis

- Market Structure: factors that affect managerial decisions
 - Number of firms and firm size.
 - Industry concentration. How to measure?
Four-firm concentration ratio: $C=(S1+S2+S3+S4)/4$
Herfindahl-Hirschman Index
 - Technological and cost conditions.
 - Demand conditions.
Rothschild Index:
 - Ease of entry and exit.

Industry Analysis

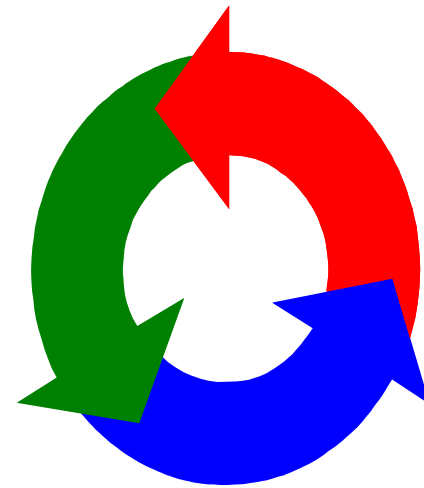
- Conduct
 - Pricing.
Lerner Index
 - Advertising.
 - R&D.
 - Merger activity.
- Performance
 - Profitability.
 - Social welfare.
Dansby-Willig Performance Index

Approaches to Studying Industry

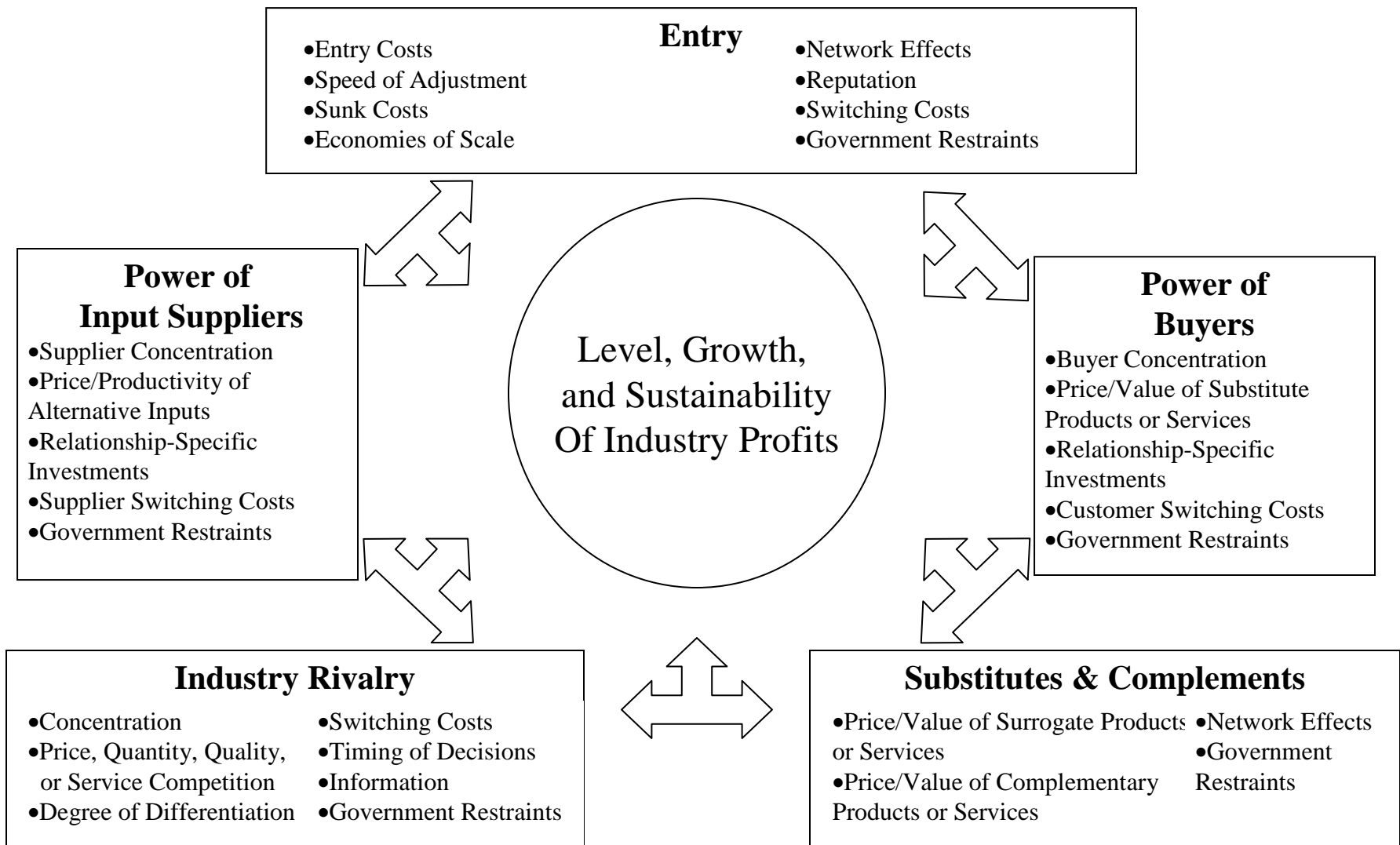
- The *Structure-Conduct-Performance (SCP)* Paradigm: Causal View



- The *Feedback Critique*
 - No one-way causal link.
 - Conduct can affect market structure.
 - Market performance can affect conduct as well as market structure.



Relating the Five Forces to the SCP Paradigm and the Feedback Critique



Industry Concentration

- Four-Firm Concentration Ratio
 - The sum of the market shares of the top four firms in the defined industry. Letting S_i denote sales for firm i and S_T denote total industry sales

$$C_4 = w_1 + w_2 + w_3 + w_4, \text{ where } w_i = \frac{S_i}{S_T}$$

- Herfindahl-Hirschman Index (HHI)
 - The sum of the squared market shares of firms in a given industry, multiplied by 10,000: $HHI = 10,000 \times \sum w_i^2$, where $w_i = S_i/S_T$.

Example

- There are five banks competing in a local market. Each of the five banks have a 20 percent market share.
- What is the four-firm concentration ratio?

$$C_4 = 0.2 + 0.2 + 0.2 + 0.2 = 0.8$$

- What is the HHI?

$$HHI = 10,000 \left((.2)^2 + (.2)^2 + (.2)^2 + (.2)^2 + (.2)^2 \right) = 2,000$$

TABLE 7-1 The Largest Firms in Selected Industries

Industry	Largest Company	Sales (millions of dollars)
Aerospace	Boeing	50,485
Apparel	Nike	10,697
Beverages	Coca-Cola	21,044
Building materials, glass	Owens Corning	4,996
Chemicals	Dow Chemical	32,632
Commercial banks	Citigroup	94,713
Computer, office equipment	IBM	89,131
Electronics, electrical equipment	Emerson Electric	13,999
Food production	Archer Daniels Midland	30,708
Forest and paper products	International Paper	25,200
Furniture	Leggett & Platt	4,388
Household and personal products	Procter & Gamble	43,377
Industrial and farm equipment	Caterpillar	22,763
Metals	Alcoa	21,728
Mining, crude-oil production	Occidental Petroleum	9,326
Motor vehicles and parts	General Motors	195,645
Petroleum refining	Exxon Mobil	213,199
Pharmaceuticals	Pfizer	45,950
Publishing and printing	Gannett	6,711
Scientific, photographic, and control equipment	Eastman Kodak	13,317
Textiles	Mohawk Industries	5,005
Tobacco	Altria Group	60,704
Toys, sporting goods	Mattel	4,960
Transportation equipment	Harley-Davidson	4,904

Sources: Fortune 500 List (April 5, 2004); Company 10-Ks; and author's calculations.

TABLE 7-2 Four-Firm Concentration Ratios and Herfindahl-Hirschman Indexes for Selected U.S. Manufacturing Industries

Industry	C_4	HHI
Breakfast cereals	83	2,446
Breweries	90	N/A
Cookies and crackers	60	1,383
Distilleries	60	1,076
Electronic computers	45	728
Fluid milk	21	205
Games and toys	43	564
Household refrigerators and home freezers	82	2,025
Jewelry (excluding costume)	13	81
Luggage	52	1,419
Men's and boys' clothing	42	846
Motor vehicles	82	2,506
Pens and mechanical pencils	65	1,375
Ready-mixed concrete	7	29
Semiconductors	34	414
Snack foods	63	2,619
Soap and detergent	65	1,618
Soft drinks	47	800
Tires	73	1,814
Women's and girls' clothing	14	111
Wood containers and pallets	6	16

Source: Concentration Ratios in Manufacturing, U.S. Bureau of the Census, 1997.

Limitation of Concentration Measures

- Market Definition: National, regional, or local?
- Global Market: Foreign producers excluded.
- Industry definition and product classes.

Measuring Demand and Market Conditions

- The Rothschild Index (R) measures the elasticity of industry demand for a product relative to that of an individual firm:

$$R = E_T / E_F .$$

- E_T = elasticity of demand for the total market.
 - E_F = elasticity of demand for the product of an individual firm.
 - The Rothschild Index is a value between 0 (perfect competition) and 1 (monopoly).
- When an industry is composed of many firms, each producing similar products, the Rothschild index will be close to zero.

Own-Price Elasticities of Demand and Rothschild Indices

<i>Industry</i>	<i>Elasticity of Market Demand</i>	<i>Elasticity of Firm's Demand</i>	<i>Rothschild Index</i>
Food	-1.0	-3.8	0.26
Tobacco	-1.3	-1.3	1.00
Textiles	-1.5	-4.7	0.32
Apparel	-1.1	-4.1	0.27
Paper	-1.5	-1.7	0.88
Chemicals	-1.5	-1.5	1.00
Rubber	-1.8	-2.3	0.78

Market Entry and Exit Conditions

- Barriers to entry
 - Capital requirements.
 - Patents and copyrights.
 - Economies of scale.
 - Economies of scope.

Conduct: Pricing Behavior

- The Lerner Index

$$L = (P - MC) / P$$

- A measure of the difference between price and marginal cost as a fraction of the product's price.
- The index ranges from 0 to 1.
 - When $P = MC$, the Lerner Index is zero; the firm has no market power.
 - A Lerner Index closer to 1 indicates relatively weak price competition; the firm has market power.



Markup Factor

- From the Lerner Index, the firm can determine the factor by which it should over MC. Rearranging the Lerner Index

$$P = \left(\frac{1}{1-L} \right) MC$$

- The markup factor is $1/(1-L)$.
 - When the Lerner Index is zero ($L = 0$), the markup factor is 1 and $P = MC$.
 - When the Lerner Index is 0.20 ($L = 0.20$), the markup factor is 1.25 and the firm charges a price that is 1.25 times marginal cost.

Lerner Indices & Markup Factors

<i>Industry</i>	<i>Lerner Index</i>	<i>Markup Factor</i>
Food	0.26	1.35
Tobacco	0.76	4.17
Textiles	0.21	1.27
Apparel	0.24	1.32
Paper	0.58	2.38
Chemicals	0.67	3.03
Petroleum	0.59	2.44

Integration and Merger Activity

- Vertical Integration
 - Where various stages in the production of a single product are carried out by one firm.
- Horizontal Integration
 - The merging of the production of similar products into a single firm.
- Conglomerate Mergers
 - The integration of different product lines into a single firm.

DOJ/FTC Horizontal Merger Guidelines

- Based on $HHI = 10,000 \sum w_i^2$, where $w_i = S_i / S_T$.
- Merger may be challenged if
 - HHI exceeds 1800, or would be after merger, and
 - Merger increases the HHI by more than 100.
- But...
 - Recognizes efficiencies: “The primary benefit of mergers to the economy is their efficiency potential...which can result in lower prices to consumers...In the majority of cases the *Guidelines* will allow firms to achieve efficiencies through mergers without interference...”

Performance

- Performance refers to the profits and social welfare that result in a given industry.
- Social Welfare = CS + PS
 - Dansby-Willig Performance Index measure by how much social welfare would improve if firms in an industry expanded output in a socially efficient manner.

Dansby-Willig Performance Index

<i>Industry</i>	<i>Dansby-Willig Index</i>
Food	0.51
Textiles	0.38
Apparel	0.47
Paper	0.63
Chemicals	0.67
Petroleum	0.63
Rubber	0.49

Preview of Coming Attractions

- Discussion of optimal managerial decisions under various market structures, including:
 - Perfect competition
 - Monopoly
 - Monopolistic competition
 - Oligopoly

Conclusion

- Modern approach to studying industries involves examining the interrelationship between structure, conduct, and performance.
- Industries dramatically vary with respect to concentration levels.
 - The four-firm concentration ratio and Herfindahl-Hirschman index measure industry concentration.
- The Lerner index measures the degree to which firms can markup price above marginal cost; it is a measure of a firm's market power.
- Industry performance is measured by industry profitability and social welfare.

Additional Review

- Baye's Text, pages 260-265
Question #1, 2, 4, 7, 9, 11, 12, 14, 15, 18
- Chapter 3
Demonstration Problems 1, 2, 3, 4
- Math Review
Ratio and Fractions