Industrial Economics is concerned with the activities and policies (including prices, advertising, and product quality) of business firms toward suppliers, incumbent rivals, potential entrants, customers, and substitute products (i.e., Michael Porter’s Five Forces) in different market settings. Put simply, it is the area of economics that studies the way markets work. It analyzes the behavior of firms in competitive and non-competitive markets. Effective competition makes markets perform well, monopoly power impairs industrial performance. Because competition is a process as well as a state, it is important to maintain diversity through independence to keep the competitive process working and the competitive state fluid. Competitive markets lead to the maximization of societal welfare through static allocative efficiency and dynamic innovation. That is, competition lowers quality-adjusted output prices, expands output, forces firms to operate efficiently, increases product and supplier options, promotes technological innovation, and increases societal welfare. Industrial economists have developed generally accepted principles applicable to all markets, all industries, and all economies. The central questions addressed by industrial economics are (1) Is there market power and if so, how do you measure it? (2) How do firms acquire and maintain market power? (3) What are the implications of market power? (4) What is the role for public policy as regards market power?

To do a complete analysis of an industry, market, or economy, there is a three-part paradigm consisting of market structure, conduct, and performance sometimes used by industrial economists. With this model, an independent investigator can assess whether sufficient market power exists for any firm or groups of firms to complete successfully any challenged market conduct abuse. The market structure of an industry is concerned with the number and size distribution of buyers and sellers (concentration ratios), the nature of the product (differentiated or homogeneous), and conditions of entry (cost structure and barriers to entry). Market conduct is the pricing behavior (independent or collusive), the product strategy and policy (independent or collusive), and the promotional activities, (advertising, research, and development) operating within the market. Market performance is the productive and allocative efficiency (price, cost, and profit levels and trends) and the industry progressivity (technological change) of the market. While industrial economics has traditionally emphasized the causal flows running from exogenous market structure and/or the exogenous basic conditions to conduct and performance, there are important feedback effects from performance to structure (e.g., high profits from efficiency increase market share and affect structure), performance to conduct (reinvested monopoly profits can finance greater R&D, advertising, or predation and low profits encourage collusion), and from conduct to structure (R&D, mergers, predation, strong product differentiation, advertising, and patents affect structure). These feedback effects suggest that market structure and the basic conditions are endogenous (i.e., determined within the whole system of relationships and not fixed by outside forces).

In industrial economics, a new paradigm has not yet been accepted to fill the void from the retreat of the traditional structure-conduct-performance approach. In fact, one approach suggests the economic institutions of the firm, the market, and the industry, are too complex to be used in a single, simple model. The literature in industrial economics has developed in several different directions in recent years. These developments include: (1) emphasizing the importance of property rights, institutional structure, and transaction costs in determining the boundaries of economic organization; (2) using game-theoretic models to analyze strategic interactions of firms under various assumptions as to the information available to the involved economic entities; and (3) applying the insights of the economic theory of regulation and public choice to the analysis of the purposes and effects of public policies toward business. Integrating these diverse approaches into a unified whole is a complex task. There are three basic approaches: (1) Traditional School—Market power exists and is a problem; (2) Chicago School—Market power does not exist; and (3) Austrian School—Market power exists and it is good for it is a precondition for technical progress.

This course includes topics such as structure, conduct, and performance in relevant product and geographic markets; the nature, background, significance and issues in public policy with emphasis on federal and state public utility and antitrust regulation; technological change; industry studies; and the three recent developments described previously. As such this course has two aims: an understanding of the tools of IE analysis and an ability to apply these tools to specific situations. An understanding of the text should give adequate understanding of the tools of analysis. While we do some review at the beginning of the course, it is expected that everyone has a working knowledge of undergraduate price theory.

**Prerequisite for this course:** ECON 4010

TABLE 1: DECISION-MAKING ALGORITHM FOR MAXIMIZING PROFITS IN ALL MARKET STRUCTURES WHETHER MONOPOLY OR COMPETITION:

Output \( n \) is a unique profit maximizing level of output if:

1. **Short run:**
   \[ TR_n \geq TVC_n, \quad (= P_n \geq AVC_n) \]

2. **Long run:**
   \[ TR_n \geq TC_n, \quad (= P_n \geq LAC_n) \]

3. **MR_{n-1} > MC_{n-1},** where \( n-1 \) represents in general outputs smaller than \( n \),
   \[ MR_{n-1} > MC_{n-1}, \quad (= P_{n-1} > AVC_{n-1}) \]
   
   \[ MR_{n+1} < MC_{n+1}, \quad (= P_{n+1} < AVC_{n+1}) \]

*This table assumes that all fixed costs (i.e., costs that do not vary in total with output) are sunk costs (i.e., costs that are not recoverable). If only a portion of fixed costs are sunk costs, all the rules in Table 1 and 2 change from "variable" costs to "avoidable" or nonsunk costs ((i.e., the sum of variable costs and the recoverable (nonsunk) part of fixed costs)).

For example, if TC = $180, and TFC = total sunk cost = $100, then the firm should produce if TR > $80 (= TVC).

If TC = $180, TFC = $100, TVC = $80, but total sunk costs = $40, then the firm should produce if TR > $140 (= $80 of variable costs + $60 of recoverable fixed costs = NSFC). TFC = TSC (= total sunk costs) + TNSC (= total nonsunk costs). Thus, TC = TSC + TNSC.

<table>
<thead>
<tr>
<th>SHORT RUN</th>
<th>LONG RUN</th>
</tr>
</thead>
<tbody>
<tr>
<td>( PS = TR - TNSC ), if all fixed costs are sunk, ( PS = TR - TVC )</td>
<td>( PS = TR - TC )</td>
</tr>
<tr>
<td>( \Pi) = TR – TC, Therefore, ( PS &gt; \Pi)</td>
<td>( \Pi) = TR – TC</td>
</tr>
<tr>
<td>( PS = \Pi + TSC (= \Pi + TFC ) if all fixed costs are sunk)</td>
<td>Therefore, ( PS &gt; \Pi), if constant cost industry, if increasing cost industry, ( PS &gt; \Pi)</td>
</tr>
<tr>
<td>Example if all fixed costs are sunk, TR = 200, TC = 180, TVC = 80, TFC = 100</td>
<td></td>
</tr>
<tr>
<td>( \Pi) = TR – TC = 200 – 180 = 20</td>
<td></td>
</tr>
<tr>
<td>( PS = TR - TVC = 200 - 80 = 120 )</td>
<td></td>
</tr>
<tr>
<td>( PS = \Pi + TFC = 20 + 100 = 120 )</td>
<td></td>
</tr>
</tbody>
</table>

TABLE 2

A. ECONOMIC COMPARISONS

1. Microeconomics V. Macroeconomics
2. Positive V. Normative
3. Theory V. Tautology – map
4. Exogenous (given) V. Endogenous (determined within the model)
5. Explanation V. Prediction
6. Equity V. Efficiency (Pareto)
7. Nominal Value V. Real Value
8. Demand V. Supply
9. Implicit Costs V. Explicit Costs V. Total Costs
10. Accounting V. Economics Costs
11. Avoidable (Recoverable or Nonsunk Costs) V. Nonavoidable (Nonrecoverable or Sunk) Costs
12. Fixed Costs = Sunk Costs + Nonsunk Costs
13. Competition V. Noncompetition
14. Equilibrium V. Constrained Optimization V. Comparative Statics
15. Average V. Marginal V. Total
16. Markets V. Government
17. Production Possibility Curve V. Paradise
19. (a) Ceteris Paribus; (b) De gustibus non disputandum est; (c) TANSTAAFL; (d) Passionate Irrationality for Dispassionate Rationality (e) Behavioral Economics
PARADIGM - Theme and Counterpoint - Hat Rack - Filing System

BASIC CONDITIONS - exogenous
Consumer Demand
Price elasticity of demand
Substitutes
Seasonality
Rate of market growth
Location
Lumpness of order
Method of purchase
Type of goods

STRUCTURE (S)
Number and size of buyers and sellers
Barriers to entry (roasts), exit, and upward
mobility of new firms
Minimum Efficient Scale (MES)
Scale economies
Scope economies
Product differentiation
Vertical integration
Diversification
Expansion

CONDUCT (C)
Advertising
Research and development
Pricing behavior – price discrimination
Plant Investment
Legal tactics and strategy
Product choice
Collusion
Merger and contracts
Plant investment
Strategic behavior

PERFORMANCE (F)
STATIC
Production efficiency
Allocative efficiency
Profits, Price
Equity
Product quality
Technical progress
DYNAMIC

GOVERNMENT POLICY (G)
Regulation
Antitrust
Taxes and subsidies
Investment incentives
Employment incentives
Macroeconomic policies
Price controls
Wage regulation

Figure 1.1 Structure, Conduct, and Performance: Morphology - Science of Structure
1. The central questions addressed by industrial economics are
   a. Is there market power and if so, how do you measure it?
   b. How do firms acquire and maintain market power?
   c. What are the implications of market power?
   d. What is the role for public policy as regards market power?

2. Troika: theory, empirical, and policy

3. Linkages and Feedbacks

   \[ \text{S} \rightarrow \text{C} \rightarrow \text{P} \]

   S→P traditional—e.g., high sellers’ concentration→high profits
   C→S R&D, mergers, patents, strong product differentiation→high sellers’ concentration
   P→C low profits→collusion
   P→S Chicago school high profits→high sellers’ concentration

4. Traditional School—Structure Conduct Performance (SCP)
   a. Measurement without theory
   b. Market power exists and is a problem.
   c. Emphasizes firms and not industries and emphasizes dynamic over static efficiency.

5. Chicago School
   a. Theory without measurement.
   b. Price theory and game theory
   c. Chicago School shows “tight prior” is the purely competitive model can be used to explain all persistently observed behavior in real world markets. Government causes monopoly.
   d. Market power does not exist
   e. Profits are the result of efficiency and advertising and not barriers to entry, and information tends to lower price.

6. Austrian School—Whereas a Chicago economist would argue that market power does not exist, the Austrian School, led by its greatest exponent, J. Schumpeter, would rather say that market power exists—and it's a good thing that it does, for market power is a precondition for technical progress.

7. Michael Porter’s Five Forces—An incumbent business firm faces these 5 forces: (1) its suppliers, (2) its rivals, (3) its customers, (4) its potential entrants, and (5) its substitute products

8. Transactions Costs, i.e., the costs of trading with others and using the market, besides price, such as writing and enforcing contracts.
   a. Uncertainty, frequency, and asset specificity
   b. Bounded rationality, opportunism

9. Contestable Markets
Contestable
Perfectly contestable market
1) No entry or exit costs (no sunk costs)—free entry
2) Potential entrant has access to same technology as incumbent (i.e., existing firm)
3) Incumbent has a one period lag before it can adjust its price—so absolute entry in sense entrant can get 100% market share.
4) Price is equal to MC, and long-run profits are zero. The structure is such that the number of firms
\[(\text{NF}) = \frac{\text{Market Demand}}{\text{MES}}\]

### TABLE 1 - CONTESTABILITY ASSUMPTION

The theory-of-perfectly contestable markets yields results that are strictly static and refer to long-run market equilibrium. For these results to be produced:

1. either incumbents must believe that potential entrants make the decision to enter on the assumption that incumbents' prices are fixed, or at least could not be changed before an entrant could (costlessly) exit;
2. or incumbents must believe that potential entrants could protect themselves from retaliation by signing long-term contracts before entry;
3. incumbents must believe that an entrant could capture the entire market with a slight price cut;
4. sunk costs must be completely absent;
5. the cost of financial capital must be the same for entrants and incumbents;
6. products must be absolutely standardized.


A. **Exogenous Sunk Costs**
   a. **Homogenous products**—price competition only
      
      (1) Three forms of the game: Bertrand, Cournot, and Cartel
      
      (2) Intuitive—An increase in market size (S) leads to decrease in concentration (CR), except for Bertrand.
      
      (b) That is, \( CR = \alpha - ln \frac{S}{MES} \), where \( MES \) = minimum efficient scale
      
      (3) Counterintuitive—Given market size \( S \), the tougher is competition, the higher is concentration (CR) —as the low prices from competition discourages entry.

   b. **Heterogeneous products**—The results are not so simple, as with homogeneous goods, but the toughness of competition decreases as there is more product differentiation.

      (1) While it depends on the nature of the good, in general, competition diminishes compared to when there are homogeneous goods.

B. **Endogenous Sunk Costs**
   a. Firms compete on quality (Q) as firms decide on size of investment and not just on
b. An increase in quality (Q) increases fixed and maybe marginal costs and attracts customers away from lower quality products.

c. The increase in a firm’s quality (Q) leads to an increase in firm’s size (S).

d. An increase in market size (S) leads to an increased in market quality (Q).

e. A high quality (Q) keeps market concentration (CR) high.

f. The precise results depend critically on the form of the game, i.e., whether Bertrand, Cournot or Cartel.

Table 1
The Porter Competitive Framework

<table>
<thead>
<tr>
<th>Suppliers</th>
<th>Intramarket</th>
<th>Customers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rivalry</td>
<td></td>
</tr>
<tr>
<td>Potential</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entrants</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Threat of new entrants</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bargaining power of suppliers</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Substitute Markets</td>
<td></td>
</tr>
<tr>
<td>Threat of substitute products or services</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bargaining power of buyers</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
(1) The modern theory of the firm builds on Coase’s observations that the firm and the market are two alternative ways, each with different costs, of organizing production.

(2) The advantages of the market include aggregating demands of small firms to get economies of scale and scope and reduced production costs through reduced risk.

(3) High transactions costs lead to internal production based on frequency, uncertainty, and asset specificity.

### Table 3: Four Basic types of corporate action analyzed in industrial organization

<table>
<thead>
<tr>
<th>Level</th>
<th>Type</th>
<th>Efficiency (E)</th>
<th>Strategy (S)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production (P)</td>
<td>Efficiency in production (EP)</td>
<td>Strategy in production (SP)</td>
<td></td>
</tr>
<tr>
<td>Organization (O)</td>
<td>Efficiency in organization (EO)</td>
<td>Strategy in organization (SO)</td>
<td></td>
</tr>
</tbody>
</table>

### Table 4: Theoretical Limitations of the Competitive Price System

1. Consumer Sovereignty
2. Public goods
3. Increasing Returns to Scale
4. External Effects – i.e.
   (a) private costs and social costs are not equal and/or
   (b) private benefits and social benefits are not equal
5. Equity and Income Distribution
6. Other Economic Criteria—e.g., growth and stability
7. Dynamics. No advertising, change in technology, consumer preferences, or price strategies
8. Ethical, Political, and Societal Considerations
9. "Second Best" Analysis
10. Information Costs. Assumes Perfect Information
11. If the products are Bads not Goods
12. Countervailing Power--Buyer Power

### Table 5

**MONOPOLY POWER**

1. Price > Marginal Cost
2. Long run profit > 0

**MARKET POWER**

1. Price > Marginal Cost
2. Long run profit = 0

Unilateral

Collusion

---

TABLE 2: \( MR = P - P/\eta \), where \( \eta \) = absolute value of price elasticity of demand, \( MR = \text{Marginal Revenue} \), 
\( MC = \text{Marginal Cost} \)

\[ P = MC \frac{\eta}{\eta - 1} \]

- \( \eta = 1 \Rightarrow MR = 0 \)
- \( \eta > 1 \Rightarrow MR > 0 \)
- \( \eta < 1 \Rightarrow MR < 0 \)

EXAMPLE: If \( \eta = 2 \), and \( P = 2MC \)

If \( \eta = 10 \), \( P = 1.1MC \)

If \( \eta = \infty \), \( P = MC \)
MAJOR ELEMENTS OF INDUSTRIAL STRUCTURE

A. Size distribution of firms.
   1. At any one time.
   2. Over time.
      a. Entry to and exit from the industry.
      b. Stability of share and rank.

B. Nature of selling (customer) markets.
   1. Geographical boundaries.
      a. Local
      b. Regional
      c. National
      d. International
   2. Product boundaries.
   3. Problems in defining the market.
   4. Monopsonistic power of customers.

C. Nature of buying (supplier) markets.
   1. Monopsonistic and monopolistic power.
   2. Reliability of sources of supply.
   3. Vertical integration as an alternative to market exchange.

D. Nature of products.
   1. Consumer or producer of goods.
   2. Homogeneous or differentiable products.
   3. Perishable or durable goods.

E. Product diversification within firms.
   1. Corporate size and economic power.
   2. Advantages of product diversity.
      a. Tie-ins and reciprocal dealing.
      b. Mutual forbearance.
      c. Multimarket concept.

F. Barriers to entry, mobility, and exit.
   1. Natural barriers to entry.
      a. Economies of scale relative to size market.
      b. Nonduplicable resources.
   2. Artificial barriers to entry.
      a. Public.
      b. Private.
         (1) Foreclosure.
         (2) Product differentiation.
         (3) Capital cost and access.
         (4) Imposition of higher cost.
   3. Barriers to mobility.
   4. Barriers to exit.

G. Nature of costs.
   1. Absolute levels.
   2. Economies of scale and scope: real and pecuniary.
   3. Ratios of fixed to variable costs.

H. Nature of demand.
   1. Elasticity.
      a. For the product.
      b. Facing the individual seller.
   2. Stability.
   3. Underlying rate of growth or decline.

I. The technological base.

J. Externalities.
   This outline contains considerable overlap and duplication. As examples, the extent to which a product is durable or perishable is a major determinant of the stability of demand for it, and absolute cost advantages may represent a significant barrier to entry. But each of the items merits discussion in its own right.
## SUMMARY OF SOME MARKET MODELS

### A. SELLERS’ SIDE

<table>
<thead>
<tr>
<th>Model</th>
<th>Number of Firms</th>
<th>Freedom of Entry</th>
<th>Type of Product</th>
<th>Example in the United States</th>
<th>Short-Run Profit</th>
<th>Long-Run Profit</th>
<th>Price-Marginal Cost Markup</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. PERFECT COMPETITION</td>
<td>Many</td>
<td>Very Easy</td>
<td>Homogeneous</td>
<td>Wheat Computer Chips Gold</td>
<td>+,0,-</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2. MONOPOLISTIC COMPETITION</td>
<td>Many</td>
<td>Relatively Easy</td>
<td>Differentiated</td>
<td>Pens Books Paper</td>
<td>+,0,-</td>
<td>0</td>
<td>+</td>
</tr>
<tr>
<td>3. OLIGOPOLY</td>
<td>Few</td>
<td>Difficult</td>
<td>Either Homogeneous or Differentiated</td>
<td>Clothing Steel Light Bulbs Autos Cereal</td>
<td>+,0,-</td>
<td>+(or 0)</td>
<td>+</td>
</tr>
<tr>
<td>4. PURE MONOPOLY</td>
<td>One</td>
<td>Barred</td>
<td>Unique</td>
<td>Public Utilities Postal Service</td>
<td>+,0,-</td>
<td>+(or 0)</td>
<td>+</td>
</tr>
<tr>
<td>5. PERFECTLY CONTESTABLE</td>
<td>Few or Many</td>
<td>Ultra Easy Entry &amp; Exit</td>
<td>Either Homogeneous or Differentiated</td>
<td>Airlines</td>
<td>+,0,-</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

### B. BUYERS’ SIDE

<table>
<thead>
<tr>
<th>Model</th>
<th></th>
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<tbody>
<tr>
<td>6. PERFECT COMPETITION</td>
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<tr>
<td>7. MONOPSONISTIC COMPETITION</td>
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<td>8. OLIGOPSONY</td>
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<td></td>
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<tr>
<td>9. PURE MONOPSONY</td>
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</table>

The late Nobel laureate George Stigler and others criticized the Chamberlin model on a variety of grounds. First of all, there is the difficulty of defining what is meant by the amorphous concept of an “industry group.” From a methodological perspective, Stigler joined Milton Friedman in arguing that a theory should be judged not by the descriptive accuracy of its assumptions, but by its ability to predict responses to changes in the economic environment. Stigler believed that Chamberlin’s theory significantly complicates the theory of perfect competition, without appreciably altering its most important predictions. But the most telling criticism of the Chamberlin model is not that it too closely resembles the competitive model, but that in at least one very important respect it does not depart sufficiently from it.
A. Oligopoly Theories of:

1. Cournot, 1838, conjectural variation as to quantity is zero. Market power is a function of the number of firms, market demand, product differentiation, capacity, capital costs.

2. Bertrand, 1883, conjectural variation as to price is zero without capacity constraint. Bertrand Paradox is that Price = marginal cost even if only two firms, but not robust to product differentiation, nonconstant costs, and capacity limits.

3. Edgeworth, 1897, conjectural variation as to price is zero with capacity constraint.

4. Forchheimer, 1908, early residual demand model.

5. Hotelling, 1929, linear location model.

6. Chamberlin, 1933, interdependence recognized.


8. Sweezy, 1938, kinked demand, price rigidity model.

9. Cartel and price leadership models, 1930s.

10. Von Neumann-Morgenstern, 1944, first game theory.

11. Neogame Theory, 1980s, includes prisoner’s dilemma.

B. Cournot-Bertrand-Nash Equilibrium Model

1. A Nash equilibrium requires each firm to choose a strategy that maximizes its profits given the strategy of its rival.

2. In the Cournot model of duopoly, each firm selects its profit-maximizing output assuming that the output of its rival is constant. As compared to the cooperative solution, in a Nash equilibrium, the price is lower and total output is higher with two Cournot competitors.

3. In the Bertrand model of duopoly, each firm selects a price. In a Nash equilibrium, price equals marginal cost and falls abruptly to marginal cost when the number of sellers increases from one to two.

4. a. Observations on prices appear to fit the predictions of the Cournot model more closely than those of the Bertrand model.

   b. The standard Bertrand and Cournot models reach the same conclusion if: N (the number of firms) = one (i.e., monopoly) or N = infinity (i.e., pure competition).

5. The Cournot theory of oligopoly pertains to firms that make a single, once-and-for-all decision on output. The Cournot equilibrium outcome is a natural focal point for firms that fully understand that they are simultaneously choosing output on an once-and-for-all basis and have full confidence in the rationality of their rival.
We can reconcile the different predictions made about industry equilibrium in the Cournot and Bertrand models in two ways. First, the Cournot model can be thought of as pertaining to long-run capacity competition, while the Bertrand model can be thought of as pertaining to short-run price competition for firms with sufficient capacity to satisfy market demand. Cournot is a better model if quantity or capacity is hard to adjust. Bertrand is a better model if price is hard to adjust. Cournot is a simultaneous move, quantity choice game of imperfect information (any simultaneous move game is imperfect information). Second, the two models make different assumptions about the expectations each firm has about its rivals’ reactions to its competitive moves.

Two products are horizontally differentiated when some consumers regard one as a poor substitute for the other, while other consumers have the opposite opinion. Horizontal differentiation refers to differences between brands based on different product characteristics, but not on different over-all quality. Vertical differentiation refers to differences in the actual quality of two brands.

In a Bertrand equilibrium with differentiated products, equilibrium prices generally exceed marginal cost. When horizontal product differentiation between the firms is significant, the gap between prices and marginal costs can be substantial.

Each firm faces a downsloping residual demand curve. With Bertrand each firm faces a perfectly elastic demand at the price quoted by a rival. So for a Bertrand firm a price decrease is always profitable if $P > MC$. A Bertrand firm must end up with $P_x = P_r = MC$ which is a Nash equilibrium. The Bertrand model has been criticized because (1) if the products are homogeneous would not the firm’s focus be on quantity and not price? and (2) why would the market be divided equally?

A consistent conjecture is if rivals’ behavior is as predicted at or near equilibrium, e.g., Cournot & Bertrand or if conjectures about rivals’ behavior that a firm uses to make its own decisions are those implied by rival’s reaction function. Cournot assumes 0 but really -1/2 sloped reaction function (if constant $MC$ and no product differentiation)

**C. ASSUMPTIONS OF MOST OLIGOPOLY MODELS**

1. Only price and quantity not advertising are modeled
2. Homogeneous products
3. No entry
4. No capacity constraints (except for Edgeworth)
5. Static, single period models
6. Identical and constant marginal costs
7. Perfect information
8. Linear demand
9. The buyers are pure competitors who collectively pay $P > MC$

**D. GAME THEORY DEFINITIONS AND RESULTS**

1. Game theory is the study of strategic interaction between players = interactive decision theory = theory of strategic rivalry. Game theory is a bad name like imaginary numbers such as $x^2 = -1$ which are used in electrical engineering. Thus, game theory is the branch of economics concerned with the analysis of optimal decision makers who are presumed to be rational, and each is attempting to anticipate the actions and reactions of its competitors. It involves a competitive situation where 2 or more players pursue their own interests and no player can dictate the outcome.

2. Game theory is how interdependent decision makers make choices including players, actions, information, strategies, payoffs, outcomes, and equilibria. (Players, actions and outcomes are called the rules.)

3. Single period - only 1 period in game (1 year, etc.)
4. Repeated games - Repeated for X amount of periods
5. Super games - Repeated for infinite periods
6. Nature - a nonplayer who takes random actions
7. Static - both players move simultaneously – means imperfect information
8. Dynamic - players take turns moving sequentially (and a player may not have an advantage if he moves first).
9. A Nash equilibrium (NE) exists if all the players are doing the best they can, given the choices of their rivals and relies on the rationality of each player. In simple zero-sum games the minimax strategy is a dominant solution to the game. The dominant solution to the classic prisoner's dilemma game results a nonoptimal solution for the players. In a game of mixed strategy there is no NE or NE is unstable as profit is same regardless of strategies. There is little incentive to maintain the equilibrium. Furthermore, in the mixed strategy equilibrium, both players are indifferent between playing their mixed strategy equilibrium and any other strategy. In sequential games, the players take turns moving instead of moving simultaneously. In dynamic games, players take turns moving.

10. It is important to understand the information structure of a game. Nature is a nonplayer who takes random actions. In a game of perfect information each player knows every move that has been made by the other players before taking any action. In games of complete information, nature does not move first or nature's first move is observed by all the players. In a game of certain information, nature never moves after another player moves. In a game of symmetric information all players have exactly the same information when each moves. A game is cooperative if the parties can communicate and arrange binding contracts.

11. Dominant strategy (DS) A DS is strategy that outperforms all other strategies no matter what strategy an opponent selects
   a. All DSs are Nash Equilibrium (NE), but some games without a DS can have more than one NE
   b. The DS for all zero sum games is minimax strategy
Single and repeated games—end up in competitive solution or defect if \( N \) (the number of firms) > 1

Super Game - may be competitive (defect) or monopoly corporate result

Robert Axelrod—contest for game theory

Rapaport—won with the shortest theory

Tit-for-tat strategy - Cooperate on the first move—then do whatever rival did in the previous move

While in head-to-head battles, detect always wins, the most money is made by tit-for-tat strategy. Some degree of niceness gets better results for the doer

trigger vs grim strategy.

A prisoners’ dilemma game illustrates the conflict between self-interest and collective interest. The dominant solution to the classic prisoner's dilemma game results in a nonoptimal solution for the players. In the Nash equilibrium of a prisoners’ dilemma game, each player chooses a “non-cooperative” action, even though it is in the players' collective interest to pursue a cooperative action.

A pure strategy is a specific choice among the possible moves in a game. Under a mixed strategy, a player chooses among two or more price strategies according to pre-specified probabilities.

In the repeated prisoners’ dilemma game, the players might, in equilibrium, play cooperatively. The likelihood of a cooperative outcome is enhanced when the players are patient, their interactions are frequent, cheating is easy to detect, and the one-shot gain from cheating is small. An analysis of sequential-move games reveals that moving first in a game can have strategic value.

A strategic move is an action you take in an early stage of a game that alters your behavior and your competitors’ behavior later in the game in a way that is favorable to you. Strategic moves can limit a player’s flexibility and in so doing can have strategic value.

Folk theorem: Any combination of output levels could be infinitely repeated so long as each firm's profits at those levels are at least as great as the minimum each firm could earn in a one-period game.

E. Von Stackelberg (VS) Models

- Follower-Follower - Cournot
- Leader-Leader—Collapse of system as economic warfare-nondeterminate solution.
- If the leader anticipates correctly the behavior of rivals, the leader-follower model enhances profit margin for both.
- The follower in a VS leader-follower model responds to the leader’s quantity decision by producing on its reaction function.
- The leader maximizes its profit given the behavior of the follower on its reaction function. The Cournot and Bertrand models each moves at the same time, while in VS the leader moves first. VS is a two-stage sequential version of Cournot, but where one firm moves first. The leader (follower) produces more (less) output than a Cournot-Nash equilibrium.
THEORIES OF PRICE IN OLIGOPOLY MARKETS

FIGURE 1. CORTNOT MODEL

\[ P = 100 - q \]

MC = 0

Monopoly \( q = 50 \)

Competition \( q = 100 \)

4350 6350 - Fall, 2009
FIGURE 6A: THEORIES OF PRICE IN OLIGOPOLY MARKETS

FIGURE 7
Cartel Profit Maximization

FIGURE 8
Ideal Market-sharing in a Cartel

FIGURE 9
Price Leadership by the Dominant Firm

TABLE 1
Payoff Matrix for a Two-person, Constant-Sum Game

<table>
<thead>
<tr>
<th>A's Strategies</th>
<th>W</th>
<th>X</th>
<th>Y</th>
<th>Z</th>
<th>Row Min.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>10</td>
<td>9</td>
<td>13</td>
<td>13</td>
<td>9</td>
</tr>
<tr>
<td>D</td>
<td>11</td>
<td>8</td>
<td>15</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Col. Max.</td>
<td>12</td>
<td>9</td>
<td>13</td>
<td>17</td>
<td>9 - 9</td>
</tr>
</tbody>
</table>

A's profits are shown.

TABLE 2: Prisoners' Dilemma game

<table>
<thead>
<tr>
<th>McAlpin's strategies</th>
<th>Don't confess</th>
<th>Confess</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smith's strategies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Don't confess</td>
<td>-1, -1</td>
<td>-10, 0</td>
</tr>
<tr>
<td>Confess</td>
<td>0, -10</td>
<td>-6, -6</td>
</tr>
</tbody>
</table>
BERTRAND DEMAND FUNCTION FACING EACH DUOPOLIST IS DISCONTINUOUS FUNCTION ABCDE

(1) If firm X sets $P_X$, firm X sells zero (0) if $P_X > P_Y$ (segment AB)
(2) If firm X's $P_X = $ firm Y's $P_Y$, they share market $X = BC$, $Y = CD$
(3) If firm X lowers price $P_X < P_Y$, X gets whole market (segment DE)

If the inverse demand curve is $P = a - bq$, then $q = \left(\frac{a}{b}\right) - \left(\frac{1}{b}\right)P$

<table>
<thead>
<tr>
<th>BERTRAND RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>(1) $P_X &gt; P_Y$</td>
</tr>
<tr>
<td>(2) $P_X = P_Y$</td>
</tr>
<tr>
<td>(3) $P_X &lt; P_Y$</td>
</tr>
</tbody>
</table>
A. **THE ECONOMIC EFFECTS OF MONOPOLY** (Monopoly power exists if \( \frac{P_M - P_C}{P_M} > 0 \))

1. Monopolist has a price policy
2. Given the same costs, monopoly prices are usually higher than would prevail under pure competition because the amounts produced and offered for sale are lower.
   a. If costs are higher, conclusion is strengthened.
   b. If costs are lower for the monopolist, this is necessary but not sufficient condition for lower prices and higher outputs than pure competition.
3. Excess profits may be earned under monopoly in the long run.
4. Monopoly reduces the flexibility of the economy.
5. Monopoly prevents the optimal allocation of resources (and causes deadweight losses).
6. Monopoly tends to redistribute income.
7. Monopoly can influence technological change and innovation.
   a. Schumpeter vs. orthodox theory
8. Can't predict response of price and quantity to an increase in demand except that both can't fall.
   a. If demand becomes more elastic, price can fall, but quantity will rise.
   b. If demand becomes more inelastic, price can increase, but quantity can fall.
   c. In the most likely case, both price and quantity will increase.
9. Other things being equal, prices and quantities will change less absolutely in monopoly than in competition in response to a change in marginal costs.
10. Firms may not maximize their profits.
    a. Long-run profit versus short-run profit comparison
    b. Want to maximize profits but can't--lack information--full cost theory
    c. May have other goals--depends on individuals and organizations-organization theory
    d. Don't want to maximize profits--satisficing, sales maximizing, quiet life, etc.
11. May be considerably more nonprice competition under monopolistic competition and oligopoly, but not pure monopoly.
12. Monopoly may reduce macroeconomic stability--effect of rigid prices on unemployment, aggregate consumption, and aggregate investment.
13. Other inefficiencies
    a. X-inefficiencies or organizational slack
    b. Promotional outlays
    c. Operate lower output less than economies of scale justify
    d. Wasteful cross hauling from basing point and other pricing schemes
    e. Excess capacity from e.g., prorationing
    f. Regulation

B. **THE POLITICAL EFFECTS OF COMPETITION**
   a. Decentralize and disperse power
   b. Solves economic problems impersonally and not through the personal control of entrepreneurs or bureaucrats
c. Provides freedom of opportunity


DETERMINANTS OF STRUCTURE (Scherer & Ross, 3rd Edition, Chapter 4)

1. COST CONSIDERATIONS
   a. Product Specific
   b. Plant Specific
   c. Multiplant Specific
   d. Firm Specific
   e. Multiproduct Specific
   f. Function coefficient (FC) = AC/MC and there are pecuniary or technical economies of scale if AC/MC > 1.
   g. Reasons for economies of scale: (1) Fixed setup costs don’t change, i.e., spreading of overhead (2) Technical reasons (3) Division of labor (4) Economies of mass reserves (5) Indivisibilities (6) Access to national capital or advertising markets
   h. Economies of Scope (ES) from common inputs if \[ \frac{(TC_x + TC_y) - (TC_{xy})}{TC_{xy}} > 0 \]
      (If MC > 0 ES can’t be > 1)

2. GROWTH – MARKET SIZE
   -R_{CR4,VA}, but slight
   -R_{CR4,G&A}

3. CHANCE
   Gibrat’s Law–If the population of firms is fixed, the distribution of growth rates(gr) are independent of firm size and past growth history. Empirical evidence shows 
   \[ R_{gr, size} = \sigma, size = o, R_{gr, size} \]
   where \( \sigma \) = standard deviation in growth.

4. GOVERNMENT POLICY

MEASURING COSTS

1. PROFITS AS A FUNCTION OF SIZE
2. STATISTICAL COST ANALYSIS – inverted L shape
3. SURVIVOR TECHNIQUE – assumes same costs and products
4. ENGINEERING APPROACH

STRUCTURAL AND OTHER MEASURES OF MONOPOLY–the ability to control prices and exclude competition

1. Aggregate Concentration (AC) – intercorporate linkages, - R_{size of nation, AC}
2. Market Concentration
   (1) Defining the market \( n_{xy} \neq n_{yx}, e_{xy}, SIC \)
3. Lerner Index \( (LI) = \frac{P - MC}{P} = \frac{1}{\eta_{xx}} = \) markup test
   
   a. Problems with LI
   1. Hard to measure MC and \( \eta_{xx} \)
   2. Neglects learning curve and dynamics
   3. Measures actual not potential power
   4. Hard to interpret as in “cellophane fallacy”
   5. Only relevant in long run
   6. LI deadweight loss
   
   b. For an N-firm dominant market, \( LI = \) Lerner Index, \( \eta_M = \) price elasticity of market demand, \( CR_N = \) N-firm concentration ratio, \( \epsilon_0 = \) price elasticity of supply of other nondominant firms.

   \[
   LI = \frac{P - MC}{P} = \frac{1}{\eta} \text{ is also } = \frac{CR_N^2}{\eta_M + \epsilon_0 (1 - CR_N)} \quad \frac{dLI}{d\eta_M} < 0 \quad \frac{dLI}{dCR} > 0
   \]

4. Rosse-Panzer Test.

   \( \Delta TR_x < 0 \) Monopoly Power (MP)

   \( \Delta AC_x > 0 \) Pure Competition (PC)

   a. If MP, if there is an increase in price of an input, this increases average cost (AC) & marginal cost (MC) which decreases \( Q_x \), TC, and total revenue TR (if a decrease in \( Q_x \) would increase profits, the firm would have done it before)

   b. If PC, if there is an increase in the price of an input, this increases AC, so profit decreases, so there is need for an increase in \( P_x \) and hence TR

5. Bain's Economic Profit Test, Long Run Profit Greater than Zero

6. Tobin's \( q \) ratio Greater than One, \( q = (\text{Market Value of Assets})/(\text{Replacement Value of Assets}) \)

7. Deadweight Loss Calculations

8. Effective Competition Calculations

   a. Firm's Market Share
   b. Market Price Elasticity of Demand
   c. Fringe Firm's Price Elasticity of Supply

10. Conjectural Variation (\( \alpha \))
    a. Cournot \( \alpha = 0 \)
    b. Pure Monopoly \( \alpha = +1 \)
    c. Pure Competition \( \alpha = -1 \)
DEADWEIGHT OR WELFARE LOSS ANALYSIS

Let DWL = Deadweight or welfare loss;
P = price;
Q = quantity;
d = \Delta P/P or relative price distortion = \frac{P_M - P_{PC}}{P_M} = \frac{P_M - MC}{P_M} = \text{Lerner Index} = LI

\eta = \text{own-price elasticity of demand or } (\Delta Q/Q)/(\Delta P/P) = (\Delta Q/Q)(P/\Delta P);
R = P \times Q \text{ or total revenue; remembering } LI = 1/\eta

and assuming the supply curve or LMC is perfectly horizontal (infinitely elastic).

\[ \text{DWL} = -\frac{1}{2} \Delta P \Delta Q = -\frac{1}{2} \frac{\Delta P}{P} PQ(\frac{\Delta Q}{Q} \frac{P}{\Delta P}) \frac{\Delta P}{P} = -\frac{1}{2} d^2 R \eta \]

If a firm maximizes profits, then \( \eta = \frac{1}{d = LI} \) , so \( \text{DWL} = -\frac{1d^2 R}{2d} = \frac{1dR}{2} \). Since \( dR = \pi \), we get \( \text{DWL} = -\frac{\pi}{2} \).

It appears that DWL rises as R, d and \( \eta \) increases. This equation is deceptive as DWL does not necessarily rise as the absolute value of \( \eta \) increases. This is true only if d is constant as \( \eta \) increases. But d is inversely related to \( \eta \) and as d changes so does R. Holding R constant, DWL falls as the absolute value of \( \eta \) increases. However, DWL does rise as R rises and d rises. Thus, DWL depends on R, d, and \( \eta \).

In general, DWL is the net loss in the sum of consumer and producer surplus from a monopoly price increase that is not transferred to another group. Since the price is higher in a monopoly, if there is a gain in producer surplus, this is less than the loss in consumer surplus.

Scherer & Ross, 3rd edition put DWL at 0.5-2.0% of national income, while Martin, 2nd edition (1994) puts it at .1%-13% of national income. Kamerschen estimates the DWL for the U.S. at 5.0%-15.0% of national income.
Even if DWL is, say, 1%, there are problems as (1) GDP is very large, (2) The losses may be large in some markets, and (3) Some strategies such as rent seeking make the losses greater than the DWL triangle.

Limitations - Harberger Analysis
1. Only manufacturing included - which is 1/5 of the U.S. economy in the 1990s
2. Assumed $\eta = 1$ for all industries
3. Distrust profit data - used average rather than lowest profit as competitive results
4. Neglected transmission through different stages
5. Labor may share in monopoly and set higher wages
6. Partial not general equilibrium analysis
7. Neglects x-inefficiency or organizational slack
8. Neglects rent seeking waste
9. Rent seeking is when government or private monopoly margins are created, economic agents compete to earn them by spending until margins are transferred into costs.

Combining the Harberger DWL triangle with the Tullock rent-seeking rectangle equals the Harberger-Tullock trapezoid. Tullock includes rent seeking but not x-inefficiency, i.e., a higher cost function. With linear demand and cost function, the triangle = 50% of the rectangle so the trapezoid equals 1.5 times the rectangle.

If 10 risk neutral people bid $10,000 each for $100,000 gain - assume that they cannot collude and the bids are nonrefundable, EV = 1/10 x $100,000 = $10,000. If you use game theory, with its different motivation, you get similar results. Also people use resources in rent avoidance, so rent seeking could be greater than, equal to, or less than $100,000).

These resources may or may not be counted as a waste to the economy. Resources allocated to establishing or maintaining monopoly power that should not be considered as reducing welfare include (See Oz Shy, 1996):

1. R&D leading to a patent monopoly right for seventeen years, since the R&D improves technologies and results in new products.
2. Bribe to politicians or civil servants for the purpose of getting exclusive business rights (since this constitutes only a transfer of wealth), but there is a cost to transfer.

Now, resources allocated to the establishment of monopoly power that may count as a social waste include:
1. Persuasive advertising, needed to convince consumers that alternative brands are inferior
2. Resources needed to preempt potential entrants from entering the industry. Also, excessive production or investment in capital for the purpose of making entry unprofitable for potential competitors
3. Lobbying costs, needed to convince the legislators that a particular monopoly is not harmful (provided that these costs divert resources from productive activities).
4. Excessive R&D resulting from a patent race

INDUSTRY STRUCTURE AND PERFORMANCE Chapter 9 (MODERN INDUSTRIAL ORGANIZATION Carlton & Perloff, 2nd ed)

A. Measures of Performance
   (1) Profit on Investment -- Economic Profit not Accounting Profit (Internal Rates of Return) -- Normally, economic profits are less than accounting profits. When is this not true?
a. Economic profit (\(\Pi\)) = CR, other structural factors such as EOS, capital requirements, product differentiation (advertising intensity), research intensity, market shares, industry characteristics, barriers to entry, sales, unionization, growth rate, demand, \(u\)

b. Profit on shareholders equity = \(\frac{\Pi}{\text{Equity}}\). Items b-d can all be done before or after taxes.

c. Rate of return on total assets = \(\frac{\Pi + \text{Interest payments to debt holders}}{\text{Total Assets}}\)

d. Profit on Sales = \(\frac{\Pi}{\text{TR}} = \frac{\text{TR} - \text{TC}}{\text{TR}}\). If there are constant returns to scale \(\frac{MC}{AC}\), then

\[
\frac{\text{PQ} - (\text{AC})Q}{\text{PQ}} = \frac{(P - MC)}{P}, \text{ so it is the Lerner index.}
\]

(2) Price-Cost Margin (PCM) The usual method to measure PCM at plant level is good as less diversification than at firm level.

a. \(P - MC\) or proxy with \(P - \text{AVC} + (r + \delta)(P_kK)/(PQ)\), where \(\delta\) = economic depreciation of capital.

\(r\) = competitive rate of return. \(K\) = dollar value of capital employed. \(P_kK\) = the rental value of capital and \(PQ\) = value of output or total revenue. Capital cost is a flow, not a stock.

b. To understand the rationale for using the price-cost margin as a measure of performance, start again with the Lerner index, \(\frac{P - MC}{P}\). Because data on marginal costs are usually not available, economists often assume long-run constant returns to scale so that long-run average cost equals long-run marginal cost. With this assumption, the Lerner index can be written as:

\[
\frac{P - MC}{P} = \frac{P - v - (r + \delta)(K/Q)}{P} = \frac{PQ - vQ}{PQ} - (r + \delta) \frac{K}{PQ'}
\]

[Equation 1]

Where \(v\) = variable cost per unit, \(\delta\) = depreciation rate of capital, \(r\) = competitive rate of return, \(P\) = price, \(Q\) = output, and \(K\) = dollar value of capital employed. The first term on the right in Equation 1, \((\text{total revenue} - \text{variable cost})/\text{total revenue}\), is the price-cost margin. Under competitive conditions, price should equal long-run average (and marginal) cost. This implies that the price-cost margin should on average equal the second term on the right of Equation 1 if the industry is competitive. A common practice, therefore, is to use the price-cost margin as the dependent variable in a regression and to include the ratio of assets to sales as one of the independent variables. Equation 1 shows that this approach amounts to assuming that both the competitive rate of return and the rate of depreciation are the same for all industries in the sample - an assumption that may not be valid. Researchers typically calculate variable costs as the cost of materials plus payroll. This calculation omits several possible variable costs, including advertising, central office expenses, taxes, and research and development. Recognizing this problem, some researchers include industry aggregates for these factors as independent variables in their regression equations to control for their effects.

(3) Tobin's \(Q\) = (market value assets, MVA)/(replacement value assets, RVA). \(Q\) = 1.35 median value for U.S. Industry. RVA is hard to determine and usually involves accounting. The advantages of \(Q\) are (1) MVA depends on profits, which depends on risk, including degree of diversification and (2) MVA looks to the future, not the past. Tobin’s \(q\) is probably the best of these 3 measures.

B. ELEVEN PITFALLS IN CALCULATING ROR

(1) Valuing capital, intangible assets
Valuing depreciation
Valuing R&D, advertising, etc. Should the firm amortize vs expense these items?
Adjusting for inflation
Capitalizing monopoly profits and noncapitalizing of Ricardian rents.
Adjusting after-tax returns
Adjusting for risk--beta--CAPM
Using total assets not equity
Making arbitrary common cost and joint cost calculations
Adjusting for the fact that owner--manager salaries are higher than non-owner-manager salaries
Adjusting for distorted transfer prices

C. SUMMARY OF EMPIRICAL RESULTS CORRELATING PROFITS AND CONCENTRATION
(See W&J)

(1) Studies using cross-section industry-level data typically found a strong, statistically significant relationship between market concentration and profitability. This relationship appeared to be particularly strong in the presence of high barriers to entry. Based on this evidence, the structure-conduct-performance paradigm was widely accepted by the early 1970’s.

(2) Even as additional industry-level studies throughout the 1970’s confirmed the general structure-performance results, critics pointed out a number of conceptual problems and problems of interpretation. One important criticism, raised by economists associated with the Chicago School, is that the statistical relationship between market share and profitability might be the result of efficiency rather than of collusion. According to this interpretation, high profits result from low costs rather than high prices, and market concentration is not the cause of collusion but the result of superior efficiency.

(3) Economists have used firm-level data in an attempt to discriminate between the collusion hypothesis and the efficiency hypothesis. These studies suggest that the connection between average industry profitability and concentration may not actually be a causal connection, but may be caused by aggregating data from the firm to the industry level. At this point, the results of the empirical research on concentration and profitability do not support one clear conclusion. Researchers have learned to be cautious about inferring the existence of market power from market structure.

(4) Some economists have examined the relationship between concentration and price, rather than profitability. Concentration-price studies using data from separate cross-sectional geographic markets in the same industry find strong evidence of a positive relationship between concentration and the level of price. Studies using time-series data also find evidence of this relationship.

(5) Recent work, called the “new empirical industrial organization” (NEIO), argues that price-cost margins cannot be observed and that industries are so individual that researchers cannot learn anything useful from broad cross-section studies. NEIO focuses on a single industry and tries to estimate behavioral equation to make inferences about price and quantity.

MEASURES OF MARKET STRUCTURE
(1) Sellers Concentration: CR₄, HHI, Entropy, Gini, etc.
(2) Buyers Concentration: CR₄, HHI, Entropy, Gini, etc.
(3) Barriers to Entry--most important determinant of performance
(4) Unionization
<table>
<thead>
<tr>
<th>Criticisms of Result</th>
<th>Modern Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurement and Statistical Problems</td>
<td>(1) Static</td>
</tr>
<tr>
<td>1. Multiperiod and Multiproduct</td>
<td>a. Direct--DHP, Hall</td>
</tr>
<tr>
<td>2. Measurement Error --e.g., R&amp;D</td>
<td>b. Indirect</td>
</tr>
<tr>
<td>3. Functional Form –Linear</td>
<td>(2) MultiPeriod</td>
</tr>
<tr>
<td>4. Simultaneity</td>
<td>Summary</td>
</tr>
<tr>
<td>Conceptual Problems</td>
<td>a. Use market prices not accounting profit data</td>
</tr>
<tr>
<td>1. Exogenous</td>
<td>b. Treat variables as exogenous--(wages, taxes, $\Delta$ Demand) not as endogenous such as CR $((as N = f(\pi))$, advertising</td>
</tr>
<tr>
<td>2. Stability-disequilibrium</td>
<td></td>
</tr>
<tr>
<td>3. $P \neq S$ not $S \bullet P$</td>
<td></td>
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<tr>
<td>CONJECTURAL VARIATION CASE (CV)</td>
<td>FIRM</td>
</tr>
<tr>
<td>--------------------------------</td>
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</tr>
<tr>
<td>Same CV = 0</td>
<td></td>
</tr>
<tr>
<td>Equal MS and MC</td>
<td>$\frac{P - MC}{P} = \frac{1}{\eta_m N}$</td>
</tr>
<tr>
<td>Same CV = 0</td>
<td></td>
</tr>
<tr>
<td>Unequal MS and MC</td>
<td>$\frac{P - MC_i}{P} = \frac{MS_i}{\eta_m}$</td>
</tr>
<tr>
<td>Different Cases of CV = +1,0,-1</td>
<td></td>
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<tr>
<td>Unequal MS and MC</td>
<td>$\frac{P - MC_i}{P} = \frac{\alpha_i + (1 - \alpha_i) MS_i}{\eta_m}$</td>
</tr>
</tbody>
</table>

Legend:
- $P =$ Price
- $MC =$ Marginal Cost
- $MS =$ Market Share
- $N =$ Number of firms
- $HHI =$ Herfindahl-Hirschman Index
- $\eta_m =$ Own-price elasticity of market demand
- $\alpha =$\%\cfrac{\Delta Q_i}{\%\Delta q_i}$
- $\Delta Q_i =$ change in output of all other firms except the $i$th firm
- $\Delta q_i =$ change in output of the $i$th firm
- In (5) firm $i$ and in (6) the industry has market power as long as $\alpha_i + (1 - \alpha_i) MS_i (or HHI) > 0$

DIFFERENT CV CASES
- Cournot $\alpha = 0$
- Pure Monopoly $\alpha = +1$
- Pure Competition $\alpha = -1$
TABLE 1  LIMITATIONS OF CONCENTRATION RATIOS
Because concentration ratios are so often used in the analysis of industrial markets, it is important to be aware of their potential weaknesses. The most glaring possible weaknesses are the following:

1. The SIC system upon which the concentration ratios are biased, may not accurately reflect economic markets.
2. Concentration ratios do not reflect the presence or absence of potential entry of competitors.
3. Concentration ratios are based upon national figures and therefore ignore regional market power and regional concentration.
4. Concentration ratios ignore the rule of imports in domestic markets.
5. Concentration ratios ignore the export sales of domestic producers.
6. Concentration ratios do not describe the entire number and size distribution of firms, only a slice of it.
7. Concentration ratios give no information about the relative size and position of the group of firms included in a ratio.
8. Concentration ratios fail to reflect "turnover" (changes in the position and ranking of given firms).
9. Concentration ratios are structural indicators that describe a given market; they do not necessarily imply certain types of conduct by firms in that market.

TABLE 3  Percent Aggregate Concentration in the Manufacturing Sector (measured by value added)

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Top Firms</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50 Largest</td>
<td>17</td>
<td>23</td>
<td>23</td>
<td>25</td>
<td>24</td>
<td>25</td>
<td>25</td>
<td>24</td>
<td>24</td>
<td>24</td>
<td>25</td>
</tr>
<tr>
<td>100 Largest</td>
<td>23</td>
<td>30</td>
<td>33</td>
<td>33</td>
<td>33</td>
<td>33</td>
<td>32</td>
<td>32</td>
<td>32</td>
<td>32</td>
<td>34</td>
</tr>
<tr>
<td>200 Largest</td>
<td>30</td>
<td>37</td>
<td>38</td>
<td>41</td>
<td>42</td>
<td>43</td>
<td>43</td>
<td>42</td>
<td>40</td>
<td>40</td>
<td>42</td>
</tr>
</tbody>
</table>


Aggregate concentration has not increased and may have decreased in the last 25 years.

TABLE 1 -- Two-Digit SIC Codes for the Manufacturing Sector
TABLE 2--Standard Industrial Classification System: An Example

<table>
<thead>
<tr>
<th>SIC CODE</th>
<th>Designation</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>Major Industry Group</td>
<td>Food and kindred products</td>
</tr>
<tr>
<td>208</td>
<td>Industry Group</td>
<td>Beverages</td>
</tr>
<tr>
<td>2082</td>
<td>Product Group or Industry</td>
<td>Malt beverages</td>
</tr>
<tr>
<td>20822</td>
<td>Product Class</td>
<td>Bottle beer and ale case goods</td>
</tr>
<tr>
<td>2082224</td>
<td>Product</td>
<td>Beer: Returnable bottles: 12 oz bottles</td>
</tr>
</tbody>
</table>

TABLE 3

<table>
<thead>
<tr>
<th>Classification</th>
<th>Number of Industries</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 – DIGIT</td>
<td>20</td>
</tr>
<tr>
<td>3 – DIGIT</td>
<td>100</td>
</tr>
<tr>
<td>4 – DIGIT</td>
<td>505</td>
</tr>
<tr>
<td>5 – DIGIT</td>
<td>1,200</td>
</tr>
<tr>
<td>7 - DIGIT</td>
<td>11,500</td>
</tr>
</tbody>
</table>

TABLE 4

In 1997, the SIC system was replaced by the North American Industry Classification System (NAICS) to reflect standardization by Canada, Mexico, and the U.S. on a common SIC system. The NAICS

a. is based on supply-side substitution or similar production processes and not demand-side substitution.

b. defines 1,170 industries using six digits

c. uses the first two digits to define a sector, the first three to define a subsector, the first four to define an industry group, the first five to define a NAICS industry, and the entire 6 digits to define a national (U.S.; Canada, Mexico) industry.
TABLE 5 AN EXAMPLE OF NAICS CATEGORIES

<table>
<thead>
<tr>
<th>NAICS Code</th>
<th>NAICS Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>51</td>
<td>Sector</td>
<td>Information</td>
</tr>
<tr>
<td>513</td>
<td>Subsector</td>
<td>Broadcasting and telecommunications</td>
</tr>
<tr>
<td>5133</td>
<td>Industry Group</td>
<td>Telecommunications</td>
</tr>
<tr>
<td>51332</td>
<td>Industry</td>
<td>Wireless telecommunications carriers except satellites</td>
</tr>
<tr>
<td>513321</td>
<td>U.S. Industry</td>
<td>Paging</td>
</tr>
</tbody>
</table>

B. MARKET CONCENTRATION--most studies are for manufacturing which is less than 20% of GNP -- see Table 3 page 34 of this handout


<table>
<thead>
<tr>
<th>CR₄</th>
<th>Number of Industries</th>
<th>Percentage of all Industries</th>
</tr>
</thead>
<tbody>
<tr>
<td>90-100</td>
<td>7</td>
<td>1.4%</td>
</tr>
<tr>
<td>80-89</td>
<td>12</td>
<td>2.4%</td>
</tr>
<tr>
<td>70-79</td>
<td>28</td>
<td>5.6%</td>
</tr>
<tr>
<td>60-69</td>
<td>29</td>
<td>5.8%</td>
</tr>
<tr>
<td>50-59</td>
<td>60</td>
<td>12.0%</td>
</tr>
<tr>
<td>40-49</td>
<td>71</td>
<td>14.3%</td>
</tr>
<tr>
<td>30-39</td>
<td>96</td>
<td>19.3%</td>
</tr>
<tr>
<td>20-29</td>
<td>98</td>
<td>19.7%</td>
</tr>
<tr>
<td>10-19</td>
<td>77</td>
<td>15.5%</td>
</tr>
<tr>
<td>0-9</td>
<td>20</td>
<td>4.0%</td>
</tr>
<tr>
<td></td>
<td>498</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

CR₄ is the percentage of industry sales supplied by the four largest firms in the industry. Four-firm concentration ratios for seven industries were suppressed by the Bureau of the Census from the total of 505 for reasons of confidentiality.


TABLE 2: SUMMARY OF CR₄ DISTRIBUTION, 1987

<table>
<thead>
<tr>
<th>SUMMARY OF TABLE 1</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>CR₄ ≤ 19</td>
<td>19.5%</td>
</tr>
<tr>
<td>CR₄ ≤ 49</td>
<td>72.7%</td>
</tr>
<tr>
<td>CR₄ ≥ 50</td>
<td>27.3%</td>
</tr>
<tr>
<td>CR₄ ≥ 70</td>
<td>9.4%</td>
</tr>
<tr>
<td>CR₄ ≥ 80</td>
<td>3.8%</td>
</tr>
</tbody>
</table>

See Table 1
TABLE 3: POSSIBLE DIFFERENCES IN NUMBER AND SIZE DISTRIBUTION OF FIRMS BETWEEN INDUSTRIES WITH IDENTICAL FOUR-FIRM SELLERS’ CONCENTRATION RATIOS (CR₄).

<table>
<thead>
<tr>
<th>MARKET SHARES</th>
<th>HHIᴬ</th>
<th>HHIᴮ</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>71%</td>
<td>20%</td>
<td>5,041</td>
</tr>
<tr>
<td>4%</td>
<td>20%</td>
<td>16</td>
</tr>
<tr>
<td>3%</td>
<td>20%</td>
<td>9</td>
</tr>
<tr>
<td>2%</td>
<td>20%</td>
<td>4</td>
</tr>
</tbody>
</table>

CRᴬ = 80%  CRᴮ = 80%  HHIᴬ = 5,070  HHIᴮ = 1,600

NE = Numbers Equivalent  NEᴬ = 1.97  NEᴮ = 6.25

TABLE 4
a. Most manufacturing industries have 20 < CR4 < 75, indicating little or no pure monopoly or pure competition.
   Market competition has increased in the last 20 years from imports, antitrust, deregulation, and reduced MES.
b. Entry and exit patterns show a high rate of turnover in U.S. manufacturers. Both the entering and exiting firms are considerably smaller than existing firms, on average.

TABLE 5: WEIGHTED AVERAGE CONCENTRATION RATIOS (CR) FOR ALL MANUFACTURING INDUSTRIES, LETTING EACH INDIVIDUAL INDUSTRY’S FOUR-FIRM RATIO BE WEIGHTED BY THE VALUE ADDED ORIGINATING IN THAT INDUSTRY. THE RESULTING CONCENTRATION INDICES ARE AS FOLLOWS:

<table>
<thead>
<tr>
<th>WEIGHTED AVERAGE SELLERS FOUR-FIRM CR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1947</td>
</tr>
<tr>
<td>1954</td>
</tr>
<tr>
<td>1958</td>
</tr>
<tr>
<td>1963</td>
</tr>
<tr>
<td>1972</td>
</tr>
<tr>
<td>1977</td>
</tr>
<tr>
<td>1982</td>
</tr>
</tbody>
</table>

Scherer & Ross 3rd ed. (1990) p. 84

TABLE 6: THE PROPORTIONS OF MANUFACTURING VALUE ADDED ORIGINATING IN INDUSTRIES WITH FOUR-FIRM SALES CONCENTRATION RATIOS OF 50 OR HIGHER WERE AS FOLLOWS:

<table>
<thead>
<tr>
<th>VALUE ADDED FROM INDUSTRIES WITH CR₄ &lt; 50%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1947</td>
</tr>
<tr>
<td>1954</td>
</tr>
<tr>
<td>1958</td>
</tr>
<tr>
<td>1963</td>
</tr>
<tr>
<td>1972</td>
</tr>
<tr>
<td>1982</td>
</tr>
<tr>
<td>1987</td>
</tr>
</tbody>
</table>

TABLE 7: PREDICTIONS BASED ON MARKET STRUCTURE

<table>
<thead>
<tr>
<th>P - MC</th>
<th>Profit Short Run (Πₜ₀)</th>
<th>Profit Long Run (Πₜᵢ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4350</td>
<td>6350</td>
<td>Fall, 2009</td>
</tr>
</tbody>
</table>
(1) $\Pi_{SR}$ tells nothing regarding competition

(2) $\Pi_{LR} = 0$ is really a test of free entry. Monopoly power is $(P - MC) > 0$.

<table>
<thead>
<tr>
<th>Pure Competition</th>
<th>0</th>
<th>+,-,0,-</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monopolistic Competition</td>
<td>+</td>
<td>+,-,0,-</td>
<td>0</td>
</tr>
<tr>
<td>Pure Monopoly</td>
<td>+</td>
<td>+,-,0,-</td>
<td>+ (or 0)</td>
</tr>
<tr>
<td>Oligopoly</td>
<td>+</td>
<td>+,-,0,-</td>
<td>+ (or 0)</td>
</tr>
<tr>
<td>Perfectly Contestable</td>
<td>0</td>
<td>+,-,0,-</td>
<td>0</td>
</tr>
</tbody>
</table>

TABLE 8: CRITICAL LEVELS OF CONCENTRATION

| CR | 35 |
| CR₄ | 45 |
| CR₈ | 70 |
| HHI | 1000 (1800) |
| • HHI | 100(50) |

or market share of dominant firm (MSD) • 35% and MSD > 2MS of the next largest firm

Chicago School $\Pi = (P-AC^*).Q$

$R_{MS} > R_{CR}$
### TABLE 9
Selected Concentration Ratios in Manufacturing (Based on Value of Shipments)

<table>
<thead>
<tr>
<th>SIC Industry (code)</th>
<th>1967</th>
<th>1967</th>
<th>1967</th>
<th>HH1*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Four-firm</td>
<td>Eight-firm</td>
<td>Four-firm</td>
<td>Eight-firm</td>
</tr>
<tr>
<td>Meat-packing (2021)</td>
<td>41</td>
<td>54</td>
<td>23</td>
<td>38</td>
</tr>
<tr>
<td>Fluid milk (2026)</td>
<td>—</td>
<td>—</td>
<td>22</td>
<td>20</td>
</tr>
<tr>
<td>Cereal breakfast foods (2043)</td>
<td>79</td>
<td>91</td>
<td>28</td>
<td>67</td>
</tr>
<tr>
<td>Distilled liquor, except brandy (2055)</td>
<td>75</td>
<td>80</td>
<td>54</td>
<td>71</td>
</tr>
<tr>
<td>Roasted coffee (2085)</td>
<td>—</td>
<td>—</td>
<td>53</td>
<td>71</td>
</tr>
<tr>
<td>Cigarettes (2111)</td>
<td>60</td>
<td>99</td>
<td>81</td>
<td>100</td>
</tr>
<tr>
<td>Men's and boys' suits and coats (2311)</td>
<td>9</td>
<td>15</td>
<td>17</td>
<td>27</td>
</tr>
<tr>
<td>Women's and misses' dresses (2335)</td>
<td>—</td>
<td>—</td>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td>Logging camps and contractors (2411)</td>
<td>—</td>
<td>—</td>
<td>14</td>
<td>22</td>
</tr>
<tr>
<td>Mobil homes (2451)</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Pulp mills (2611)</td>
<td>—</td>
<td>—</td>
<td>45</td>
<td>70</td>
</tr>
<tr>
<td>Book publishing (2721)</td>
<td>—</td>
<td>—</td>
<td>20</td>
<td>32</td>
</tr>
<tr>
<td>Cellulose-man-made fibers (2823)</td>
<td>3</td>
<td>99+</td>
<td>63</td>
<td>99+</td>
</tr>
<tr>
<td>Pharmaceutical preparations (2834)</td>
<td>—</td>
<td>—</td>
<td>24</td>
<td>40</td>
</tr>
<tr>
<td>Petroleum refining (2911)</td>
<td>—</td>
<td>—</td>
<td>33</td>
<td>57</td>
</tr>
<tr>
<td>Flat glass (3211)</td>
<td>—</td>
<td>—</td>
<td>94</td>
<td>98</td>
</tr>
<tr>
<td>Ready-mixed concrete (3273)</td>
<td>—</td>
<td>—</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Glass furnaces and steel mills (3112)</td>
<td>50</td>
<td>66</td>
<td>46</td>
<td>89</td>
</tr>
<tr>
<td>Metal coke (3411)</td>
<td>76</td>
<td>86</td>
<td>73</td>
<td>84</td>
</tr>
<tr>
<td>Electric lamps (3441)</td>
<td>92</td>
<td>96</td>
<td>91</td>
<td>95</td>
</tr>
<tr>
<td>Radio and TV receiving sets (3661)</td>
<td>—</td>
<td>—</td>
<td>48</td>
<td>69</td>
</tr>
<tr>
<td>Motor vehicles and car bodies (3711)</td>
<td>—</td>
<td>—</td>
<td>92</td>
<td>108</td>
</tr>
<tr>
<td>Jewelry, precious metals (3911)</td>
<td>13</td>
<td>20</td>
<td>23</td>
<td>28</td>
</tr>
<tr>
<td>Parts and mechanical pencils (3951)</td>
<td>—</td>
<td>—</td>
<td>48</td>
<td>60</td>
</tr>
</tbody>
</table>

* Herfindahl-Hirschman Index for the 10 largest companies. Not available prior to 1962.


### TABLE 10
Range of Selected Industries in Order of Decreasing Seller Concentration in Five Countries, 1970

<table>
<thead>
<tr>
<th>Industry</th>
<th>United States</th>
<th>United Kingdom</th>
<th>West Germany</th>
<th>France</th>
<th>Canada</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cigaretttes</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Glass bottles</td>
<td>2</td>
<td>5</td>
<td>2</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Refrigerators</td>
<td>3</td>
<td>7</td>
<td>5</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Storage batteries</td>
<td>4</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Antifriction bearings</td>
<td>5</td>
<td>3</td>
<td>3</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Ordinary steel</td>
<td>6</td>
<td>10</td>
<td>6</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Brewing</td>
<td>7</td>
<td>3</td>
<td>11</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>Fabric weaving</td>
<td>8</td>
<td>11</td>
<td>12</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>Paints</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td>Petroleum refining</td>
<td>10</td>
<td>4</td>
<td>8</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>Cement</td>
<td>11</td>
<td>2</td>
<td>7</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>Shoes</td>
<td>12</td>
<td>12</td>
<td>10</td>
<td>12</td>
<td>12</td>
</tr>
</tbody>
</table>

### Table 14 - Market Concentration in U.S. Manufacturing Industries, 1992

<table>
<thead>
<tr>
<th>Range of Four-Firm Concentration Ratios (CR₄)</th>
<th>Number of Industries</th>
<th>Percent of All Industries</th>
<th>Percent of Value of Shipments Contributed by these Industries</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-19</td>
<td>77</td>
<td>18.8%</td>
<td>56.9%</td>
</tr>
<tr>
<td>20-39</td>
<td>156</td>
<td>38.1%</td>
<td>42.0%</td>
</tr>
<tr>
<td>40-59</td>
<td>110</td>
<td>26.9%</td>
<td>42.1%</td>
</tr>
<tr>
<td>60-79</td>
<td>47</td>
<td>11.5%</td>
<td>11.1%</td>
</tr>
<tr>
<td>80-100</td>
<td>19</td>
<td>4.6%</td>
<td>7.3%</td>
</tr>
</tbody>
</table>

Source: Authors' calculations based on U.S. Bureau of the Census, 1992 Census of Manufactures, Concentration Ratios in Manufacturing.

CR₄ of 90-100 <1% of all industries are at this level.

Average market share of leading firm in 4-digit industries is 17.5%

Median number of plants is 3.25 in 4-digit industries.
### Table 16 - Critical Concentration Levels

<table>
<thead>
<tr>
<th>Product Grouping</th>
<th>CR&lt;sub&gt;1&lt;/sub&gt;</th>
<th>CR&lt;sub&gt;2&lt;/sub&gt;</th>
<th>CR&lt;sub&gt;4&lt;/sub&gt;</th>
<th>CR&lt;sub&gt;8&lt;/sub&gt;</th>
<th>HHI*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meat products</td>
<td>35</td>
<td>48</td>
<td>77</td>
<td>1,076</td>
<td></td>
</tr>
<tr>
<td>Breakfast cereal</td>
<td>83</td>
<td>94</td>
<td>NR</td>
<td>NR</td>
<td></td>
</tr>
<tr>
<td>Distilleries</td>
<td>60</td>
<td>77</td>
<td>846</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cigarettes</td>
<td>99</td>
<td>56</td>
<td>87</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men's and boy's suits and coats</td>
<td>42</td>
<td>20</td>
<td>246</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sawmills</td>
<td>15</td>
<td>20</td>
<td>364</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Folding paperboard boxes</td>
<td>25</td>
<td>45</td>
<td>422</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Book printing</td>
<td>32</td>
<td>49</td>
<td>445</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Petroleum refining</td>
<td>29</td>
<td>45</td>
<td>445</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tires and inner tubes</td>
<td>68</td>
<td>86</td>
<td>1,518</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blast iron and steel mills</td>
<td>33</td>
<td>53</td>
<td>445</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Household refrigerators and freezers</td>
<td>82</td>
<td>97</td>
<td>2,025</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motor vehicles and car bodies</td>
<td>87</td>
<td>54</td>
<td>87</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computers</td>
<td>40</td>
<td>68</td>
<td>658</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Herfindahl-Hirschman Index for the 50 largest companies. NR indicates that the index is not reported.

Source: Census of Manufactures: Concentration Ratios in Manufacturing (2001, Table 2).

### Legend
- CR<sub>1</sub> = the percentage of total market output produced by the single largest seller
- CR<sub>2</sub> = the percentage of total market output produced by the two largest sellers
- CE<sub>3</sub> = the percentage of total market output produced by the three largest sellers
- CR<sub>4</sub> = the percentage of total market output produced by the four largest sellers
- CE<sub>8</sub> = the percentage of total market output produced by the eight largest sellers
- HHI = Herfindahl-Hirschman Index is the sum of the squared market shares of each seller in the market
- *HHI* = change in the HHI from the previous level

The Coverage Ratio The coverage ratio is defined as the extent to which the primary market of an industry originates in plants that are classified specifically in that industry. It is defined as

\[ \text{Coverage Ratio} = \frac{\text{Primary Market Plants}}{\text{Total Industry Plants}} \]
**Coverage ratio**

\[ \text{Coverage ratio} = \frac{\text{shipments of product x that come from plants classified in industry x}}{\text{total shipments of product x}} \]

Thus, coverage ratio of, say, .70 in commercial laundry equipment, for example, indicates that 70 percent of the commercial laundry equipment output originates in plants classified in this industry.

**Specialization Ratio**

The specialization ratio, otherwise called the primary-product specialization ratio, tells us the degree to which plants classified in the industry actually specialize in making the products primary to that industry, it is defined as

\[ \text{Specialization ratio} = \frac{\text{shipments of product x coming from plants classified in industry x}}{\text{total shipments of plants classified in x}} \]

If the same industry had a specialization ratio of .91, that means that 91 percent of the output of plants classified in that industry actually consists of commercial laundry equipment, or otherwise stated, 9 percent of the output of that industry consists of something else. These ratios may change over time. At one time, both the coverage and specialization ratios were .94 for commercial laundry equipment.

The lower the specialization ratio, the more diversified the plants are in an industry. The paint and allied products industry, for example, has a specialization ratio of 60 percent, meaning that 40 percent of the output of plants in that industry consists of something other than paints and allied products. (See Kenneth W. Clarkson and Roger LeRoy Miller, *Industrial Organization*, 1982, pp. 77-78).

---

### DEADWEIGHT WELFARE LOSS MEASURE

**TABLE 1 - WELFARE LOSS ASSOCIATED WITH MONOPOLY IN THE UNITED STATES**

<table>
<thead>
<tr>
<th>Investigator</th>
<th>Demand Elasticity</th>
<th>Estimated Welfare Loss as a Percentage of National Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harberger*</td>
<td>-1.1</td>
<td>0.1</td>
</tr>
<tr>
<td>Kamerschen**</td>
<td>Various, averaging -2 to -3</td>
<td>6.0</td>
</tr>
<tr>
<td>Worcester***</td>
<td>-2</td>
<td>0.5</td>
</tr>
</tbody>
</table>


Source: Clarkson & Miller (1982, p. 126)

**TABLE 2 - ALTERNATIVE ESTIMATES OF THE WELFARE COST OF MARKET POWER**

<table>
<thead>
<tr>
<th></th>
<th>DWL</th>
<th>DWL + Monopolization</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Harberger*</td>
<td>C&amp;M**</td>
</tr>
<tr>
<td>General Motors</td>
<td>123.4</td>
<td>1,060.5</td>
</tr>
<tr>
<td>AT&amp;T</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>All firms</td>
<td>488.2</td>
<td>4,527.1</td>
</tr>
<tr>
<td>As a percentage of corporate output</td>
<td>0.40</td>
<td>3.96</td>
</tr>
</tbody>
</table>

Figures are millions of dollars per year, averaged over 1963-1969. DWL is based on profit only; DWL + monopolization includes profit and advertising.

**Table 3 - MASSON AND SHANNAN ESTIMATES**

Masson and Shannan (1984) found that the actual deadweight losses for 37 concentrated industries (average four-firm sellers’ concentration ratio is 68) was 2.9 percent of the value of shipments, whereas if they acted as pure monopolists maximizing joint profits the deadweight losses would have been 11.6 percent. The difference, 8.7 percent of the value of shipments, was attributed to the effects of strict antitrust enforcement and natural market forces such as actual and potential competition. They refused to speculate which factor was more important.
### Table 3 - 1994 Gross Domestic Product by Sector

<table>
<thead>
<tr>
<th>Industry Category</th>
<th>Sector</th>
<th>Percentage Share of Each Category of Total National Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture, Forestry, and Fisheries</td>
<td>1.8%</td>
<td></td>
</tr>
<tr>
<td>Mining</td>
<td>1.5%</td>
<td></td>
</tr>
<tr>
<td>Construction</td>
<td>3.8%</td>
<td></td>
</tr>
<tr>
<td>Manufacturing</td>
<td>17.7%</td>
<td></td>
</tr>
<tr>
<td>Transportation and Public Utilities</td>
<td>8.9%</td>
<td></td>
</tr>
<tr>
<td>Wholesale Trade</td>
<td>6.8%</td>
<td></td>
</tr>
<tr>
<td>Retail Trade</td>
<td>9.1%</td>
<td></td>
</tr>
<tr>
<td>Finance, Insurance, and Real Estate</td>
<td>18.1%</td>
<td></td>
</tr>
<tr>
<td>Services</td>
<td>18.9%</td>
<td></td>
</tr>
</tbody>
</table>

Source: Economic Report of the President, February 1995, Table B-11

### Table 4 - A Comparison of Market Concentration Indexes

<table>
<thead>
<tr>
<th>Market shares, N = 4</th>
<th>Concentration Ratio, CRₙ</th>
<th>Herfindahl-Hirschman Index (HHI)</th>
<th>Entropy [E]</th>
<th>Gini coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>.25, .25, .25, .25</td>
<td>100</td>
<td>2.500</td>
<td>.25</td>
</tr>
<tr>
<td>B</td>
<td>.10, .15, .25, .50</td>
<td>100</td>
<td>3.450</td>
<td>.299</td>
</tr>
<tr>
<td>C</td>
<td>.01, .25, .25, .49</td>
<td>100</td>
<td>3.652</td>
<td>.337</td>
</tr>
<tr>
<td>D</td>
<td>.05, .10, .35, .50</td>
<td>100</td>
<td>3.850</td>
<td>.335</td>
</tr>
<tr>
<td>E</td>
<td>.01, .01, .01, .97</td>
<td>100</td>
<td>9.412</td>
<td>.487</td>
</tr>
<tr>
<td>Lower bound</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Upper bound</td>
<td></td>
<td>100</td>
<td>10,000</td>
<td>1</td>
</tr>
</tbody>
</table>


Remember, you always need a properly defined market before calculating any market or sellers’ concentration ratio.

**ENTROPY INDEX:** The antilog of the negative weighted sum of the logged reciprocals of the individual firm’s market shares,

\[ \text{Entropy} [E] = - \sum_{i=1}^{n} MS_i \log \left( \frac{1}{MS_i} \right) \]

where the shares are the weights and the MS are the weights of the industry firm's market share.
<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Industry</th>
<th>Lerner Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bresnahan</td>
<td>1981</td>
<td>Automobiles</td>
<td>0.100-0.340</td>
</tr>
<tr>
<td>Appelbaum</td>
<td>1982</td>
<td>Rubber, Textile, Electrical Machinery, Tobacco</td>
<td>0.049, 0.072, 0.198, 0.648</td>
</tr>
<tr>
<td>Porter</td>
<td>1983</td>
<td>Railroads (in collusive phase)</td>
<td>0.40</td>
</tr>
<tr>
<td>Lopez</td>
<td>1984</td>
<td>Food Processing</td>
<td>0.504</td>
</tr>
<tr>
<td>Roberts</td>
<td>1984</td>
<td>Coffee Roasting (largest/second largest firms)</td>
<td>0.055/0.025</td>
</tr>
<tr>
<td>Spiller-Favaro</td>
<td>1984</td>
<td>Banks (Regulated, large firms/small firms)</td>
<td>0.88/0.21</td>
</tr>
<tr>
<td>Suslow</td>
<td>1986</td>
<td>Aluminum</td>
<td>0.590</td>
</tr>
<tr>
<td>Slade</td>
<td>1987</td>
<td>Retail Gasoline</td>
<td>0.100</td>
</tr>
<tr>
<td>Karp and Perloff</td>
<td>1989a</td>
<td>Rice Exports (largest estimate)</td>
<td>0.11</td>
</tr>
<tr>
<td>Karp and Perloff</td>
<td>1989b</td>
<td>Small Black and White TVs in Japan</td>
<td>0.58</td>
</tr>
<tr>
<td>Buschena and Perloff</td>
<td>1991</td>
<td>Philippines Coconut Oil</td>
<td>0.89</td>
</tr>
<tr>
<td>Wann and Sexton</td>
<td>1992</td>
<td>Fruit Cocktail</td>
<td>1.41</td>
</tr>
<tr>
<td>Gasmi, Laffont, and Vuong</td>
<td>1992</td>
<td>Soft Drinks (Coke/Pepsi post 1976)</td>
<td>0.64/0.56</td>
</tr>
<tr>
<td>Ellison</td>
<td>1994</td>
<td>Railroads (in collusive phase)</td>
<td>0.472</td>
</tr>
<tr>
<td>Deodhar and Sheldon</td>
<td>1995</td>
<td>German Bananas</td>
<td>0.26</td>
</tr>
<tr>
<td>Taylor and Zona</td>
<td>1997</td>
<td>AT&amp;T (long-distance telephony)</td>
<td>0.88</td>
</tr>
<tr>
<td>Genesove and Mullin</td>
<td>1998</td>
<td>Sugar Refining 1880-1914</td>
<td>0.05</td>
</tr>
<tr>
<td>Hyde and Perloff</td>
<td>1998</td>
<td>Australian Retail Meats</td>
<td>= 0</td>
</tr>
</tbody>
</table>

Table 5
Means of the Variables

AND DECIDED - 1956-1992
(70 mergers, 44 horizontal, 12 vertical, 14 potential competition theories)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Merit Variables</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Herfindahl</td>
<td>2622</td>
<td>2216</td>
<td>2425</td>
</tr>
<tr>
<td>Barriers</td>
<td>.69</td>
<td>.71</td>
<td>.70</td>
</tr>
<tr>
<td>Vertical</td>
<td>.28</td>
<td>.06</td>
<td>.17</td>
</tr>
<tr>
<td>Pot. Comp.</td>
<td>.17</td>
<td>.24</td>
<td>.20</td>
</tr>
<tr>
<td>Internal Politics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Old Comm.</td>
<td>2.19</td>
<td>1.56*</td>
<td>1.89</td>
</tr>
<tr>
<td>Republican</td>
<td>.51</td>
<td>.53</td>
<td>.52</td>
</tr>
<tr>
<td>President</td>
<td>.33</td>
<td>.63*</td>
<td>.48</td>
</tr>
<tr>
<td>External Politics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sales</td>
<td>1.83</td>
<td>2.93*</td>
<td>2.39</td>
</tr>
<tr>
<td>Price</td>
<td>3.41</td>
<td>4.46*</td>
<td>3.92</td>
</tr>
<tr>
<td>Senate (ADA)</td>
<td>49.2</td>
<td>46.6</td>
<td>48.0</td>
</tr>
<tr>
<td>Committee</td>
<td>52.0</td>
<td>40.9*</td>
<td>46.6</td>
</tr>
<tr>
<td>Subcommittee</td>
<td>60.3</td>
<td>43.0*</td>
<td>51.9</td>
</tr>
<tr>
<td>Chairman</td>
<td>77.4</td>
<td>41.0*</td>
<td>59.7</td>
</tr>
<tr>
<td>House (ADA)</td>
<td>40.3</td>
<td>44.3*</td>
<td>42.2</td>
</tr>
<tr>
<td>Committee</td>
<td>29.6</td>
<td>51.9*</td>
<td>40.5</td>
</tr>
<tr>
<td>Subcommittee</td>
<td>47.6</td>
<td>47.8</td>
<td>47.7</td>
</tr>
<tr>
<td>Chairman</td>
<td>85.5</td>
<td>70.3*</td>
<td>78.1</td>
</tr>
<tr>
<td>Subcommittee Pork</td>
<td>.78</td>
<td>.44*</td>
<td>.61</td>
</tr>
<tr>
<td>Committee Pork</td>
<td>2.30</td>
<td>2.24</td>
<td>2.27</td>
</tr>
</tbody>
</table>

* The difference between the two periods is significant.

SOURCE: Malcolm B. Coate and Andrew N. Kleit, "The Political Economy of Federal Trade
CHAPTER 5  MERGERS: HISTORY, EFFECTS AND POLICY – Scherer & Ross, 3rd Edition

MOTIVES FOR MERGERS
1. MONOPOLY OR MARKET POWER
2. SPECULATION
3. NORMAL BUSINESS MOTIVES: (a) Failing company; (b) Small company; (c) Taxes; (d) Capital raising; (e) Efficiency gains from scale economies of production and distribution (marketing) (f) R & D; (g) Superior manager; (h) Financial gains to stockholders; (i) Risk reduction; (j) Aging owners; and (k) Empire building
4. Horizontal mergers are most likely to result in increased market power, but they also may result in efficiency gains due to economies of scale.
5. Vertical mergers may reduce transactions costs, but they also may increase barriers to entry, lead to price squeezes, and facilitate collusion.
6. Conglomerate mergers are least likely to reduce actual competition, but they may reduce potential competition, and lead to reciprocity, cross-subsidization, and economic forbearance.
7. Factors that can be used to attack conglomerate mergers
   a. Potential competition: Competition may be eliminated and the price would increase.
   b. Reciprocity: A large conglomerate can encourage its suppliers to purchase input from another of the conglomerate's divisions.
   c. Cross subsidization: Conglomerates will attempt to gain an increased market share in one market by using profits earned in another market.
   d. Economic forbearance: No conglomerate firms will rock the boat in any market, because of the potential retaliation in another market.
   e. Foreclosure is where downstream firms have difficulty obtaining buyers and upstream firms have difficulty finding inputs.
8. The empirical evidence suggests that most mergers have little impact on profitability or efficiency.

STATISTICAL EVIDENCE
1. STOCK PRICE OR EVENT STUDIES - The Baxter-Eckbo-Kamerschen approach to determining if mergers are procompetitive, anticompetitive, or competitively neutral.
2. PREMERGER PROFITABILITY
3. POSTMERGER PERFORMANCE
4. SUMMARY: Little evidence mergers improved efficiency or increased market power and prices significantly. The acquired firms did well, the acquiring firms not so well.

MARKET DEFINITION

<table>
<thead>
<tr>
<th>TABLE 1: MERGER WAVES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mergers – Years</td>
</tr>
<tr>
<td>1. 1883 or 1887-1904</td>
</tr>
<tr>
<td>2. 1915 or 1916-1929</td>
</tr>
<tr>
<td>3. 1960s – early 1970s</td>
</tr>
<tr>
<td>4. 1980s to now</td>
</tr>
</tbody>
</table>

Process – DOJ-FTC Horizontal Merger Guidelines, 1997
1. Define Market:
   (1) \( n_x \epsilon_x < 1 \); (2) DOJ 5% price elevation or foil test (3) \( high + R_{px,py} \) or \( high + R_{APX,APY} \)
   (4) Elzinga-Hogarty shipments test
2. Calculate HHI; if \( < 1000 \) or \( \Delta HHI < 50 \) there is no challenge; otherwise see Table 2: Safe Harbors for Mergers under 1997 Merger Guidelines.
3. Other consideration
   a. Ease of Entry—if very easy to enter market is sense that the potential entrant can be competitive within two years, merger is allowed (usually). A firm is considered in the market if can be competitive in the market within 1 year.

4350 6350 - Fall, 2009  38
b. Failing firm—valid if true. Buying (merging) firm that is failing (usually division—not whole company). Hard to define or decide what is actually failing.


4. Reagan 1981-89 mergers challenged—10 per year (approximately)

5. 1960-80 mergers challenged—20 per year (approximately)

6. Levin (1990) 50% rule: If the ex ante market share of the merging firms is <50%, a merger increases social welfare if it is profitable.

7. Under the Cournot assumption, there is no incentive to merge as the profits of merging firms will fall if N > 2, even though the profits of the industry will increase. The profits will go up for merging firms only if all firms in the industry merge.

<table>
<thead>
<tr>
<th>TABLE 1: SAFE HARBORS FOR MERGERS UNDER 1997 MERGER GUIDELINES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level of Concentration</td>
</tr>
<tr>
<td>------------------------</td>
</tr>
<tr>
<td>Highly Concentrated</td>
</tr>
<tr>
<td>Moderately Concentrated</td>
</tr>
<tr>
<td>Unconcentrated</td>
</tr>
<tr>
<td>Increase in HHI</td>
</tr>
</tbody>
</table>

Table 2

<table>
<thead>
<tr>
<th>MERGERS, MARKET SHARES (MS), A FAILING FIRM AND HHI</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOW</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>FIRM 1</td>
</tr>
<tr>
<td>FIRM 2</td>
</tr>
<tr>
<td>FIRM 3</td>
</tr>
<tr>
<td>TOTAL OUTPUT(Q)</td>
</tr>
<tr>
<td>TOTAL HHI</td>
</tr>
</tbody>
</table>

NOTE: If there is a merger, HHI increases from 3,400 to 5,800, but it increases to 5,000 if firm 3 fails. But it is an irrelevant comparison of HHI if total output (Q) is not constant. If the merger is allowed, the market keeps more assets and more output, i.e., an increase from 60 to 100, so consumers are better off (CARLTON & PERLOFF, Chp. 19, p. 659, footnote 50).
### Table 1

**Horizontal Merger Guidelines of the Department of Justice and Federal Trade Commission**

<table>
<thead>
<tr>
<th>Market Structure</th>
<th>Post-Merger Herfindahl-Hirschman Index (HHI)</th>
<th>Change in HHI Due to Merger</th>
<th>Likely Agency Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unconcentrated</td>
<td>0-999</td>
<td>(a) 0-100</td>
<td>Will Not Challenge (except in extraordinary circumstances)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(b) Over 100</td>
<td></td>
</tr>
<tr>
<td>Moderately Concentrated</td>
<td>1000-1800</td>
<td>(a) 0-50</td>
<td>(a) Unlikely to Challenge</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(b) Over 50</td>
<td>(b) Likely to Challenge*</td>
</tr>
<tr>
<td>Highly Concentrated</td>
<td>Over 1800</td>
<td>(a) 0-50</td>
<td>(a) Unlikely to Challenge</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(b) Over 50</td>
<td>(b) Likely to Challenge*</td>
</tr>
</tbody>
</table>

The Herfindahl-Hirschman Index (HHI) is the sum of all market shares expressed as percentages (e.g., 20/100 = 0.2) squared. That is, the

\[
HHI = \sum_{i=1}^{N} (MS_i)^2
\]

where \(MS_i\) is the percentage share of the market held by firm \(i\), and there are \(N\) firms in the market. HHI ranges from near 0 in a perfectly competitive market to 10,000 in a purely monopolistic market with one firm. If all of the firms in the market are of equal size, \(HHI = 10,000/N\), e.g., with 10 equal-sized firms \(HHI = 1,000\). Thus, the number of equal-sized firms that generate an equivalent HHI is called the numbers equivalent (NE) = 10,000/HHI. A market consisting of 4 firms with market shares of 30%, 30%, 20%, and 20% have an HHI of 2600 (\(= 30^2 + 30^2 + 20^2 + 20^2\)). A merger of two rivals with market shares of 10% and 20% respectively, increases the HHI by 2xy. For example, a merger of two firms with market share of 10 percent and 5 percent respectively increases the HHI by 100 (2-10-5). A HHI of 1000 corresponds roughly to CR4 = 50%, whereas a HHI of 1800 corresponds roughly to CR4 = 70%.

**Source:** Developed by the author from U.S. Department of Justice and Federal Trade Commission Horizontal Merger Guidelines, Antitrust and Trade Regulation Report, U.S. Department of Justice, Washington, D.C., issued April 2, 1992, and revised April 8, 1997, pp. 1 to 34. The unifying theme of these Guidelines is mergers should not be permitted to create or enhance market power (i.e., the ability to restrict output, raise prices above competitive levels for a significant period of time and exclude competition profitably) or to facilitate its exercise. The mergers will not be challenged if adverse competitive effects or consequences are unlikely and will be challenged if they raise significant competitive concerns. The 1992 guidelines differ from the previous 1984 ones in at least two significant ways. The 1992 version eliminates the 35% rule, which triggered government scrutiny of a merger if one party held 35% of the market. Additionally, the 1992 version concerns only horizontal mergers.

*Unless the Agency concludes on the basis of HHI, change in HHI, and presence or absence of the other factors that the merger is not likely substantially to lessen competition. However, if the HHI substantially exceeds 1800 and the change in HHI exceeds 100, only in extraordinary cases will such factors establish the merger is not likely substantially to lessen competition.

### Table 2 - Four Classes of Market Structure and the Intensity of Price Competition

<table>
<thead>
<tr>
<th>Nature of Competition</th>
<th>Herfindahl-Hirschman Index (HHI)</th>
<th>Intensity of Price Competition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perfect Competition</td>
<td>Usually below 2,000</td>
<td>Fierce</td>
</tr>
<tr>
<td>Monopolistic competition</td>
<td>Usually below 2,000</td>
<td>May be fierce or light, depending on product differentiation</td>
</tr>
<tr>
<td>Oligopoly</td>
<td>2,100 - 6,000</td>
<td>May be fierce or light, depending on interfirm rivalry</td>
</tr>
<tr>
<td>Monopoly</td>
<td>6,000 and above</td>
<td>Usually light, unless threatened by entry</td>
</tr>
</tbody>
</table>

COSTS, BENEFITS, AND NET SOCIAL GAIN (LOSS) OF A HORIZONTAL MERGER

### TABLE 1

<table>
<thead>
<tr>
<th></th>
<th>Before Merger</th>
<th>After Merger</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumers' Surplus</td>
<td>( A + B + C + D + E )</td>
<td>( A + B )</td>
</tr>
<tr>
<td>Producers' Surplus</td>
<td>Zero</td>
<td>( C + D + F + G )</td>
</tr>
<tr>
<td>Social Gain</td>
<td>( A + B + C + D + E )</td>
<td>( A + B + C + D + F + G )</td>
</tr>
<tr>
<td><strong>SUMMARY:</strong></td>
<td><strong>LOSE E</strong></td>
<td><strong>GAIN F + G</strong></td>
</tr>
</tbody>
</table>

**FIGURE 1**

[Diagram of supply and demand curves with shaded areas representing different surplus components before and after merger.]
A. THE RELEVANT ANTITRUST MARKET

To support an inference that a defendant possesses market power, the plaintiff must correctly define the relevant antitrust market and present evidence of the defendant's position in such a market. A properly defined relevant market is "some grouping of sales in which there are no close substitutes on the demand side (that is, where elasticity of demand is lower than one) and for which entry on the supply side is either expensive or time consuming (that is, where elasticity of supply is also low) or in total where $\eta_{xx}$ and $\varepsilon_{xx}$ are each inelastic. Proper delineation of the relevant antitrust market requires the plaintiff to establish both the relevant product market and the relevant geographic market.

B. ALTERNATIVE METHODS OF PROVING MARKET POWER

(1) The traditional market share analysis used in determining whether a defendant possesses market power is only one method that can be used, albeit the most common. While "all methods of assessing power involve difficulties of proof and judgment, market definition (and its resultant market-share calculation) has the additional disadvantage of being insufficient to establish the degree of market power a firm possesses" (Areeda et al.) The use of alternative methods is dependent upon the available data.

(2) Areeda, et al., show how the presence of "excess returns" and a firm's conduct, among other indica, can be relevant on the question.

(3) Similarly, they show how market power may be directly estimated through the use of residual demand curve estimates. Residual demand curve estimation is "far more precise than inferences drawn from market share" data due to the directness of the inquiry. The drawback with residual demand analysis is the amount of data and the high level of technical analysis needed to generate the estimates.

(4) The courts generally acknowledge that while market definition and market share data are the customary tools used to determine the market power question, a more direct method is by "proof of actual detrimental effects, such as reduction of output, [which] can
obviate the need (for) elaborate market analysis." The Ninth Circuit characterized the Supreme Court's opinion in Indiana Fed'n of Dentists 476 U.S. (1986) at 461.
C. ALTERNATIVE MARKET DEFINITIONS

1. TEST OF PRICE CONVERGENCE (Horowitz, 1981)

If two goods (two geographic areas) are in the same market, prices have a stable relationship (P₁ doesn't have to be identical to P₂ but the difference in price P must differ by transportation costs, e.g.)

\[ D_L = P_1 - P_2 \] = long run difference in the prices of two goods or two geographic areas.

\[ D_t = \text{the difference in the price in any one time period} \]

\[ D_L - D_t = \alpha + \lambda (D_L - D_{t-1}) \]

\[ D_t \text{ converges to } D_L \text{ if } |\lambda| < 1 \]

<table>
<thead>
<tr>
<th>Three (3) possibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Market</td>
</tr>
<tr>
<td>( \alpha = 0,</td>
</tr>
</tbody>
</table>

Problems

(1) autocorrelated price series
(2) trend or seasonality

So, "prewhitening" or filtering is done to remove these two influences. (In P, ΔP, or both, usually do it).

Also, Box & Jenkins does not need to be first order autoregressive.

2. GRANGER CAUSALITY -- A variable X is said to Granger-cause variable Y if the current value of Y is better predicted from past values of Y and X than Y alone.

Granger Causality refers only to situations where a movement in one variable leads to movement in another variable at some later date. If contemporaneously changes, Granger Causality will significantly understate the true degree of price correspondence.

3. RESIDUAL DEMAND MODEL

If a merger is consummated, the disappearance of a fringe firm would shift the supply of the fringe firm to the left, so with market demand (D) unchanged, the residual demand is steeper or more inelastic, so *ceteris paribus* a higher price is likely.
4. **PRICE CORRELATIONS**

   **Problems**
   1. Common influence problem = remove serial correlation
   2. Use ΔP, ln P, or both -- only static, not causal, "high" arbitrary, not a sufficient test.

D. **HYPOTHETICAL MONOPOLY, FOIL, OR 5% TEST**

<table>
<thead>
<tr>
<th>Own-Price Elasticity of Demand ( \eta )</th>
<th>Optimal Markup on Price ( (\text{OMP}) = \frac{(P - MC)}{(P)} = -1/(\eta) )</th>
<th>Optimal Markup on Marginal Cost ( (\text{OMC}) = \frac{(P - MC)}{(MC)} = -1/(\eta + 1) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1.1</td>
<td>90.9(%)</td>
<td>1000.0(%)</td>
</tr>
<tr>
<td>-1.2</td>
<td>83.3</td>
<td>500.0</td>
</tr>
<tr>
<td>-1.5</td>
<td>66.7</td>
<td>200.0</td>
</tr>
<tr>
<td>-2.0</td>
<td>50.0</td>
<td>100.0</td>
</tr>
<tr>
<td>-2.5</td>
<td>40.0</td>
<td>66.7</td>
</tr>
<tr>
<td>-3.0</td>
<td>33.3</td>
<td>50.0</td>
</tr>
<tr>
<td>-4.0</td>
<td>25.0</td>
<td>33.3</td>
</tr>
<tr>
<td>-5.0</td>
<td>20.0</td>
<td>25.0</td>
</tr>
<tr>
<td>-10.0</td>
<td>10.0</td>
<td>11.1</td>
</tr>
<tr>
<td>-25.0</td>
<td>4.0</td>
<td>4.2</td>
</tr>
</tbody>
</table>


1. This table can be used to determine a relative antitrust market and/or the presence of market power.

2. If a price increase is profitable and optimal, i.e., \( \frac{P - MC}{P} < -1 \frac{1}{\eta} \), then a relevant market exists according to the DOJ-FTC *Horizontal Merger Guidelines* "foil," "cartel," or "hypothetical monopolist" test.

   a. For example, if \( \frac{P - MC}{P} = 50\% \), \( \eta \) must be less than -2.0 to have a price increase optimal and, therefore, for a relevant antitrust market to exist.

3. If inelastic demand (i.e., \( \eta \) is smaller than -1.0, e.g., -0.5), the optimal markup results in a Lerner index greater than one. However, this is not a profit maximizing solution, as marginal revenue is negative.
PRINCIPAL DEFINITIONS OF AN ENTRY BARRIER

(1) Entry depends on both the incentives (or attractiveness) and the barriers. The major incentives are expected profitability and market growth. Barriers to entry are factors that prevent new firms from entering a market. Barriers to entry are the source of all monopoly power. If any other firms could enter the market, there would, by definition, no longer be a monopoly. Two general types of barriers to entry: structural barriers and strategic barriers. All barriers are costs, but not all costs are barriers. Entry barriers can be considered on a positive or a normative basis and on an absolute or relative basis.

(2) Exit barriers are generally some type of sunk costs that can never be recovered by resale, such as durable and specific assets.

(3) A barrier to entry is an advantage of established sellers in an industry over potential entrant sellers, which is reflected in the extent to which established sellers can persistently raise their prices above competitive levels without attracting new firms to enter the industry (Joe Bain, 1956, p. 3). A barrier to entry is a business with moats around it that make it difficult for competitors to enter that market.

(4) A barrier to entry is a cost of producing (at some or every rate of output) that must be borne by firms seeking to enter an industry but is not borne by firms already in the industry. (George J. Stigler, 1968, p. 67)

(5) A barrier to entry is a factor that makes entry unprofitable while permitting established firms to set prices above marginal cost, and to persistently earn monopoly return. (James M. Ferguson, 1974, p. 10)

(6) A barrier to entry is anything that prevents entry when entry is socially beneficial. (Franklin M. Fisher, 1979, p. 23)

(7) A barrier to entry is a cost of producing that must be borne by a firm seeking to enter an industry but is not borne by firms already in the industry, and that implies a distortion in the allocation of resources from the social point of view. (C.C. von Weizsäcker, 1980, p. 400)

(8) An entry barrier is a rent that is derived from incumbency. (R. Gilbert, 1989, p. 478)

(9) A barrier to entry is anything that prevents an entrepreneur from instantaneously creating a new firm in a market. A long-run barrier to entry is a cost necessarily incurred by a new entrant that incumbents do not (or have not had to) bear. (Dennis Carlton and Jeffrey Perloff, 1994, p. 110)

(10) A barrier to entry must meet three requirements (Hovenkamp and Sullivan, 1994, p. x)

1) there must be some relatively high cost that the prospective entrant must bear.
2) there must be a significant risk of failure.
3) a significant percentage of these costs must be ‘sunk’ or unrecoverable in the event of failure.

(11) An economic barrier to entry is a cost that must be incurred by a new entrant and that incumbents do not or have not had to incur. (McAfee, et al., 2004, p. 463)

(12) An antitrust barrier to entry is a cost that delays entry and thereby reduces social welfare relative to immediate but equally costly entry. (McAfee, et al., 2004, p. 463)

(13) A primary barrier to entry is a cost that constitutes a barrier to entry on its own. (McAfee, et al., 2004, p. 463)

(14) An ancillary barrier to entry is a cost that does not constitute a barrier to entry by itself, but reinforces other barriers to entry if they are present. (McAfee, et al., 2004, p. 463)

(15) Entry and exit patterns show a high rate of turnover in U.S. manufacturers. Both the entering and exiting firms are considerably smaller than existing firms, on average.

(16) If there are no barriers to entry, the free entry equilibrium number of firms is not likely to be the efficient number of firms. The efficient number is a function of the trade-off involving the increase in total surplus as there is more competition with more firms versus the duplication of cost. It is not optimal when the business-stealing effects of firms is large as the firms can’t appropriate all of the surplus they create.

(17) | TABLE 1 – Relationship of Selected Variables to Number of Firms |
<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Number of Firms</td>
</tr>
<tr>
<td>+ Transportation Costs</td>
<td>+</td>
</tr>
<tr>
<td>+ Number of Customers</td>
<td>+</td>
</tr>
<tr>
<td>+ Fixed Costs</td>
<td>•</td>
</tr>
<tr>
<td>+ Economies of Scale</td>
<td>•</td>
</tr>
</tbody>
</table>
1. **Economies of Scope** (as compared to product-specific economies of scale from producing a particular product) is when costs that are reduced by producing two or more products jointly rather than in specialized firms.

2. **Subadditive Cost Functions**—a firm can produce a bundle of outputs demanded by the market at a lower total cost than some combination of two or more single producers and/or low-volume producers. Economies of scale are neither a necessary nor a sufficient condition for subadditive cost.

3. **Sustainable**—if the incumbent dominant firm can devise a set of prices that permits it to at least cover its costs while entrants can find no overlapping output bundle at which their costs are covered.

4. **Limit Pricing vs predatory pricing** (predation)
   - Limit pricing—done to limit entry
   - Predation—punish existing rivals (also to keep potential entrants out)

5. **Credible Threat**
   - Requires incumbent to have:
     a. Durable investment
     b. Irreversible investment
     c. Make sure entrant knows about it

6. **Entry**
   - Bain’s absolute structural barrier to entry vs. Stigler’s relative structural barriers to entry
     1. **Economies of Scale**
        a. Empirical evidence suggests that most industries in the United States can support a fairly large number of MES firms. In many cases, actual concentration is higher than required by economies of scale.
     2. **Absolute Cost Advantages**
        a. Control of a crucial input;
        b. Access to investment funds at a lower interest rate than that facing potential entrants;
        c. Superior production technologies; and
        d. The ability to pay less for scarce inputs such as raw materials or personnel.
     3. **Capital Costs**
        a. Capital costs can create a barrier to entry in industries with large minimum efficient scales if new firms have to pay a higher interest rate on borrowed funds than established firms.
     4. **Product Differentiation**
        a. Advertising can create an advantage for incumbents through three channels:
           (1) Creating an absolute cost advantage;
           (2) Economies of scale; and
           (3) Increasing the capital costs of entry.

7. Coarse Theorem - See T
TABLE 1: U.S. GOVERNMENT'S ANTITRUST POLICY

1. The antitrust laws developed in response to the Industrial Revolution, which resulted in significant economies of scale and greatly increased the size of the geographic market for many products. The laws were also spurred by the development of modern capital markets that enabled firms to raise large amounts of capital in the equity market and the liberalization of the laws of incorporation in many states.

2. The ostensible purpose of these laws is to prevent business practices that materially reduce competition and to promote efficiencies. Private vs public interest theory.

3. Federal antitrust policy is based on three principal laws.

4. The Sherman Act (SAT) outlaws any form of collusion or monopolization or any attempt to monopolize a market. There must be substantial monopoly power as every U.S. firm has some monopoly power.

5. The Clayton Act (CAT) is directed primarily against four specific practices: (1) price discrimination that lessens competition, (2) tying contracts and exclusive dealerships when the result is to lessen competition, (3) mergers that reduce competition, and (4) interlocking directorates among competing firms.


7. SAT 1890  CAT 1914  FAT 1914
8. Robinson-Patman Act 1936
9. Celler-Kefauver Act 1950 (closed loophole in section 7 of CAT)
10. Overall, the antitrust laws have been fairly successful in horizontal agreements.

TABLE 2: SHERMAN ACT VIOLATIONS

A. Section I Violation
   1. A Section I violation claim requires proof of the following two elements:
      (1) an express (explicit or implicit) contract, combination, or conspiracy (i.e. concerted action among two
          or more persons); and
      (2) an unreasonable restraint of trade.

B. Section II Violation
   1. A Section 2 monopolization claim requires proof of the following two elements:
      (1) Defendants' possession of monopoly power in some well-defined markets; and
      (2) Defendants' willful acquisition or maintenance of such monopoly power as distinguished from growth
          or development as a consequence of a superior product, business acumen or historic accident.

2. Concerted action is not an element of a Section 2A claim.

3. A Section 2 attempt to monopolize claims requires proof of three elements:
   (1) The Defendants engaged in anti-competitive conduct
   (2) specific intent to monopolize a relevant market; and
   (3) a dangerous probability that the attempt will succeed.

4. A Section 2 unlawful conspiracy to monopolize claim requires proof of three elements:
   (1) concerted action:
   (2) overt acts in support of the conspiracy: and
   (3) specific intent to monopolize.

5. Proof of the relevant market is unnecessary in a conspiracy case, unless it is a rule-of-reason case. Moreover, the Defendants need not possess a dangerous probability of monopolization.

CHAPTER 9  ANTITRUST POLICIES TOWARD PRICE-FIXING - Scherer & Ross, 3rd Ed.

1. Major Section 1 price-fixing cases after the Sherman Act of 1890 (John Sherman, Republican) - - goals (1) public interest-efficiency (2) private interest help & harm
   a. Trans-Missouri Freight Association 1897 - first federal antitrust case to get to the U.S. Supreme Court.
   b. Addyston Pipe 1899 (AP) – Some regard this as the greatest of all antitrust cases.  It made the distinction between naked (illegal) and ancillary (legal) price fixing. Firms still merged after they lost Section 1 cases.
   c. Trenton Potteries 1927 (TP) – Both Addyston and Trenton were high fixed cost industries with possibly an empty core or cutthroat competition possible. It discussed how “today’s” reasonable prices could be “tomorrow’s” unreasonable prices. The efforts of TP probably had no effect on price while those of AP did increase the price.
   d. Appalachian Coals 1933 (AC) – Said cartel could be desirable. It was a bad non precedent depression decision like NRA (which was declared unconstitutional). It was an anomaly with no precedent. It said price fixing was okay if it prevented financial ruin.
   e. Socony Vacuum Oil (Madison Oil Case) 1940 (SVO) – Established firmly that all horizontal price fixing was per se illegal.

2. Borderline Cases – efficiency reasons to fix prices
   a. Chicago Board of Trade 1918 –exports (Webb-Pomerene Act, 1918)
   b. National Society of Professional Engineers 1978
   c. Broadcast Music, Inc. (BMI) 1979
   d. NCAA 1984
   e. Explicit exemptions, e.g., labor unions, joint ventures, e.g., R&D, exports, regulated industries
   f. Nonprofit firms and professional sports (since 1970s) are subject to antitrust laws.

3. FTC's only remedy is cease and desist. FTC can issue fines of $5,000 per day if don't abide. Case is heard by an administrative law judge and is reviewed by the FTC. Respondent or FTC can appeal to full FTC, but only respondent can appeal to CCOA, but either can go to USSC. DOJ uses injunction and can bring suit to recover the cost of the suit plus the damages if the government is a victim.

4. Penalties for violating the Sherman Antitrust Act – passed 52 - 1. (President Benjamin Harrison, 1889-1893) signed July 2, 1890; grandson of William Henry Harrison, 1841.
   Maximum Fines:
   a. 1890-1954, $5,000
   b. 1955-1973, $50,000
      (1)$100,000 for individual, then $350,000
      (2)$1 million for corporation, then $10 million
   d. 2004 on $100 million or twice profits gained by the violator (e.g., $500 million and $225 million in vitamins case, 1999) or twice the losses suffered by the victim and $1 million for an individual
   e. Changed violation from misdemeanor to felony in 1974; changed maximum time in prison from one to three years. It is now 10 years.
   f. Clayton Act allows an injured party to collect treble (i.e., Triple) damages – contribution not allowed.
   g. A convicted defendant is responsible for (a)-(f) plus attorney and court fees of both sides.
   h. Per se (no defense) vs Rule of Reason (cost-benefit). Per se decreases court costs and decreases uncertainty.
   i. There are special courts only for antitrust in Great Britain. In the U.S. we don’t like such power in the hands of a few. Antitrust abroad is called competition policies and the U.S. is the extreme for antitrust enforcement.
   j. From 1890 to 1940 jail sentences were served by only 24 people: 13 union leaders and 11 business executives. Average prison term was 3 months from 1955 to 1993. The longest time in jail until 1974 was 90 days.
   k. There are roughly 20 times more private suits (i.e., roughly 95% of cases are private) brought than government cases as greater incentive of triple damages versus fine; perverse incentives also.
   l. Illinois Brick 1977 pass on rule--standing-only those directly injured can sue—if the injury was something the laws were designed to prevent. Manufacturers—distributors—consumers—actually pass on depends on
      \[
      \frac{e}{(e + \eta)}
      \]
m. Conscious parallelism plus is required to show antitrust violations. Must show monopoly power plus practices (like meetings or doing something that only makes sense if collusion, e.g., one firm raising prices unilaterally)
n. Legal standing—only a party that suffers an antitrust injury can sue. In civil cases only remedies not penalties can be imposed, but this is largely a semantic issue.

o. The SAT Section 1 law is peculiar in that if two firms agree to price in a purely competitive market it is a violation, but they could merge with impunity.

p. Class action suits.

CHAPTER 12--ANTITRUST POLICY TOWARD MONOPOLY MARKET STRUCTURES--Scherer & Ross 3rd Ed.

1. a. Sherman Act Section 1 (SAT-1) involves collusion, unreasonable restraint of trade and always involves someone else (Conduct and Performance).

b. Sherman Act Section 2 (SAT-2) involves efforts to monopolize or attempt to monopolize and may be collusive or unilateral (structural). A violation requires proof of monopoly power in a well-defined market and evidence of intent to monopolize. The intent was to penalize structure and not conduct and this is why the term monopolize was used.

SAT-2 Cases - forbids exclusionary conduct (bad acts) that adversely affect competition – use rule of reason

(1) Northern Securities 1904 - first win for the government under SAT-2
(2) Standard Oil - New Jersey 1911 - Chief Justice White laid down the Rule of Reason precedent in this decision. This involved a sophisticated region-by-region limit pricing.
(3) American Tobacco 1911 - This involved widespread limit pricing.
(4) U.S. Steel 1915 - Government won every major case until here. This was the largest consolidation, adjusted for inflation, in history--180 firms who had 80%-90% of market. This case showed size alone not enough for a violation, you also need bad acts. Cases 2, 3, and 4 were the emergence of the behavioral or rule of reason approach. Judge Gary dinners.
(5) Alcoa 1945 - Judge Learned Hand of the appeals court heard this USC case as too many SC judges had an aluminum conflict. Judge Hand said if look at virgin aluminum only as the market, Alcoa had a 90% market share and that WAS monopoly. If you look at virgin aluminum plus secondary aluminum as the market, Alcoa had a 67% market share and this was MAYBE a violation. If you look at virgin and secondary aluminum and imports as the market Alcoa, had 33% market share and this was NOT monopoly. He chose the first definition and found Alcoa guilty of monopoly even if no bad acts. However, Alcoa did build up undue capacity and practiced limit pricing.
(6) American Tobacco 1946-- With cases (5) and (6) the courts were almost back to a per se approach. America used 10¢ fighting brands to stop competition.
(7) SAT-2 in the courts have gone through a complete cycle from the behavioral interpretation of Standard Oil (1911) to the structural interpretation of Alcoa (1945) and then back to a behavioral interpretation in recent decision.
(8) The structural cycle took a modest upswing in the 1970’s.
(9) Du Pont 1956 - The definition of the market was crucial and cross elasticity measures were used. If the market was flexible wrapping market, Du Pont had an 18% market share. If clear plastic wrapping materials was the market, cellophane had a 75%-100% market share. It had high profits. The “cellophane fallacy” came out of this decision of no monopoly power for Du Pont.
(10) Grinnell 1964 - This involved an exceedingly narrow market definition. The case led to the phrase about monopoly must be bad acts and not good events.
(11) IBM 1969 - Dismissed 1982 - IBM fought vigorously. IBM was dominant when case filed, but was competitive when dismissed. There was a market definition issue and some bad acts, and hot documents. The bad precedent of the case was that a firm can win by attrition. A government economist was on the stand 78 days.
(12) AT&T 1974 - Modified Final Judgment 1982 - AT&T did not fight. This was a case of winning by losing as for local service P<MC and losing distance P>MC. AT&T got to keep winning Western Electric and Bell Labs and lost losing “baby bells.”
(13) RTE Breakfast Cereal 1970’s - "Shared Monopoly" Dismissed 1982
(14) Matsushita-Zenith 1986 – This was a 5-4 USC decision of no predation. Did not say what costs are appropriate to use. It said it just doesn’t make economic sense (i.e., no reasonable discount rate) to lose money for 20 years. The Brooke (1993) USC case reinforced that if the alleged predator can’t recoup losses, not predation. The parties agreed to AVC as the test for predation, but USC did not rule that AVC is the appropriate metric.
2. Predation or Predatory Pricing
   a. The Chicago School’s position is that predation will not occur unless perhaps by mistake or miscalculation, under conditions of perfect information and in the absence of barriers to entry and re-entry, transaction costs, and opportunism. The extreme Chicago position has not been accepted by the courts or by mainstream economists.
   b. A critical assumption of the Chicago School position on predation is that (1) the cost of obtaining information is so low that financial markets or coalitions of customers will provide financial support to firms that are targets of predatory campaigns; (2) entry is always so free and easy that there can be no payoff to a successful predatory campaign.
   c. Chicago School says you need imperfect capital markets and/or ignorant consumers for predation to work. But may be done as a demonstration effect to raise the perceived costs to a potential entry, or to reduce the purchase price of the target firm.
   d. The stylized version of the predatory pricing “recoupment fallacy” states that it is not correct that “the large firm raises price in other markets when it cuts price in the target market.”
   e. Predatory pricing involves time in a fundamental way. It is an investment in market power, and like all investments, it is inherently dynamic.
   f. The lower the discount rate, all else equal, the more likely is predation to occur.
   g. Can do predation by keeping the price constant and increase the quality such as by faster deliveries or an enhanced warranty.
3. Tests for Predatory Pricing--(1) Bash; (2) Exit; (3) Recoupment
   a. Areeda Turner test (1975)--knowingly pricing less than reasonably anticipated short-run marginal cost (SRMC); i.e., P<MC; actually SRMC hard to measure so P<AVC; other tests are LRMC, LRIC, ATC, and average bookkeeping costs.
   b. The rule of reason standard for the treatment of alleged predation is (1) due to Phillip Areeda and Donald P. Turner (1975); (2) uses reasonably anticipated short-run marginal cost (or its proxy short-run average variable cost) as the benchmark; and (3) ignores strategic behavior such as preemptive entry deference.
   c. Full-Cost test: P<ATC and not profit maximizing
   d. Richard A. Posner (1976) (1) defines as predatory “pricing at a level calculated to exclude from the market an equally or more efficient competitor;” (2) condemns either pricing below short-run MC or long-run MC with the intent to exclude a competitor and suggests using average balance-sheet cost--i.e., the company’s total costs as stated on the books divided by the number of units produced--as a practical substitute for long-run MC; and (3) recommends that plaintiffs in private antitrust cases be required to show that the market involved has structural characteristics that would make predatory pricing profitable.
   e. Oliver E. Williamson’s Post-entry Output Increase Rule (1977): An incumbent monopolist confronted with new entry may not produce a quantity greater than it was supplying prior to the entry, i.e., Pre-entry quantity output < Post-entry quantity output. Thus, this rule forbids the dominant firm to increase output in response to entry for 12-18 months following the entry.
   f. Oliver E. Williamson’s (1977) output rule (no postentry output increase) that forbids a dominant firm from increasing output for 12 to 18 months following entry -- would rely on actual competition to obtain desirable market performance wherein the Baumol price rule (1979) would give maximum force to potential competition.
   g. William J. Baumol’s Post-exit Price Increase Rule (1979)--Incumbent may decrease price if P>ATC. But forbid the predator from having a significant increase price within two years of the exit without a change in cost or demand (Baumol).
   h. William J. Baumol (1979) advances this consideration in defense of his proposed price rule (no postexit price increase) that forbids an incumbent to raise prices at some later date after an entry leaves if the incumbent cut price in response to the entry: (1) it encourages greater pre-entry output; (2) it encourages a lower cost of postentry supply; and (3) it requires entrants to know less or to bear less uncertainty.
   i. Januz A. Ordoover and Robert D. Willig (1981) provide a general definition of predatory behavior that includes predatory pricing but is not limited to pricing policy (including e.g., predatory innovation or introduction of new products). They opine that a business strategy is predatory if it is profitable only on the condition that rivals are driven from the market. Thus, if some rivals leave the market when a firm cuts its price and that firm makes a greater profit on that account, that is not predation. The exit must be a requirement for predation. If a firm lowers its price, all rivals stay, and the predator has greater profits, that is not predation.
   j. Frank H. Easterbrook (1981), now a judge, accepts the Chicago School arguments that predation is unlikely ever to be profitable and advocates a rule of per se legality for predatory pricing. He would deny rivals the right
to initiate private suits over alleged predation but would allow consumers to sue to recover. No predatory pricing until after exit and market price rises.

k. **Game theory strategy.** Assuming asymmetric information: (1) long purse as dominant firm has greater resources; (2) demonstrates a firm’s propensity to prey based on a reputation for toughness; (3) low price signals (perhaps falsely) that exit or non-entry is attractive.

l. Regardless of the number of markets, by similar backwards induction to the Nth market (the first market entered), the incumbent will never have an incentive to behave aggressively, and it will accommodate entry in every market. In this model, entry occurs in all N markets and the incumbent always shares the market. Selten first identified this result and called it the **chain store paradox.** It is easy to understand why Selten described this as a paradox because even with a large number of markets, the implication is that entry will be accommodated in each and every market, a result that seems counterintuitive. In a game with perfect, certain, complete, and symmetric information predation is irrational because of Selten’s chainstore paradox. In a game with imperfect, certain, incomplete and asymmetric information, it may be rational for “weak” incumbents to predate to fool entrants into believing the incumbent is “strong.” Limit pricing may be rational with limited information.

m. There are several ways of credibility deterring entry including predation, building excess capacity (involves a large profit sacrifice), raising rivals’ costs (e.g., lobby government to increase costs by an increase fee or increase advertising to force a potential entrant to advertise) product proliferation, and first-mover advantages associated with the learning curve. Empirical evidence, Smiley (1982), suggests the most common strategies are heavy advertising (soaps), product proliferation (beer, cereal, cigarettes, soap, frozen foods, pet foods, alcoholic beverages, cleaning supplies, safety razors, laundry detergent, soft drinks), and investment in R&D. Far fewer firms use limit pricing or build excess capacity. Examples of the learning curve include commercial aircraft, autos and semiconductors. Examples of the first-mover advantages include soups, soft drinks, batteries, and net browsers (Explorer vs. Netscape), AOL, Nokia, drugs.

n. **Joskow-Klevorick approach (1979)**
   1. Check for sufficient monopoly power for recoupment
   2. If and only if a is true, go to second part of test
      a. P<AVC
      b. ATC>P>AVC but not short-run maximizing-pricing
      c. **William J. Baumol price rule (1979)**—Can decrease price if P > ATC, but later the predator cannot have a significant increase price within two years without a change in cost or demand.

   3. **Paul L. Joskow and Alvin K. Klevorick (1979)** are concerned with the following type of costs for any proposed rules on predatory pricing (1) costs that result from condemning predatory pricing as competitive and costs that result from allowing predatory pricing to escape condemnation; (2) costs of resources employed in the judicial system and the costs of private litigation aimed at preventing competition (congested counts and discouraged competition on the merits); and (3) costs of welfare losses resulting from strategies chosen by dominant firms in response to the rule and the cost of uncertainty introduced into firms’ decision making when legal standards are unclear.

   a. Among these three rules, Q = Williamson's output rule ATC = P<ATC full-cost rule, MC = Areeda-Turner rule, the best rule in terms of deadweight losses--where best is (1) and worst is (3), is as follows:

<table>
<thead>
<tr>
<th>Pre Entry</th>
<th>Post Entry</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Q</td>
<td>1) ATC</td>
</tr>
<tr>
<td>2) MC</td>
<td>2) MC</td>
</tr>
<tr>
<td>3) ATC</td>
<td>3) Q</td>
</tr>
</tbody>
</table>

   b. Since the MC rule is in the middle in both tests, it is used the most. However, the U.S. Supreme Court has never issued a ruling which cost rule is best.

   c. Defendants win predation cases 90% of the time.

   d. There have been many proposals to reform section 2 of SAT.

4. **Robinson-Patman Act (1936) (RPA = price differentiation or chain store act.) (Chapter 15 of W & J)**

   a. Types
      1. **Primary Line—** possible injury to a direct competitor
      2. **Secondary Line**— possible injury to a nonfavored competitor of a favored buyer who receives a lower discriminatory price

   b. Defense
      1. Cost – average, not marginal, on a penny-for-penny basis is typically used
      2. Meeting (not beating) competition in good faith
      3. Changing conditions – obsolete or discontinued products – seldom used
c. Assessment of RPA

1. RPA has been severely criticized, the elimination of basing point systems (U.S.S.C. 1945) under RPA was a bright moment. RPA has been criticized for promoting competitors instead of competition. Where much of this criticism is justified, but it may have resulted in too strong a bias in favor of dominant firms that use price discrimination to create a tough reputation and deter entry. See David R. Kamerschen, "Establishing Liability and Calculating Damages under Robinson-Patman Act and Predation Claims," *Journal of Forensic Economics*, Vol. VII, No. 1, (Winter, 1993), pp. 81-102.

2. Unlike other AT laws that require injury to competition, RPA only requires that there may be injury to specific competitor(s) or may be substantially lessening of competition.


4. Hart-Scott-Rodino Antitrust Improvement Act of 1976 - As of February 2007, as a result of indexing, the minimum transaction value filing became $59.8 million.

CARLTON & PERLOFF, Chapter 5

A. A conspiracy "A conspiracy is a combination of two or more persons to accomplish an unlawful end or to accomplish a lawful end by unlawful means." (*U.S. Anchor Mfg. v. Rule Indus.*, 264 Ga 295,297,443 S.E.2ed 833, 835 (1994)).

B. EFFECTIVE COLLUSION REQUIREMENTS

(1) Cartel members must knowingly make an agreement on pricing (tacit or overt) among the primary market participants with the purpose understood to be controlling price.

(2) There must be a system to detect and deter cheating.

(3) There must be a mechanism to punish cheaters.

C. A consistent conjecture is if rivals behavior is as predicted at or near equilibrium, e.g., Cournot & Bertrand or if conjectures about rivals behavior that a firm uses to make its own decisions are those implied by rival’s reaction function. Cournot assumes 0 but really -1/2 sloped reaction function and Bertrand assumed a -1 sloped reaction function (if constant $MC$ and no product differentiation).

D. ATTAINING AND MAINTAINING A MONOPOLY

1. Superior Knowledge – product, technology, management
2. Government Created – patents, franchises
3. Natural Monopoly
4. Strategy – most dangerous to competition
5. Access to Key Input or Any Other Barrier to Entry
6. Network economies – A product becomes more valuable as greater number of customers use, e.g., VHS, Microsoft Windows, fax machines, telephones, etc.
7. Empty Core - The theory of cooperative games suggests that because of the integer problem a competitive equilibrium may not exist in some industries.
8. Number, size, and interaction of firms
9. More inelastic price elasticity of demand of monopolist and of supply of other firms at outset

E. ATTAINING AND MAINTAINING A CARTEL (Forming)

1. $|\psi| \leq \mathbf{1}$ at the outset so can raise price profitably
2. Low expectation of severe punishment by government
3. Low organizational costs relative to benefits
   a. Number of firms ($N$) is small, The number of two-way flows (TWF), required to attain or maintain a cartel is $\frac{N(N - 1)}{2}$ e.g. if $N = 10$ then TWF = 45
   b. Sellers’ Concentration (CR) high
   c. Homogeneous product
   d. Trade association exists
4. Detect Cheating (Enforcing)
   a. N small
   b. Prices do not fluctuate independently
   c. Prices are widely known
   d. Same degree of integration
5. Little Incentive to Cheat – no incentive if
   a. $MC$ inelastic
   b. (Fixed Costs)/(Total Costs) are low
   c. Small, frequent orders
   d. A single sales agent
6. **Methods of Preventing Cheating**
   a. Fix terms also
   b. Divide the market
   c. Fix market shares
   d. Use MFN clauses
   e. Use meet competition clauses
   f. Establish trigger or grim prices

F. The Coase Conjecture (Coase 1972) is that a durable goods monopoly that sells its product has less market power--indeed, in the extreme case, no market power--when compared to a monopoly that rents the durable good. The intuition behind this result is that a monopoly that sells has an incentive to cut price in the future, whereas such behavior does not occur if the monopoly only rents.

**TABLE - AN ECONOMIC APPROACH TO THE DETECTION AND PROOF OF COLLUSION**

A. **CONDITIONAL FACTORS**

1. NUMBER AND SIZE DISTRIBUTION OF SELLERS AND BUYERS
   a. **SELLERS**
      1. NUMBER
      2. SIZE DISTRIBUTION
      3. TREND
      4. STABILITY
   b. **BUYERS**
      1. NUMBER
      2. SIZE DISTRIBUTION
      3. TREND
      4. STABILITY

2. OWN PRICE ELASTICITY OF DEMAND AT THE COMPETITIVE PRICE
3. DEGREE OF HOMOGENEITY, STANDARDIZATION, OR FUNGIBILITY OF THE PRODUCT (RELATIVE ABSENCE OF TECHNOLOGICAL CHANGE)
4. CONDITION OF ENTRY (AND EXPANSION)
   1. PRODUCT DIFFERENTIATION
   2. ABSOLUTE COST
      a. CAPITAL AND PLANT
      b. EXCESS CAPACITY; VERTICAL INTEGRATION
      c. DISTRIBUTION
   3. ECONOMIES OF SCALE (AND SCOPE)
      a. PRODUCTION
      b. DISTRIBUTION

5. TYPE OF COMPETITION: PRICE OR NONPRICE
6. INCIDENCE OF VERTICAL INTEGRATION
7. GROWTH IN MARKET DEMAND
8. RATIO OF FIXED (OR OVERHEAD) TO VARIABLE COSTS
9. TRANSPORTATION COSTS
10. IMPORTS
11. SEALED BIDDING
12. THE MARKET’S SOCIAL STRUCTURE AND TRACK RECORD ON ANTITRUST--TRADE ASSOCIATION
13. EXPECTATIONS AS TO THE FUTURE
14. MUTUAL RECOGNITION OF INTERDEPENDENCE

B. **CIRCUMSTANTIAL EVIDENCE**

1. TREND IN MARKET SHARES
2. OWN PRICE ELASTICITY OF DEMAND AT THE MARKET PRICE
3. LEVEL AND TREND OF PROFITS
4. PRICE, OUTPUT, AND CAPACITY AT THE INITIAL FORMATION OF A CARTEL
5. ANNOUNCEMENTS AND EXCHANGES OF ECONOMIC INFORMATION
6. SYSTEMATIC PRICE DISCRIMINATION
7. REACTION TO CHANGES IN COST AND/OR DEMAND
8. (IDENTICAL) SEALED BIDS
9. PREDATION
10. PRICE LEADERSHIP


C. THE "TOPSY-TURVY" PRINCIPLE is that the more competitive possible behavior, the more likely collusion is sustainable. This is because the more competitive possible behavior, the harsher is possible punishment, and the more likely collusion (Carl Shapiro, "Theories of Oligopoly Behavior," in *Handbook of Industrial Organization*, ed., R Schmalensee and R.D. Willig (Amsterdam: North-Holland, 1989), pp. 329-414). Flat marginal cost curves or excess capacity can be factors that promote the stability of collusion! The game-theoretic view suggests a positive correlation between collusion and excess capacity. Also it has been suggested that firms who compete in multimarkets and smaller privately owned firms are more likely to collude.
<table>
<thead>
<tr>
<th>Product</th>
<th>Territorial Scope</th>
<th>Concentration Four-Firm (percentage)</th>
<th>Conspirators</th>
<th>Number of Firms</th>
<th>Percent of Markets</th>
<th>Number of Firms in Market</th>
<th>Nature of Offense</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wrought-steel wheels</td>
<td>National</td>
<td>85</td>
<td></td>
<td>5</td>
<td>100</td>
<td>5</td>
<td>List price fixing; identical bidding</td>
</tr>
<tr>
<td>Bedsprings</td>
<td>National</td>
<td>&lt;61</td>
<td>10</td>
<td>20</td>
<td></td>
<td></td>
<td>List price fixing</td>
</tr>
<tr>
<td>Metal library shelving</td>
<td>National</td>
<td>60</td>
<td>7</td>
<td>9</td>
<td>78</td>
<td>9</td>
<td>Complementary bidding; job allocation</td>
</tr>
<tr>
<td>Self-locking nuts</td>
<td>National</td>
<td>97</td>
<td>4</td>
<td>6</td>
<td>97</td>
<td>6</td>
<td>List price fixing; identical bidding</td>
</tr>
<tr>
<td>Liquefied petroleum gas delivery</td>
<td>Regional</td>
<td></td>
<td>5</td>
<td>100</td>
<td>5</td>
<td></td>
<td>List price fixing</td>
</tr>
<tr>
<td>Women's swimsuits</td>
<td>National</td>
<td>&lt;69</td>
<td>9</td>
<td>Agreement on sale dates</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fabricated structural steel</td>
<td>Regional</td>
<td>91</td>
<td>6</td>
<td>99</td>
<td>Complementary bidding; job allocation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commercial baking flour*</td>
<td>Regional</td>
<td>50</td>
<td>9</td>
<td>65</td>
<td>List price fixing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stainless steel welding electrodes</td>
<td>National</td>
<td>77</td>
<td>7</td>
<td>87</td>
<td>8</td>
<td>List price fixing; identical bidding</td>
<td></td>
</tr>
<tr>
<td>Nonpremium beer*</td>
<td>Local</td>
<td></td>
<td>10</td>
<td>10</td>
<td></td>
<td>Elimination of discounts</td>
<td></td>
</tr>
<tr>
<td>Book matches (resale)*</td>
<td>National</td>
<td>77</td>
<td>10</td>
<td>10</td>
<td></td>
<td>List pricing</td>
<td></td>
</tr>
<tr>
<td>Concrete Pipe</td>
<td>Regional</td>
<td>100</td>
<td>4</td>
<td>4</td>
<td>Complementary bidding; job allocation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Linen supplies*</td>
<td>Local</td>
<td>49</td>
<td>31</td>
<td>90</td>
<td>Customer allocation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class rings</td>
<td>Regional</td>
<td>&lt;100</td>
<td>3</td>
<td>90</td>
<td>5</td>
<td>Bid rigging</td>
<td></td>
</tr>
<tr>
<td>Tickets</td>
<td>Regional</td>
<td>&lt;78</td>
<td>9</td>
<td>&lt;31</td>
<td>&gt;10</td>
<td>Customer allocation</td>
<td></td>
</tr>
<tr>
<td>Brass plumbing fittings*</td>
<td>National</td>
<td>64</td>
<td>6</td>
<td>30</td>
<td></td>
<td>List price fixing</td>
<td></td>
</tr>
<tr>
<td>Baked goods (wholesale)</td>
<td>Regional</td>
<td>46</td>
<td>7</td>
<td>&gt;8</td>
<td></td>
<td>List price fixing; elimination of discounts</td>
<td></td>
</tr>
<tr>
<td>Linen supply</td>
<td>Local</td>
<td>89</td>
<td>6</td>
<td>100</td>
<td>6</td>
<td>Customer allocation</td>
<td></td>
</tr>
<tr>
<td>Diary products</td>
<td>Regional</td>
<td>&gt;95</td>
<td>3</td>
<td>95</td>
<td>13</td>
<td>List price fixing; bid rigging</td>
<td></td>
</tr>
<tr>
<td>Vending machines*</td>
<td>Local</td>
<td>93</td>
<td>6</td>
<td>100</td>
<td>6</td>
<td>Price fixing; customer allocation</td>
<td></td>
</tr>
<tr>
<td>Ready-mix concrete</td>
<td>Local</td>
<td>86</td>
<td>9</td>
<td>100</td>
<td>9</td>
<td>List price fixing</td>
<td></td>
</tr>
<tr>
<td>Automotive glass replacement</td>
<td>Local</td>
<td>75</td>
<td>8</td>
<td>11</td>
<td></td>
<td>Reduction of discounts</td>
<td></td>
</tr>
</tbody>
</table>

*Trade association was involved.

What Is the Effect of Bid-Rigging on Prices?

By

Abstract

The economics literature contains no estimates of the effect of bid rigging or price fixing on prices that are both methodologically sound and statistically reliable. This paper develops a sound method for estimating such effects and applies it to a fairly typical bid-rigging scheme. With a high degree of statistical confidence, the scheme is found to have raised prices substantially during two periods totaling over four years duration. The smallest point estimate of the effect on price is 23.1%, and the smallest lower bound of a 95% confidence interval of the point estimate is 17.9%.

Table 1
Summary of Backcast Results

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Number of Observations</th>
<th>Average Markup</th>
<th>t-Statistic</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>July 10, 1984 to Nov. 5, 1986</td>
<td>103</td>
<td>30.4%</td>
<td>5.14</td>
<td>17.9%, 44.3%</td>
</tr>
<tr>
<td>Nov. 19, 1986 to July 20, 1988</td>
<td>74</td>
<td>23.1%</td>
<td>23.3</td>
<td>21.0%, 25.2%</td>
</tr>
</tbody>
</table>

An alternative approach to estimate the effect of the conspiracy on prices is to fit the winning bid prices on the opportunity cost variables for the conspiracy period and forecast for the post-conspiracy period. Using data for the first two periods for the forecast, the opportunity cost variables explain 86.8% of the variation in winning bid prices. The forecast prices are on average 23.1% higher than the actual winning bid prices during the post-conspiracy period, a difference that is highly statistically significant, and the lower bound of a 95% confidence intervals for the average markup is 20.3%. These results are shown along with the others in Table 2. We also did forecasts using data for just one or the other of the two earlier periods. The average markup is slightly lower using the latter period alone and significantly higher using the former period alone.

Table 2
Summary of Forecast Results

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Number of Observations</th>
<th>Average Markup</th>
<th>t-Statistic</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sept. 28, 1988 to Sept. 27, 1989</td>
<td>44</td>
<td>23.1%</td>
<td>17.8</td>
<td>30.3%, 26.0%</td>
</tr>
</tbody>
</table>

The forecast and backcast estimates of the effect of the conspiracy on prices are remarkably similar and fairly substantial. These results indicate that the conspiracy successfully raised prices significantly above levels that otherwise would have prevailed and maintained them at such levels for more than four years. We encourage others to apply our approach or one of their own to data for other conspiracies. The accumulation of estimates over time will provide information of value to policy makers.
### Table A

**Waldman & Jensen – Third Edition**  
Summary of Industry Attempts to Solve the Prisoner’s Dilemma  
Table 10.3 pp. 329-330  
Chapter 10

<table>
<thead>
<tr>
<th></th>
<th>No</th>
<th>Yes</th>
<th>Low or Small</th>
<th>Medium or Moderate</th>
<th>High or Large</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entry Barriers</td>
<td>3</td>
<td>2</td>
<td>14</td>
<td></td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>Number of Firms</td>
<td>10</td>
<td>7</td>
<td>2</td>
<td></td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>Concentration</td>
<td>2*</td>
<td>3</td>
<td>14</td>
<td></td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>Product Differentiation</td>
<td>13</td>
<td>5</td>
<td>1</td>
<td></td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>Demand Elasticity</td>
<td>17</td>
<td>(Inelastic)</td>
<td>2</td>
<td>(Elastic)</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>Lumpiness of Orders</td>
<td>12</td>
<td>7</td>
<td></td>
<td></td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>Rate of Technological Advance</td>
<td>13</td>
<td>6</td>
<td></td>
<td></td>
<td>19</td>
<td></td>
</tr>
</tbody>
</table>

* A professional association was involved in one of these two industries.

### Table B

**COLLUSION MNEMONICS**

1. **INDUSTRIES THAT HAVE COLLUDED, THE MNEMONIC IS THE EXPRESSION:**
   - **e.g., COST**
   - E = Electric Equipment
   - G = Glucose
   - C = Cement
   - O = Oil
   - S = Steel
   - T = Tobacco

2. **MAIN FACTORS FACILITATING COLLUSION IN AN INDUSTRY, THE MNEMONIC IS THE WORD:**
   - **CARTEL**
   - C = Concentration
   - A = Additional factors
   - R = Revenue
   - T = Talk
   - E = Entry
   - L = Likeness


### Table 1 – SELLERS’ PRICE CONSPIRACY LESS SUCCESSFUL IF:

1. Turnover of customers is large
2. Number of orders is small
3. Price information is scarce
4. Size of the order is large
1. The Court’s tough stand against direct price-fixing agreements makes economic sense. There are so few cases of economically justified price fixing that a per se ban, by avoiding long, complicated, and costly arguments over reasonableness, represents an optimal policy.

2. The basic issue of direct price-fixing agreements has been settled by the courts, but other more subtle forms of solving the prisoner’s dilemma have been left open for judicial interpretation. One open area is price exchanges between competitors. The Supreme Court has ruled that price exchanges come under a Rule of Reason interpretation, and are illegal only if there is an intent to raise prices.

3. With regard to oligopolistic behavior, the issues are far more complex. Consciously parallel behavior is likely to remain outside the reach of the current antitrust statutes. Oligopolists follow consciously parallel behavior because it is rational. In the absence of structural remedies, it is doubtful that convictions and fines will have much impact on oligopolistic behavior.

4. Unless the Courts dramatically change their current position and order structural remedies in oligopoly cases, any long-run change in policy toward conscious parallelism would require new legislation.

5. With regard to trade associations, the continuous reporting of price information to competitors can be used to discourage price cutting because few firms wish to be identified as chislers by their competitors, who are often also their friends. Price reporting schemes that do little more than ask members to report prices, and which then make this information available to the public, will generally be permitted. However, direct attempts to force adherence to list prices or restrict price cutting will bring an association within the reach of Section 1.

6. Overall, the antitrust laws have been fairly successful in the area of horizontal agreements. In the absence of the Sherman Act, price fixing would undoubtedly be far more common. And despite the protestations of a relatively small minority of economists, the economic inefficiencies that would result from permitting collusion would place a significant burden on society.

7. The Alleged Advantages of Collusion are
   (1) Higher profits
   (2) Lower uncertainty
   (3) Better control over entry

CONDITIONS FACILITATING OLIGOPOLY COORDINATION
1. OVERT AND COVERT AGREEMENTS
2. PRICE LEADERSHIP: (A) Dominant Firm (B) Collusive (C) Barometric
3. RULES OF THUMB
4. USE OF FOCAL POINTS
5. BUFFERING OF DEMAND SHOCKS THROUGH NONPRICE INVENTORY & ORDER BACKLOG ADJUSTMENTS

CONDITIONS LIMITING OLIGOPOLISTIC COORDINATION
1. NUMBER AND SIZE DISTRIBUTION OF SELLERS
2. PRODUCT HETEROGENEITY
3. DYNAMIC IMPLICATIONS OF COST STRUCTURES
   (a) Digression on cutthroat competition
4. LUMPINESS AND INFREQUENCY OF ORDERS
5. SECRECY AND RETALIATION LAGS
6. THE SOCIAL SCENE
THE OPTIMAL ANTITRUST PENALTY

1. Antitrust is a public good designed
to correct market failures or monopolies

THE TWO PURPOSES OF ANTITRUST ENFORCEMENT ARE COMPENSATION AND DETERRENCE

1. COMPENSATION

The monopoly overcharge or pure economic profit is the rectangle \( P_MABPC \)

The damages suffered by monopolist's customers are the rectangle \( P_MABPC + \) the deadweight loss (DWL) triangle \( ABC = \) trapezoid \( P_MACP \). Thus, the traditional antitrust penalty is misspecified.

With linear demand and constant costs, the area of DWL \( \Delta ABC = 1/2 \) area monopoly overcharge rectangle \( P_MABPC \)

The area of a triangle = \( 1/2 \) b x h = \( (BC/2)(AB) \) = ABC

The area of the profit rectangle = b x h = \( (P_mC)(P_MP_C) \).

But \( (P_mC) = BC \) and \( (P_MP_C) = AB \).

Thus, \( (P_mC)(P_MP_C) = (BC)(AB) \)

So the penalty that just compensates customers for the monopoly injury is 1.5 times the monopoly overcharge. Of course, the optimal damage multiple depends on specific functional forms of demand and cost. Overcharge multiples greater than 1 are justified if violators are risk averse. Since law enforcement activities are costly, complete avoidance is not optimal.

2. DETERRENCE

The decision to commit crime is based on the expected gain compared with the expected cost. Because a prospective violator is not certain of detection and punishment, setting the expected penalty equal to monopoly overcharge \( P_MABPC \) won't eliminate antitrust violations. That is, the probability is less than one that a violator will be detected and punished.

Let \( M \) = gain from violating the law, \( p \) = probability that the violator will be detected and found guilty, and \( F \) = the amount of the fine assessed. All violations are deterred if \( M - pF = 0 \). So the optimal fine \( F^* = M/p \). Thus, if \( p = .5 \), the optimal penalty \( (F^*) \) necessary to assure compliance is \( 2M \); if \( p = .25 \), \( P^* = 4M \), etc. If \( p = .333 \), \( F^* = 3M \) or treble damages. 28%-29% is the actual historical probability of plaintiff's winning an antitrust case.
Antitrust penalties are ineffective because of lack of post-verdict monitoring by the federal government, e.g., only 4% - 7.5% of all the DOJ and FTC lawyers work on compliance.

(1) Breit and Elzinga incentives
(2) 1966-74--maximum sentence, 1 year: 90 people sentenced; 65 people served no time; 20 people served less than or equal to 30 days; 5 people served more than 30 days; average time served was 12.8 days, so the conditional expected time is less than 2 weeks

3. DEFENSES FOR PRICE FIXING --When firms collude overtly to fix prices, the objective is to solve the prisoners’ dilemma, increase or stabilize price, and widen the gap between price and marginal cost. Therefore, these things should reduce economic efficiency. However, defendant firms try to justify price fixing by claiming that
   (1) it prevents cutthroat competition (“empty core”),
   (2) it reduces risk resulting in a more stable economy, and
   (3) it encourages research and development from enhanced profits

CHAPTER 11--STRATEGIC BEHAVIOR, Carlton & Perloff, 3rd Edition
A. Strategic Behavior (SB) = set of actions a firm takes to influence the market environment (i.e., market structure, and beliefs of market participants) to increase its profits; SB is more than structure as beliefs. Strategy makes sense only if equally efficient rival; if rival more efficient won't work and if less efficient don't need. Strategic behavior is the investment of resources to limit a rival's choices.
   1. Noncooperative Strategic Behavior (NSB) is generally an increase in strategic firm's profits, and a decrease in rivals’ profits
   2. Cooperative Strategic Behavior (CSB)—is an increase in profits for all, including rivals by reducing competition

B. NSB--two conditions are needed to be successful (1) advantage—e.g., act first (2) commitment—must show will follow this commitment regardless. Must pose a credible threat. i.e., rivals must believe this is rational for the doing firm or it is in that doing firm’s own best interest to do

SIX STRATEGIES
1. Predatory Pricing--conscious NSB of harming equally efficient rival(s) by selective sustained price decreases initially to drive out incumbents and deter potential entrants and later to increase prices.
2. Limit Pricing – firms may charge lower short-run prices to restrict future entry.
3. Investment to lower costs and increase capacity – building excess capacity – large profit sacrifices - first mover advantage, e.g. soup, soft drinks, batteries, AOL, Nokia, drugs – learning curve (e.g., commercial aircraft, automobiles, semiconductors), and heavy advertising..
4. Raising rival's costs
5. Exclusionary agreements
6. Product proliferation – e.g., cereal, soup, beer, safety razors, frozen foods, pet foods, cleaning supplies, alcohol beverages, laundry detergents.

C. PREDATION—“A dead man can't bite”—Plutarch
1. Chicago School--no predation as (1) perfect capital markets (2) buyers’ coalitions
   a. dynamic predation
   b. static cost predation
2. Static Price Predation (PP) (1) rival bashing (2) exit (3) recoupment
   a. $P>ATC$, no PP
   b. $P<AVC$, PP
   c. ATC>$P>AVC$, burden on plaintiffs. In 1990, 7 circuits use ATC
   d. DPV of PP is higher the lower discount rate, the higher sunk costs & greater barriers to entry. Get control asset--incumbent losses more than target firms.
3. Identical firms—potential entrants avoid PP by (1) merger (2) long-term contracts (3) decrease Q if low sunk cost during predation. There is no predation in perfectly contestable markets.
4. Non identical firms—potential entrants (1) large-small why not lend to small or why not large enter (2) differences in beliefs--incumbent reputation for low costs--asymmetric information--spatial preemption--like RTE cereal industry.
5. Legal Standards of Predation -- SMC, AVC, LRIC, LMC, ABC, but these costs are hard to measure. New entrant can buy market shares.
6. There are benign reasons for price cuts below costs: (1) price promotions (2) learning by doing (3) competitive behavior (4) Inventory reduction (5) tax considerations.
7. According to Malcolm Burns (1986), predation is used to (1) decrease merger price of the target (2) establish a reputation for being tough.

8. **Dynamic predation**—asymmetric information
   a. deep pocket-financial information
   b. reputation for toughness
   c. use low price to signal (perhaps falsely) so exit or nonentry

9. Evidence—defendants win 90% of the time, e.g., 1986 *Matsushita v. Zenith*. USC decided that a DPV of 20 year predation is too low to be logical.

10. In a game with **perfect, certain, complete, and symmetric** information, predatory pricing is irrational because of Selten’s chain store paradox.

11. In a game with **imperfect, certain, incomplete, and asymmetric** information, it may be rational for weak monopolists to engage in predatory pricing to fool potential entrants into believing that they are strong.

12. Examples according to W & J are tobacco, oil refining, and distributors of coffee.

D. **LIMIT PRICING**—Bain, Modigliani, Sylos-Labini models of residual demand curve assume that incumbent keeps output constant. This is not credible without a difference in cost or because of a lack of a credible threat of retaliation in the face of entry and it is not consistent with a subgame perfect Nash equilibrium. Empirical evidence suggests firms may use limit pricing such as Du Pont, United Shoe Machinery, General Foods, and Xerox. Limit output = minimum output for incumbent required to make profits of an entrant nonpositive. Limit price is highest possible price that prevents all entry. If homogeneous products and constant returns to scale, entry deterrence is never profitable. If non-homogeneous and economies of scale, entry deterrence is possible. With dynamic limit pricing the incumbent loses market share over time, but maximizes DPV. Pre-commitment worsen options make you better off, such as shoot yourself in foot. Choose inflexible is more profitable. Reynolds pens -- price = $12.50 and the cost = $.80. Within 1 year made 20 times total investment per month yet competition.

E. **INVESTMENTS TO LOWER COSTS** – (1) investing in R&D (2) learning curve by doing – first mover advantage

F. **RAISING RIVALS RELATIVE COSTS**
   1. Direct method—blow up plant; information costs; jam signals – false rumors
   2. Government regulation—grandfather environmental laws
   3. Tie-ins with other products or produce complements – e.g., airline frequent flyer programs
   4. Raise switching costs—computer programs
   5. Raise wages or other input costs—less labor intensive – support unions or by inputs to raise price
   6. Raise all firms' costs, e.g., advertising
   7. Advantage of incumbents: Profits of incumbent $100 before. If entry occurs, the total profits are $80, split $40 each to incumbent and potential entrants. Therefore it is worth $60 to the incumbent to keep the potential entrant out, but worth only $40 to the potential entrant to get into the market.
   8. Advantage of entrants: incumbent does not want to cut price everywhere or to do fighting with lower quality brands—jujitsu economics works to the advantage of the smaller firm.

G. **DOES WELFARE DECREASE OR INCREASE FROM NSB?** This is difficult to determine. Empirical evidence suggests that firms use many different types of entry deterrence strategies. The most common strategies appear to be heavy advertising, product proliferation, and investment in research and development. Far fewer firms use limit pricing or the building of excess capacity.

H. **CSB PRACTICES THAT FACILITATE COLLUSION**
   1. Uniform prices MFN, RPA decrease P to all
   2. Penalty for price discounts
   3. Advance notice of price changes
   4. Information exchanges
   5. Delivered pricing (can be legitimate efficiency reasons) vs FOB (free-on-board)
   6. Multimarket contact
PRICE DISCRIMINATION AND PRICE DIFFERENTIAL

Economists generally define price discrimination as occurring when the prices of goods are sold at prices which are disproportionate to their marginal production, distribution, delivery, storage, risk, and uncertainty costs (e.g., Kamerschen and Valentine, 1981). Thus, the price cost margin differs between customers. Thus, price differentiation may not involve price discrimination and price discrimination may not involve price differentiation. While many people believe that price discrimination involves control over supply in the sense of both extant producers as well as potential entrants, these conditions seem overly restrictive. The actual necessary conditions are fourfold (Clarkson and Miller, 1982, p. 240).

\[
\frac{P_1}{MC_1} \neq \frac{P_2}{MC_2}, \text{ i.e., price-cost margins differ.}
\]

Necessary Conditions

Several conditions are necessary for the existence of price discrimination.

1. The firm must face a downward-sloping demand curve.
2. The two or more identifiable classes of buyers must be separable at a cost that does not exceed the monetary gains from separating them.
3. The resale by those buyers who pay a low price to those who would be charged a higher price must be deterred.
4. The price elasticity of demand for the product of two or more classes of buyers must be different and must be known by the firm, at least in an ordinal sense necessary for third-degree discrimination.

\[
\frac{P_1}{P_2} = \frac{1 + \frac{1}{\eta_2}}{1 + \frac{1}{\eta_1}} \text{ where } \eta \text{ is not an absolute value, e.g. if } \eta_1 = -2, \eta_2 = -4, \frac{P_1}{P_2} = \frac{1-1/4}{1-1/2} = \frac{3/4}{1/2} = 1.5
\]

Some economists have added to the above necessary requirements two further ones: (a) that there be control over existing sellers, and (b) that there be control over entry into the industry. To some extent, these two conditions seem overly restrictive.

Table 10-2: IN-STATE AND OUT-OF-STATE TUITION FOR SELECTED UNIVERSITIES, 1986

Wide differences exist for tuition paid by in-state and out-of-state students at universities across the United States. The principle of monopoly price discrimination may be used to explain some of these variations, expressed in terms of ratios in the table.

<table>
<thead>
<tr>
<th>INSTITUTION</th>
<th>(1) IN-STATE TUITION</th>
<th>(2) OUT-OF-STATE TUITION</th>
<th>(3) DIFFERENCE (2) - (1)</th>
<th>(4) RATIO (2) • (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arizona State</td>
<td>$1172</td>
<td>$4260</td>
<td>$3088</td>
<td>3.63</td>
</tr>
<tr>
<td>University of Arkansas</td>
<td>1030</td>
<td>2542</td>
<td>1512</td>
<td>2.47</td>
</tr>
<tr>
<td>UCLA</td>
<td>1296</td>
<td>5382</td>
<td>4086</td>
<td>4.15</td>
</tr>
<tr>
<td>University of Colorado</td>
<td>1779</td>
<td>6559</td>
<td>4780</td>
<td>3.69</td>
</tr>
<tr>
<td>University of South Florida</td>
<td>1124</td>
<td>3738</td>
<td>2614</td>
<td>3.33</td>
</tr>
<tr>
<td><strong>University of Georgia</strong></td>
<td><strong>1662</strong></td>
<td><strong>4422</strong></td>
<td><strong>2760</strong></td>
<td><strong>2.66</strong></td>
</tr>
<tr>
<td>University of Illinois</td>
<td>2082</td>
<td>5141</td>
<td>3059</td>
<td>2.47</td>
</tr>
<tr>
<td>Louisiana State University</td>
<td>1727</td>
<td>4127</td>
<td>2400</td>
<td>2.39</td>
</tr>
<tr>
<td>Central Michigan University</td>
<td>1569</td>
<td>3925</td>
<td>2356</td>
<td>2.50</td>
</tr>
<tr>
<td>University of Minnesota</td>
<td>1970</td>
<td>4495</td>
<td>2525</td>
<td>2.28</td>
</tr>
<tr>
<td><strong>University of Mississippi</strong></td>
<td><strong>1727</strong></td>
<td><strong>2909</strong></td>
<td><strong>1182</strong></td>
<td><strong>1.68</strong></td>
</tr>
<tr>
<td>State University of New York</td>
<td>1495</td>
<td>3345</td>
<td>1850</td>
<td>2.24</td>
</tr>
<tr>
<td>Miami University-Ohio</td>
<td>2584</td>
<td>5458</td>
<td>2874</td>
<td>2.11</td>
</tr>
<tr>
<td>Oklahoma State University</td>
<td>889</td>
<td>2680</td>
<td>1791</td>
<td>3.01</td>
</tr>
<tr>
<td>Texas A&amp;M University</td>
<td>870</td>
<td>3990</td>
<td>3120</td>
<td>4.59</td>
</tr>
<tr>
<td>North Texas State University</td>
<td>896</td>
<td>4016</td>
<td>3120</td>
<td>4.48</td>
</tr>
<tr>
<td><strong>San Francisco State</strong></td>
<td><strong>679</strong></td>
<td><strong>4909</strong></td>
<td><strong>4230</strong></td>
<td><strong>7.23</strong></td>
</tr>
<tr>
<td>University of Virginia</td>
<td>2238</td>
<td>5468</td>
<td>3230</td>
<td>2.44</td>
</tr>
<tr>
<td>University of Wisconsin-Madison</td>
<td>1570</td>
<td>4914</td>
<td>3344</td>
<td>3.13</td>
</tr>
</tbody>
</table>
Figure 1
EFFECTS OF PRICE DISCRIMINATION

\[ A_1 = \text{consumers' surplus under single-price monopoly} \]
\[ A_2 = \text{deadweight welfare loss under single-price monopoly} \]
\[ A_1 + A_2 = \text{increase in monopolist's profit under first-degree price discrimination, before allowing for transaction costs} \]
\[ A_2 = \text{increase in social welfare under first-degree price discrimination, before allowing for transaction costs} \]
\[ T = \text{the transaction cost of implementing the discriminatory scheme} \]

Using Figure 1 it is true that:
- a. The monopolist will engage in price discrimination if \( A_1 + A_2 > T \).
- b. From a social point of view, price discrimination is beneficial only if \( A_2 > T \).
- c. The monopolist will find it privately profitable to engage in price discrimination, even though price discrimination is harmful from the social point of view if \( A_1 + A_2 > T > A_2 \).
### TABLE 12-1

**Types of Price Discrimination and Their Effects**

<table>
<thead>
<tr>
<th>Types of price discrimination</th>
<th>Attributes</th>
<th>Effects on total output and social welfare</th>
</tr>
</thead>
<tbody>
<tr>
<td>First degree</td>
<td>Each submarket consists of a single buyer who is charged his or her maximum demand price.</td>
<td>Output increases; it is equal to the competitive output with linear demand. Social welfare rises.</td>
</tr>
<tr>
<td>Second degree</td>
<td>Buyers are segregated into two or more groups such that all units with a demand price greater than x are sold at price x, all units with a demand price less than x but greater than y are sold at price y, and so on.</td>
<td>Output increases; it is equal to the competitive output with linear demand. Social welfare rises.</td>
</tr>
<tr>
<td>Third degree</td>
<td>Buyers are segregated into two markets with different elasticities of demand.</td>
<td>With linear demands, total output is unchanged and the welfare effects are ambiguous. Otherwise, total output and social welfare will increase or decrease depending on whether the more elastic demand schedule is more or less concave (from above) than the less elastic demand schedule.</td>
</tr>
<tr>
<td>Case 1</td>
<td>Both markets are served under a single-price policy.</td>
<td>Total output and social welfare are unchanged by discrimination.</td>
</tr>
<tr>
<td>Case 2A</td>
<td>Only one market can be served at any price.</td>
<td>Total output and social welfare unambiguously increase.</td>
</tr>
<tr>
<td>Case 2B</td>
<td>Only one market can be served under a single-price policy, but the weaker market can be entered with discrimination.</td>
<td>Total output and social welfare unambiguously increase.</td>
</tr>
<tr>
<td>Case 3</td>
<td>Neither market can be served at a simple monopoly price.</td>
<td>Total output and social welfare unambiguously increase.</td>
</tr>
</tbody>
</table>

**A Summing Up.** The discussion up to this point is summarized in Table 12-1, which classifies price discrimination by degree and compares its various possible effects on total output and social welfare with those produced under simple monopoly pricing. Several general conclusions can be drawn from the table.

First, "it is impossible that the total revenue under discrimination should be less than the total revenue under simple monopoly, since at worst the discriminating monopolist can leave the simple monopoly price unchanged."

Furthermore, even when the same product can be sold at different prices to different customers, such a pricing policy will be profitable only if the additional revenue it generates exceeds the additional cost incurred in separating customers into identifiable groups and preventing arbitrage between them.

Second, except for case 2 under the heading of price discrimination of the third-degree, none of the effects recorded in the table depend on any assumptions about the costs of producing the product sold at discriminatory prices. In other words, while the specific cost conditions encountered by the price discriminating firm may determine the magnitude of the predicted output change, they do not determine the direction of that change. If marginal cost is declining, for instance, any increase in output due to discrimination will be enhanced and any reduction in output will be lessened. Indeed, it is possible with declining marginal costs that a sufficiently large increase in output under discrimination would cause the prices charged in both markets to fall, although price would of course fall proportionately less in the stronger one. Similarly, if marginal cost is rising, any output expansion associated with price discrimination will be of smaller magnitude and any reduction in output will be more pronounced. If price discrimination has no effect on total output, it does not matter whether marginal cost is rising, falling, or constant.

Third, and most important, it appears that on the whole the introduction of price discrimination is more likely to increase total output than to reduce it. Hence, while some customers may be made worse off because they have to pay a higher price, whereas others gain from a reduction in price, on balance price discrimination tends to increase social welfare by reducing the allocative inefficiency of (single-price) monopoly. Public policy’s generally hostile attitude toward price discrimination cannot therefore be justified on efficiency grounds.
PRICE DIFFERENTIATION V. PRICE DISCRIMINATION (Chp. 9 CARLTON & PERLOFF, 5th ed, 2005)

NONLINEAR PRICING

1. Price Discrimination, \( MR = P_n + \frac{\Delta P}{\Delta Q} Q_{n-1} \)
   + -

2. Two-Part Tariffs
3. Tie-in Sales
4. Quality Discrimination

Market Power
1. Know, infer, identify willingness to pay
2. Prevent or limit resales
3. Is price discrimination efficient?

PREVENT RESALES BY:

1. Services
2. Warranties
3. Adulteration
4. Transaction Cost
5. Contractual Remedies
6. Vertical Integration
7. Government Intervention

OTHER METHODS OF NONLINEAR PRICING (CARLTON & PERLOFF, Chp. 10)

1. Minimum Quantities & Quantity Discounts
2. Selection of Price Schedules
3. Premium for Priority
4. Auctions – English or Dutch

REPRESENTATIVE CONSUMER AND ADDRESS MODELS

A monopolist can use brand proliferation, brand specification, and brand preemption to defer entry and maintain its monopoly power and profits.

<table>
<thead>
<tr>
<th>NAME</th>
<th>ASSUMPTIONS</th>
<th>RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Chamberlin</td>
<td>a. Free Entry</td>
<td>a. ( P &lt; MC ) ( \Pi_{LR} = 0 )</td>
</tr>
<tr>
<td>2. Chamberlin</td>
<td>b. Blocked Entry</td>
<td>b. ( P &gt; MC ) ( \Pi_{LR} \geq 0 )</td>
</tr>
</tbody>
</table>
### B. LOCATION, SPATIAL, OR ADDRESS MODEL

<table>
<thead>
<tr>
<th>NAME</th>
<th>ASSUMPTIONS</th>
<th>RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Hotelling</td>
<td>a. Compete on location, not price.</td>
<td>a. Minimum Differentiation or similar products</td>
</tr>
<tr>
<td></td>
<td>b. Fixed Number of Firms</td>
<td></td>
</tr>
<tr>
<td>2. Hotelling</td>
<td>Price Competition</td>
<td>a. Maximum Differentiation</td>
</tr>
<tr>
<td></td>
<td>Sequential Free Entry</td>
<td>b. Locate as far apart as possible</td>
</tr>
<tr>
<td></td>
<td></td>
<td>c. Localized competition</td>
</tr>
<tr>
<td></td>
<td></td>
<td>d. Successful entrants maximize market share, but smaller market</td>
</tr>
<tr>
<td></td>
<td></td>
<td>incumbents so entry deterrence and $\Pi_{LR} &gt; 0$ for incumbents</td>
</tr>
</tbody>
</table>

### C. TRANSPORTATION COSTS

The efficient location minimizes transportation costs (TC). There is a trade off in the reduction of TC versus the increase in fixed set up costs to introduce another firm (brand). When TC are small, density is large or economies of scale are small, there is too much variety and too many brands.

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#### BASING-POINT PRICING

**Figure 1**

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**LEGEND**

BP = Basing Point
$i$ = $i$th Firm
$c_i$ = $i$th Customer
From \( F_2 - C_1 \) there is phantom freight, as the buyer is charged \( BP - C_1 \) for freight costs, but the seller only incurs \( F_2 - C_1 \) of actual freight costs, so there is \( F_2 - BP \) of phantom freight.

From \( F_2 - C_2 \) there is a cross haul that is more profitable because of phantom freight as the buyer pays \( BP - C_2 \), but the seller only incurs \( F_2 - C_2 \) of actual freight costs.

From \( F_2 - C_2 \) there is freight absorption, as the buyer is charged only \( BP - C_2 \) for freight, but the seller incurs \( F_2 - C_2 \) of actual freight costs, so there is \( F_2 - BP \) of freight absorption.

**BP Pricing is Inefficient**

1. Excessive transportation costs
2. Nonoptimal transportation media
3. Distortion of industrial location
4. Encourages excessive entry & excess capacity
5. Distorts market prices and costs

Two advantages for oligopolist:
1. The price is fixed anywhere in U.S. so maintain price discipline
2. All firms do reasonably well no matter where located.

Use BP for tacit collusion as in steel, plywood, cement, and lumber

Use BP to solve prisoners dilemma. Punitive BP is to set price less than average costs at cheater’s plant location.

The biggest accomplishment of the Robinson-Patman Act was in eliminating some bad basing point systems.

**FOB** = free on board

Scherer & Ross, 3rd Edition, Chapter 14: *Buyer Power and Vertical Pricing Relationships*;
Chapter 15: *Vertical Restraints: Law and Economics*

**A. BUYERS CONCENTRATION**

1. It is hard to measure CR buyer
2. Seller better off being unimportant to buyer—“importance of being unimportant”
3. Countervailing Power
4. No hard evidence but believe average CR buyers < CR sellers

**B. VERTICAL INTEGRATION (VI) & EFFICIENCY**

1. VI can break bilateral monopoly and increase output
2. Piling monopoly on monopoly in vertical chain (double marginalization) can decrease, not increase profits.
3. VI of (2) can increase profits, increase efficiency, and lower prices
4. If a firm has monopoly power over some indispensable input at any stage in the vertical chain, the firm’s monopoly power under plausible assumptions can lead to enhanced monopoly and price increases if there is VI into a competitive stage
5. Items (2) and (3) are called Chicago School, but really from Duke economists

**C. VERTICAL RESTRAINTS (VR)** – banning VI can lead to more undesirable VR, if costs VI < costs VR

1. VR is where VI is impractical
2. VR involves arrangements between firms operating at different levels at the manufacturing chain
3. Most VR is at the retail level
4. VR relates to the Sherman Act Section 1 (SAT-1).
5. Tapered integration is where a firm both buys and makes the input.
6. **TYPES**
   a. Territorial
   b. Exclusive dealerships
   c. Tying (bundling)
   d. RPM-resale price maintenance
   e. Why RPM?
      1) Manufacturing collusion/cartel--want to maintain high quality image so as to not spoil the market
      2) Retail Manufacturing collusion/cartel. The small firms are small competitors but entry is relatively easy so little threat
      3) Effective marketing instruments (classic free rider) It stops dealers selling high-quality goods as a loss leader.
7. Double Monopoly- manufacturer doesn’t want increase \( P \), and increase service, if the \( Q \) stays constant or \( Q \) decreases,
but wants increase in demand.

8.

According to the Chicago School VR always increases welfare and anything upstream done to maximize profit so must be efficient.

D. RESALE PRICE MAINTENANCE (RPM)

1. Legal
   (1) SAT-1 violation
   (2) 1937 Miller-Tydings Act Exempt RPM from SAT-1
   (3) 1952 McGuire Act (repealed Dec., 75) Stronger support of RPM. Made law binding on signers and non-signers alike.

2. In heyday RPM affected 4-10% retail sales

3. Most RPM (1) only presale items (2) unnecessary if knowledgeable buyers (3) only on high-value items--not supermarkets. Controversial but on average RPM increases P.

4. RPM is per se illegal, but should cover minimum not maximum price. In the landmark case State Oil vs Kahn (1997), the U.S. Supreme Court ruled that maximum prices should be judged under a rule of reason. Colgate (1909) says that a unilateral decision for a manufacturer to exclude a dealer is legal. Price VR is based on per se rule, while nonprice VR is based on rule of reason. A grey area is when there is exclusive territories with exclusive dealerships.

5. Effects of RPM on average causes higher prices
   a. Desirable if RPM decreases price, increases service, increases quality or quantity, promotes product better or fosters new entry
   b. RPM is ambiguous if the choice is $10 without training and $11 with training as may increase or decrease welfare
   c. RPM is undesirable if it causes cartelization/collusion or prevents entry

6. 1985 DOJ Vertical Restraint Guidelines more permissive than legal precedent. In 1993 they were dismissed

7. VR increase interbrand competition (different brand), but decreases intrabrand competition (same brand)

8. In the desirable case, the increase in interbrand competition is more than decrease in intrabrand competition

9. Franchise--grey area restraints
   a. Franchises have similar failure rates in the U.S. compared with non franchises, but (COS – Company Owned Stores) 2% lower prices; and
   b. A common 5% royalty to a franchiser on sales (should be on profit, e.g., what is depreciation?)
   c. Although average quality of a franchise such as McDonald,s may be low, the standard deviation is very low; most fast food business is transitory, 1975 N = 220,000; 2003 N = 580,000; Subway = 17,000 franchises.
   d. Free rider problem—must monitor quality, etc., e.g., free riding on quality of NFL or MLB
   e. Franchise ratios: Autos 100%, gas stations 85%, fast food 79%, C stores 82%

CHAPTER 12--VERTICAL INTEGRATION AND VERTICAL RESTRICTIONS (Carlton & Perloff 3rd Ed.)

PAGE 65

A. VERTICAL INTEGRATION (VI): same reasons as firm creation--lower transaction costs, i.e., costs, besides price, of writing and enforcing contracts. Most vertical integration reduces transaction costs, but it can be used to raise entry barriers, or to facilitate collusion or foreclose markets. There is little empirical evidence that RPM is used to facilitate collusion for retailers or manufacturers.

1. VI is a merger of complements whereas a horizontal merger is a merger of substitutes.

2. Vertical Integration is when a firm participates in more than one successive stage of production. Make or buy is the choice. Outsourcing = In most cases, VI is done to reduce costs or eliminate a negative market externality. (1) Backward = upstream is when merge with supplier of input; (2) Forward = downstream is when merge with supplier of output.

3. Dual distribution is where producer sells directly to final users and also employs independent distributors.


5. Costs of Vertical Integration
   a. Input and distribution costs may be higher
   b. Managing costs may be higher
   c. There are substantial legal fees to merge – DOJ and FTC

6. Benefits of Vertical Integration
   a. Lower Transaction Costs-- Opportunistic behavior. 4 conditions make VI likely: (1) specialized assets, (2) uncertainty and durability of machinery makes monitoring difficult, (3) information, (4) extensive coordination
   b. To Assure Supply--nonprice allocation (e.g., bakery), just-in-time inventory system
c. Eliminate Market Failure or Externalities—positive reputational effects—this is why McDonalds forward integrates

d. Avoid Government Intervention or rules. Price controls on steel during WWII so buy steel company, taxes (transfer pricing shift profits from high to low tax state or country), regulation (shifts costs from unregulated to regulated).

e. Increase Monopoly Power or Profits
   (1) Monopoly supplier of a key input--vertical integration forward with fixed (variable) proportions cannot (can) increase profits
   (2) Price discriminate--prevent resale, e.g., aluminum - buy elastic buyer and supply to inelastic buyer.

f. Eliminate Market Power from price squeezes, exclusive dealing.

B. VERTICAL RESTRICTIONS (VR)
1. Vertical Restrictions are contract restraints on price, other terms, and other forms of behavior, involving nonvertically integrated firms e.g., restrictions on sales territory
2. Vertical restraints are arrangements between firms operating at different levels on the distribution chain (e.g., manufacturers and wholesalers or wholesalers and retailers) that restrict the conditions under which firms may purchase, sell, or resell, e.g. (1) Exclusive Dealership (ED); (2) Tying Arrangements (TA); (3) Resale Price Maintenance (RPM); (4) Territorial and Customer Restrictions.
3. Vertical Restrictions (VR) are restraints a firm at one stage in a chain of transactions (usually the seller) imposes upon the conduct of firms at another stage (usually the sellers' customers), e.g., RPM, TA, ED, etc.
4. Most VR not in perfect competition e.g., can't forbid decreases in price or selling competitive goods. VR is wrong where sales effort is already great and distribution costs are slight.
5. Free riding is when one firm benefits from the actions of another without paying for it. Like principal agent problem
6. Vertical Restrictions Used to Solve 4 Problems
   a. Double Monopoly Markup--"Two wrongs make a right." Both consumer and firm lose when a double markup or double marginalization.
      1. Manufacturers' Response: Encourage competition among distributors; Sell at marginal cost and charge a franchise fee; Establish sales quotas and maximum retail prices. Use VR if can't VI to stop distributor's desire to raise price as manufacturer wants larger output.
   b. Free Riding Among Dealers
      1. Manufacturers' Response: Establish exclusive territories or restrict the number of dealers; Establish minimum price (RPM); Take over the marketing effort; Monitor and subsidize or pay for dealers' sales effort. Cooperative advertising.
   c. Free Riding among Manufacturers—advertising, training, sales lists. E.g., one manufacturer advertises to same dealers as other manufactures or one manufacturer trains distributors how to repair products.
   d. Lack of Coordination Among Distributors Leading to Externalities
      1. Manufacturers' Response: e.g., the optimal location for a manufacturer is different than for a dealer. Use a combination of the policies above.

7. Most vertical restraints--tying, requirements, contracts, territorial customer restrictions, RPM--come under a Rule of Reason. Compared to PC, VR seems bad, but PC assumes no selling or distribution costs.
8. The U.S.S.C. has not permitted severely anticompetitive vertical restraints such as tying of non patented items to patented items or use of long-term requirements contracts by firms with market power.

<table>
<thead>
<tr>
<th>Case</th>
<th>Wholesaler is:</th>
<th>Retailer is:</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Competitive</td>
<td>Competitive</td>
</tr>
<tr>
<td>B</td>
<td>Competitive</td>
<td>Monopolist</td>
</tr>
<tr>
<td>C</td>
<td>Monopolist</td>
<td>Competitive</td>
</tr>
<tr>
<td>D</td>
<td>Monopolist</td>
<td>Monopolist</td>
</tr>
</tbody>
</table>

VI generally affects only D and increases welfare. Affects C if leverage and decreases welfare.

1. Empirical Evidence on Vertical Restriction (VR)--Almost always increase social welfare. Although exceptions, in general it is difficult to show VI or VR led to a decrease in social welfare.
Table 22.1 Problems that Arise in Distribution and Manufacturers’ Responses (p. 407)

<table>
<thead>
<tr>
<th>Problems in Distribution</th>
<th>Manufacturers’ Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Double monopoly markup</td>
<td>Encourage competition among distributors</td>
</tr>
<tr>
<td></td>
<td>Sell at marginal cost and charge a franchise fee</td>
</tr>
<tr>
<td></td>
<td>Establish sales quotas and maximum prices</td>
</tr>
<tr>
<td>Free riding among dealers</td>
<td>Establish exclusive territories or restrict the number of dealers</td>
</tr>
<tr>
<td></td>
<td>Establish minimum price (resale price maintenance)</td>
</tr>
<tr>
<td></td>
<td>Take over the marketing effort</td>
</tr>
<tr>
<td></td>
<td>Monitor and subsidize or pay for dealers’ sales effort</td>
</tr>
<tr>
<td>Free riding among manufacturers</td>
<td>Impose exclusive dealing on dealers</td>
</tr>
<tr>
<td>Lack of coordination among dealers leading to externalities</td>
<td>Use a combination of the policies above</td>
</tr>
</tbody>
</table>

2. VI and VR can solve 3 potential problems
   (1) Double marginalization
   (2) Insufficient pre-sale service
   (3) Inefficient input usage – use too much of competitive inputs and too little of monopoly inputs

3. While VI or VR reduces transaction costs, VI and VR can be used strategically to
   (a) increase entry barriers, e.g., exclusive dealing and price squeezes,
   (b) increase capital requirements to enter,
   (c) facilitate collusion, or
   (d) foreclose markets

4. Foreclosure can be (1) upstream where a firm has difficulty finding inputs for sale or (2) downstream where a firm has difficulty finding a buyer.
With monopoly in both vertical stages, vertical integration must have some effect on price, and it does. Before vertical integration, the marginal revenue curve of the retailer is the demand curve for the wholesaler. The wholesaler knows that because the retailer will restrict output according to its marginal revenue curve \( MR_R \), the wholesaler’s demand at any given wholesale price will be indicated by the \( MR_R \) curve. If the wholesaler’s demand is \( D_W = MR_R \), then the wholesaler’s marginal revenue curve becomes \( MR_W \). The profit-maximizing wholesaler now sets \( MC_W = MR_W \) and charges price \( P_W \). The retailer then takes \( P_W \) as its marginal cost, sets \( MC_R = MR_R \), and charges a price of \( P_R \). The wholesaler earns an economic profit equal to \( P_W DFG \). The retailer earns a profit of \( P_R BDP_W \), and consumer surplus equals triangle \( ABP_R \). Combined profits are equal to area \( P_R BFG \).

Summary: The vertical integration is better for:
1. The two monopolists as \( P_W CEG > P_R BFG \)
2. Consumers as consumer surplus \( ACP_W > ABP_R \)
If the two monopolists vertically integrated, the firm would maximize profits by considering the internally evaluated marginal cost of the wholesale product to be MC\(_w\), not P\(_w\). As a result, the integrated firm would charge a retail price of P\(_w\), joint profits would be maximized at P\(_w\)CEG, and consumer surplus would equal triangle ACP\(_w\). Vertical integration is better for the two monopolists because area P\(_w\)CEG is larger than area P\(_R\)BFG and better for consumers because area ACP\(_w\) is larger than area ABP\(_R\). In this case, public policy should do everything possible to encourage vertical integration.

**THE EFFICIENT COMPONENT PRICING RULE (ECPR)**

This involves the regulatory problem of how to get an optimal access price. (Let V = vertically integrated firm and I = independent firm)

The Efficient Component Pricing Rule (ECPR) states that the wholesale price to an independent (i.e., nonvertically integrated firm) W\(_I\) should not be higher than the difference between final (retail) price set by vertically integrated firm P\(_V\) and the marginal cost of the integrated firm at the downstream (retail) stage MC\(_V\). The ECPR states that the maximum wholesale price that the vertically integrated firm can charge is W\(_I\) = P\(_V\) - MC\(_V\).

At this W\(_I\), the independent firm’s margin (M\(_I\)) is

\[(M\(_I\)) = P\(_I\) - (MC\(_I\) + W\(_I\)) = (P\(_I\) - P\(_V\)) + (MC\(_V\) - MC\(_I\))\]

If P\(_V\) = P\(_I\), the independent firm would receive a positive margin if and only if MC\(_I\) < MC\(_V\). If ECPR is applied, production efficiency is maximized. However, the prices can be monopolistic. If MC\(_V\) = MC\(_I\) and if the VI firms set the monopoly price P\(_M\) = P\(_V\), then the access price is W\(_I\) = P\(_M\) - MC\(_V\). The best the independent can do is set its retail price P\(_I\) = at the monopoly price P\(_M\) for a zero margin.

Scherer & Ross, 3rd Edition, Chapter 14: Buyer Power and Vertical Pricing Relationships; Chapter 15: Vertical Restraints; Law and Economics (cont’d)

E. **TYING ARRANGEMENTS** (TA)—violate CAT-3—Northern Pacific (1958) said tying was per se illegal.

1. Jefferson-Parish Hospital District No. 2 vs. Hyde and Fortner (1969) defined bad tying agreement conditions
   a. The TA must foreclose (or have the potential to foreclose) a substantial volume of trade
   b. There must be two distinct products--test is whether the products are sold by themselves
   c. There must be sufficient economic power (tying firms)
   d. There is a tying arrangement

2. Tying agreements done to: (1) preserve quality and goodwill (2) allow price discrimination by estimating \(\eta\) (3) evade government regulations on price or profit (4) joint distribution efficiencies or EOS (5) reallocate risk and uncertainty (6) promote products (7) avoid socially nonoptimal resource usage (8) economize on the cost of grading each unit (9) enhance monopoly power (10) secret price discounts

3. Most tying arrangements are done for efficiency reasons and are a substitute for vertical integration. There is never an incentive to tie the goods sold in fixed proportions. There is need to prevent resale on ties.

4. A tie in can be either (1) bundling or fixed proportions package or (2) requirements. Bundling is the practice of forcing buyers to purchase an entire group of products from one supplier, e.g., computer manufacturers, fast-food companies, retailers, refiners. Bundling products (= packaging tie)--sold together in fixed proportions--one price--done when cannot price discriminate-requirements tie is when the buyer purchases all needs from one seller. Mixed bundling is when you have a choice of fixed price or à la carte at a restaurant or can buy season or single game tickets.

5. It is profitable to bundle when it reduces consumer surplus and increases a firm’s profits, and this occurs when the willingness-to-pay values or demands are heterogeneous and negatively correlated across consumers. For example, in Table 1, Customer 1 is a *relative B lover* while Customer 2 is a *relative A lover*. 
TABLE 1

<table>
<thead>
<tr>
<th>BUNDLING</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>A</td>
<td>$9</td>
<td>$10</td>
</tr>
<tr>
<td>B</td>
<td>$3</td>
<td>$2</td>
</tr>
</tbody>
</table>

If Sold A alone, TR is $9 x 2 = $18
If Sold B alone, TR is $2 x 2 = $4
Total TR = $22
If A and B are Bundled, Total Revenue (TR) of AB = $12 x 2 = $24

6. Second degree price discrimination can be: (a) two part tariffs with lump sum and per unit cost or (b) tying if variable proportions: extends monopoly power (c) bundling with fixed proportions (1) fixed price menu (2) MicroSoft Windows and Explorer browser
7. A two-part (2PT) tariff may or may not increase economic welfare. If both buyers consumed without 2PT, welfare is decreased with it. Many NFL and college teams use 2PT.

F. PRODUCT DIFFERENTIATION
1. Physical differences or product attributes
2. Quality of service
3. Plant or store geographic location
4. Subjective image differences, advertising
5. The advertising $/TR $(sales) median for all industries is = 1.0%
6. Advertising has good and bad effects
7. Amount of search = f (intended expenditures)
8. Advertising decreases the price of eyeglasses
9. Signaling is done to acquire or presume a reputation (Why Little frog croaks?)--reputation--Soviet Union--Cournot-Nash equilibrium more likely as firms more likely to ignore a change in advertising than a change in price.

TABLE 2 – DISCLOSURE

The literature draws four major conclusions about disclosure when a monopolist must test to determine the quality of its own product and antifraud laws are fully enforced.
First, where consumers cannot verify whether a firm has tested, if test costs are low the firm is relatively likely to test and disclose in the absence of a mandatory disclosure law.
Second, when consumers can verify whether or not a firm tests, it does not test and disclose if it fears bad results.
Third, since a mandatory disclosure law allows consumers to determine whether or not a firm has tested, a firm may not test under such a law.
Fourth, if testing is costly, a firm conducts less than the optimal amount of testing, so disclosure laws may be desirable.
A moderate enforcement law can lead to more deception as consumers believe label is correct. If no enforcement, don’t believe it is correct.

Advertising Definitions, Concepts, and Results
1. Informative advertising--provides information—US government 24th largest advertiser
2. Persuasive advertising--changes utility
3. Predatory advertising
4. Cooperative or goodwill advertising--increases demand for all firms
5. Direct effects of advertising--decreases the profits of rival
6. Indirect effects of advertising--causes rival to change price or quantity
7. Welfare effects of advertising are complex, especially persuasive advertising
8. Few robust properties of advertising except price advertising tends to decrease the price if compared to where advertising is prohibited, e.g., eyeglasses, why doctors, lawyers dentist against advertising until USC stopped.
9. Horizontal product differentiation--Differentiation between brands based on different product characteristics but not on different overall quality, e.g., a McDonald's Quarter Pounder is somewhat different from a Burger King Whopper or a Wendy's Single, but the overall quality of the three burgers is similar. Toyota Camry and Ford Taurus. Few brand names in fruit and vegetables.
10. Vertical product differentiation--Differentiation in the actual quality of two brands, e.g., Ben & Jerry's ice cream and Haagen Dazs ice cream have a higher fat content than Breyers’, which has a higher fat content than the typical store brand of ice cream. Lexus and Taurus--firm doing the advertising attracts customers of rival—It is likely to exceed the social optimum. Spurious product, differentiation is (1) anticompetitive and (2) increases barriers.

11. Shopping goods--goods that are relatively expensive and are purchased intermittently, i.e., appliances, automobiles and TVs.

12. Convenience goods—consumers’ goods that are relatively inexpensive items and are purchased on a regular basis, i.e., soft drinks, cigarettes, gasoline.

13. The advertising sales ratio (AD/sales) is about 1.0% for all U.S. industries and grows about with GDP. McDonald’s is 25.0%, Ford is 2%. AD/sales ratio is highest in oligopoly and lowest in pure competition and somewhere in between for monopoly.

14. Bertrand with product differentiation can lead to higher prices, but greater variety so not necessarily lower social welfare.

15. Under monopolistic competition and oligopoly can be too much or too little advertising relative to the social optimum.

16. The socially optimal number of firms \( N = (\text{CS} + \eta) \)

17. The Dorfman-Steiner rule for optimal advertising (OA) under monopoly calls for

\[
OA = \frac{ADV}{STR} = \frac{\eta_{ADV}}{\eta_{PRICE}} = \left(\frac{P - MC}{P}\right)\eta_{ADV}.
\]

If Cournot oligopoly, \( \eta_{ADV} \) is greater than under monopoly. \( OA = \frac{ADV}{STR} = \frac{\eta_{ADV}}{\eta_{PRICE}} = \left(\frac{P_1 - MC_1}{P_1}\right)\eta_{ADV} + \left(\frac{ADV}{MS_1} - \frac{\Delta MS_1}{\Delta AD_1}\right) \)

For non-Cournot oligopoly there is a retaliation factor. Thus, there is definitely more advertising under Cournot oligopoly than pure monopoly and likely more than under non-Cournot oligopoly. \( MC_{AD} = MB_{AD} \)

18. Since \( OA = \frac{\eta_{ADV}}{\eta_{PRICE}} \), for example, if \( \eta_{ADV} = 0.20 \) and \( \eta_{PRICE} = 4.0 \), \( OA = 0.05 \) or 5%

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Web Sites for Information

(1) Dr. Kamerschen’s Web Site
http://www.arches.uga.edu/~davidk

(2) Department of Justice
http://www.usdog.gov/atr/index.html

(3) FTC Federal Trade Commission
http://www.ftc.gov/

(4) Devoted to antitrust
http://www.antitrust.org/

(5) Speech by economist and former DOJ official Carl Shapiro on simulation techniques to asses the anticompetitive impact of mergers
http://www.antitrust.org/law/shapSpeech.html

(6) Interactive on-line merger games. Start with “Student Education.” Do the “Unilateral Effects of Merger Simulation Exercises” at the bottom of the page. Then graduate to Attorney Edition. “Spatial Merger Simulation” is of interest also.
http://mss.math.vanderbilt.edu/~pscrooke/MSS/sg.html

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ADVERTISING

### TABLE 1

<table>
<thead>
<tr>
<th>SEARCH GOODS--INSPECTION GOODS</th>
<th>EXPERIENCE GOODS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Learn quality attributes characteristics before buying</td>
<td>1. Learn characteristics after buying</td>
</tr>
<tr>
<td>2. a. Examples: PCs, clothing, auto equipment, garden tools, produce, barbells, furniture, oil change</td>
<td>2. Examples: software programs, perfume, processed foods, new soft drink, headache remedies, grass seed, automobiles, soap, detergent, psychotherapy, toothpaste, alcoholic beverage</td>
</tr>
<tr>
<td>b. No products are pure search or experience goods.</td>
<td></td>
</tr>
<tr>
<td>3. More informative advertising</td>
<td>3. Less informative advertising--more persuasive and repetition to achieve brand name</td>
</tr>
<tr>
<td>4. Advertising done more by retailers</td>
<td>4. Advertising done more by manufacturers</td>
</tr>
<tr>
<td>5. More advertising in magazines and newspapers</td>
<td>5. More advertising in radio and television</td>
</tr>
<tr>
<td>6. Improves market performance via better information</td>
<td>6. Worsens market performance if brand identity that increases entry barrier</td>
</tr>
<tr>
<td>7. Most goods are both search and experience goods</td>
<td>7. More false advertising--lie to make a trial purchase. Hard to fool consumers so firms don’t lie much.</td>
</tr>
<tr>
<td>8. Empirically, more likely positive effects especially price advertising. Search and retailing are likely positive.</td>
<td>8. Empirically, more likely negative effects. Experience and manufacturing are likely negative, but many exceptions.</td>
</tr>
</tbody>
</table>

*Ceteris paribus*, the advertising of search goods is less intensive, less persuasive, and more informative than for experience goods. Consumers are far more vulnerable to deceptive advertising than business purchasers, mainly because consumers buy a greater variety of goods in smaller quantities.

### TABLE 2 - CREDENCE GOODS

1. Costly to judge quality attributes even after purchase and consumption (normal use)
2. Examples: electronic repairs (test tube in tv), appendectomy, certain automobile repairs, medical care
3. Leaves consumers more vulnerable to fraud than search or experience goods--protect by more information, more technical expertise, putting burden of claim fulfilling on seller, etc.

### TABLE 3 - ADVERTISING IS A DEMAND--INCREASING COST THAT MAY INFLUENCE DEMAND INELASTICITY AND ENTRY BARRIERS.

<table>
<thead>
<tr>
<th>PRO ADVERTISING</th>
<th>CON ADVERTISING</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Information</td>
<td>Refute 1-7</td>
</tr>
<tr>
<td>2. Stimulates product development</td>
<td></td>
</tr>
<tr>
<td>3. Supports national communications – 50% magazines; 80% newspapers revenue.</td>
<td></td>
</tr>
<tr>
<td>4. Allows economies of scale to be realized</td>
<td></td>
</tr>
<tr>
<td>5. Helps maintain prosperity</td>
<td></td>
</tr>
<tr>
<td>6. Advertising is an art with cultural and entertainment value</td>
<td></td>
</tr>
<tr>
<td>7. Externalities--increase utility</td>
<td></td>
</tr>
</tbody>
</table>

Company states “If not satisfied money will be returned” response.
A. **INTRODUCTION**

Information is a valuable resource, subject to the LDMR, but it is a public good. Some firms purposely increase search cost to obtain monopoly power. Consumer search is a function of income (opportunity cost). Consumers stop search if \( P_1 < P_2 + \text{cost of search} \). Consumers search more for cars than toasters as a given % price decrease more important in cars. Coefficient of variation \( \sigma_x \) less for cars than toasters. Silly to search two stores for candy bars. Search is usually an inefficient device--e.g., books, friends’ advice, better.

B. **FIVE REASONS WHY INFORMATION IS LIMITED** (FTC 1978)

1. Information varies in reliability
2. There is a cost to collecting information \( MB = MC \)
3. Consumers can remember and readily recall only a limited amount. E.g., restaurant consumers, check particular items but not the mathematics of the total bill.
4. It is efficient for consumers to use simplified rules to process information--bounded rationality \( MB = MC \).
5. Some consumers do not have sufficient education or intelligence to process available information on all products correctly. Credence goods.

C. **ASYMMETRIC INFORMATION** (AI)

AI is when one economic agent (seller) to a transaction knows a material fact (quality) that the other (buyer) does not. Two undesirable results may come about with AI--equilibrium may not exist or if it does, there may result inefficient resource usage.

1. Market for risk neutral consumers of lemons. Akerlof (1970) autos. Market doesn’t exist or exists and only lower quality goods. Peach good car, $2000, lemon bad car $1000, so price is $1500. Peaches stay off the market, only lemons come on the market. Actually, autos a bad example as can hire expert to examine. Bad drives out good à la Gresham’s Law (1519-79)--lower quality. New and used car dealers and friends provide higher quality cars.
2. Evidence on Lemon Markets--41 states and D.C. in 1986, but few use (little problem if car 1-8 years of age, but is if 8-15 years of age)
3. Adverse selection – the situation in which insurance companies find that a disproportionately larger share of their customers come from high-risk groups. --Externality market failure
4. Moral hazard—behave carelessly if insurance or guarantee--hidden action or information
5. Market signaling (seller), screening (buyer) with limited information

D. **SEVEN SOLUTIONS**

1. Require sellers make disclosures.
2. Sellers give warranties or guarantees.
3. Liability laws—manufacturer must make good--high transaction costs.
4. Reputation--if deal fairly get repeated customers.
5. Disinterested experts--e.g., Consumer Reports.
6. Standards and Certification--R-value insulation--can be anticompetitive, e.g., licensing increases quality and increasing price--so welfare? Entry barriers--plastic pipe (plastic out as building code requires that builders use an expensive input, say copper), licensing can be harmful.
7. Offer standardized products.

E. **EXPERIMENTAL EVIDENCE**

w/o brand names and advertising or reputation, all lemons.

F. **SUMMARY**

1. If consumers have limited information about quality, no market exists or different, usually lower, quality
2. If consumers have limited information about price, no market exists or \( P > MC \) and it is possible welfare is higher with fewer firms.
3. Some consumers know prices at all stores and others incur search costs to determine price at any store.
   a. Two types of equilibria possible. (1) If enough informed shoppers \( P = MC \); (2) If relatively few shoppers informed, 2 prices \( P = MC, P > MC \) even though a homogeneous good. "Tourist traps"

Breaking an equilibrium (i.e., an equilibrium is not an equilibrium) in tourist trap is like proof by contradiction. Like Sherlock Holmes, after considering all the other possibilities, the one that remains, no matter how implausible, must be the truth.

b. A monopoly may price discriminate at different stores, between informed (buy at low price store) and uninformed have expensive input (buy at random stores)--"noisy monopolist"--"tourist" and "natives"
4. Lowering the cost of information gathering may not decrease average price, e.g., lowering search costs in a single-price equilibrium may have no effect (until search costs equal zero). But providing information on location of lowest-cost store is likely to lower average price. With imperfect information welfare may decrease as the number of firms increase. It pays to search if few firms. Doesn’t pay to decrease monopoly, e.g., doctors, if have more doctors as won’t search then.

### Patent Economics

<table>
<thead>
<tr>
<th>Costs</th>
<th>Benefits</th>
<th>Transfer</th>
</tr>
</thead>
<tbody>
<tr>
<td>BDC 1-20 Years</td>
<td>(1) ABP&lt;sub&gt;m&lt;/sub&gt; forever</td>
<td>(1) P&lt;sub&gt;m&lt;/sub&gt;BDP&lt;sub&gt;c&lt;/sub&gt;</td>
</tr>
<tr>
<td>(2) BDC after 20 years</td>
<td>(a) 1 – 20 years to firm</td>
<td>(b) &gt; 20 years to consumer</td>
</tr>
</tbody>
</table>

### Four Types of Protection of Property Rights

<table>
<thead>
<tr>
<th>Type</th>
<th>Number of Years of Protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. A. Patent – new or improved product, process, substance, or design (Edison)</td>
<td>BUSINESS</td>
</tr>
<tr>
<td>B. Patent – design</td>
<td>INDIVIDUAL</td>
</tr>
<tr>
<td>2. Copyrights – e.g. book &quot;The da Vinci Code&quot; Articles, drawings, maps, musical compositions, photographs, etc.</td>
<td>BUSINESS</td>
</tr>
<tr>
<td>3. Trademarks – words, symbols or other marks to distinguish a good or service- Kodak film, Exxon gas, not generic or lose trademark, cornflakes, cellophane</td>
<td>None</td>
</tr>
<tr>
<td>4. Trade Secret - (Coke, Chanel) only patent if can't keep secret</td>
<td>None</td>
</tr>
</tbody>
</table>

100,000 patents per year. 44% are eventually accepted in U.S., France, Germany, and UK. 5 million patents since 1790 1/50 (2%) patents make money. Produce or license. New, nonobvious, practical utility.

**New, improved product, process, substance, design.** Unlike Europe no tax to maintain and patent lengths vary in Europe.

If patent holder and patent royalty paying user are equally efficient, selling & licensing provides the same result. Inventor gets all gains from a minor discovery, but not all gains in major discovery as (P falls, Q increases, CS increases). The costs of patents include the monopoly price and the slower rate of diffusion.

**Benefits:** incentive Q stays constant and disclosure accelerates--externality public good.

Surveys show that 46% cannot get along without scotch tape; 67% in Iowa think music videos suck; 0% put gloves in glove box.

**Cost:** P • MC means monopoly power

**First-to-file (most) better than first-to-invent – U.S.**

**Invention vs innovation**

Patent shorter time than copyright as greater exclusivity and greater monopoly power with patent, but harder to obtain—e.g., "Romeo & Juliet" and "West Side Story," each can be copyrighted. The Ford assembly line was duplicated; no patent on slot machines as considered bad. Imitation discourages R&D. U.S. R&D 2.5% of GDP, whereas in Japan it is 2.7%. 17 years = length of apprenticeship in England.

Xerox plain paper copier had 16 firms emulating in 10 months. Imitation costs are about 65% development costs. Takes longer to duplicate with a patent. A small % of inventions are patent dependent.
Joint ventures (antitrust) and government prize research contracts (knowledge) are alternatives.

Joseph A. Schumpeter said monopoly leads to monopoly power and then to R&D. A patent leads to market power and with market power a firm can restrict entry.

Schumpeter said $+ R_{\text{innovation}}$, monopoly power and not $+ R_{\text{innovation}}$, size of firm.

Absent patents, many inventions would still be made as sufficient economic incentives exist in first-mover advantages or learning curve.

Antitrust policy has attempted to limit the most obvious patent abuses while still permitting patent holders to obtain the basic monopoly benefits associated with the system.

Although the courts have ruled that it is legal for a patent holder to fix the price a licensee may charge for a patented product, any attempt to extend the power of one patent into other areas, such as through a patent-pooling agreement, is on shaky grounds.

TECHNOLOGICAL ADVANCE Dynamic vs Static Efficiency – Solow shows $\frac{3}{4}$ of the increase in productivity from technological advances (W&J, Chp. 13)

A. Basic Research $\rightarrow$ Applied Research $\rightarrow$ Invention $\rightarrow$ Innovation $\rightarrow$ Diffusion

B. J. A. Schumpeter – “creative destruction” – Austrian School – monopoly best
   K. Arrow – perfect competition best as larger quantity to spread lower costs over

C. While Schumpeter thought monopoly and creative destruction was ideal for technological advance, later theoretical work suggested perfect competition or oligopoly was better. The empirical evidence is mixed.

D. Table 1 – ABILITY AND INCENTIVE $\bullet =$ long run profits

<table>
<thead>
<tr>
<th></th>
<th>Ability</th>
<th>Incentive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perfect Competition</td>
<td>Low, $\bullet = 0$</td>
<td>Moderate</td>
</tr>
<tr>
<td>Oligopoly</td>
<td>Moderate – High $\bullet \geq 0$</td>
<td>High</td>
</tr>
<tr>
<td>Monopoly</td>
<td>Moderate – High $\bullet \geq 0$</td>
<td>Low to Moderate</td>
</tr>
</tbody>
</table>

E. Game theorists suggest oligopolists may either under invest or over invest in R&D.

F. Large firms may engage in greater R&D efforts because
   1. They have greater resources to invest in R&D
   2. Large economies of scale with R&D
   3. Large firms can spread risk over more projects
   4. Large firms are often highly diversified and a technological advance in one area may be useful in another
   5. Large firms have longer time horizons, i.e., lower discount ratio.

G. Smaller firms may be better because of tendency for bureaucratic inefficiency in large firms.

H. 1. Measurement issues
   2. R&D output (patents) increases proportionally with firm size—JAS says more than proportionate
   3. R&D effort is greater the higher the CR, but the problem is that CR leads to R&D effort not vice versa.
   4. Even if no patents, still innovate for first mover and learning curve advantages
   5. A small percent of innovations are patent-dependent—secrecy better.
   6. Swift second, Netscape first, but Explorer leads

I. Fundamental determinants of technological advance
   1. Product market demand
   2. Technological opportunity
   3. Appropriability conditions

J. Case Studies

K. Graph of (R&D)/sales or (ADV)/sales maxs at 50-55% CR$_4$
H. **LEARNING CURVE**, Labor Only

\[ L = A + BN^{-\beta} \]

\( N \) = cumulative units of output produced

\( L \) = labor input per unit of output

\( \overline{A}, \overline{B} > 0 \quad 0 < \overline{B} < 1 \)

<table>
<thead>
<tr>
<th>Value of ( \beta )</th>
<th>Value of ( L )</th>
<th>Is there Learning?</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>( A + B )</td>
<td>No</td>
</tr>
<tr>
<td>&gt;0</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>( \rightarrow 1 )</td>
<td>( \rightarrow A )</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**EXPERIENCE CURVE**, All Inputs – e.g., commercial and military aircrafts, autos (Ford), semiconductors and sound movies

General equation

\[ AC(q) = MAC + De^{-\lambda q} \]

\( MAC \) = minimum \( AC \)

\( e \) = transcendental number = base of the natural log = 2.718

\( D \) = Cost or disadvantage if firm produces zero units of \( q \)

\( \lambda \) = constant rate at which \( AC \) declines or speed of learning

\( q \) = cumulative output

Specific equation

\[ AC(q) = 10 + \frac{100}{2^{\lambda q}} \]

<table>
<thead>
<tr>
<th>( \lambda )</th>
<th>( q )</th>
<th>( 2^{\lambda q} )</th>
<th>( \frac{100}{2^{\lambda q}} )</th>
<th>AC(q)</th>
<th>AC(q)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5</td>
<td>( \rightarrow \infty )</td>
<td>( \rightarrow \infty )</td>
<td>( \rightarrow 0 )</td>
<td>( \rightarrow 10 )</td>
<td>Minimum</td>
</tr>
<tr>
<td>1.5</td>
<td>0</td>
<td>1</td>
<td>( \rightarrow 100 )</td>
<td>( \rightarrow 110 )</td>
<td>Maximum</td>
</tr>
</tbody>
</table>
Means (1935) defined an administered price as "set by administrative action and held constant for a period of time," and defined a market price as an "interaction of buyers and sellers."

This is a partial adjustment model to estimate speed of price adjustment and the impact of market concentration.

1. \[ P_t - P_{t-1} = a (P^*_t - P_{t-1}), \quad 0 \leq a \leq 1 \]

where \( P^*_t \) is the desired price in period \( t \), \( P_t \) is the actual price in period \( t \), and \( a \) measures the speed of adjustment. Combining terms in \( P_{t-1} \), (equation 1) becomes

2. \[ P_t = aP^*_t + (1-a)P_{t-1} \]

If \( a \) is small, most of the weight in this average goes to the previous period’s price. Adjustment to the desired price then proceeds slowly. If \( a \) is large, most of the weight in the average that determines the current price goes to the desired price, and adjustment is rapid.

Domberger (1979), estimated values of speed-of-adjustment parameter for 21 British industries over the period 1963-1974. He then estimated the following equation to explain differences in the speed of adjustment parameter in terms of differences in industry concentration. See equation (3). This partial adjustment model is used to estimate speed of price adjustment and the impact of market concentration.

3. \[ a = 0.3141 + 0.0066CR \]

so market concentration accelerates, rather than delays, price adjustments.

Carlton (1986), using the Stigler-Kindahl data for U.S. finds in equation (4) that

4. \[ \text{average duration} = 4.97 + 16.12CR^4 \]

5. This Carleton result is the opposite of Domberger’s result, as for Carlton, a high CR leads to longer duration or a lower “\( a \),” while for Domberger a high CR leads to a shorter duration or a high “\( a \).”

6. Cost of price change (1) physical (menu) (2) managerial gathering and analyzing information and (3) customers must assimilate.

PUBLIC AND PRIVATE INTEREST THEORIES OF REGULATION

A. PUBLIC INTEREST THEORY -- Regulation is government intervention to change market outcomes, prices, terms of service, entry.

I. Regulation is done to correct economic, social, or political failures so as to promote efficiency or redistribute income.

1. Natural monopoly (NM) [two types--(1) positive NM says competition is not possible (2) normative NM says competition is not desirable. That is, normative NM is when the market average cost is minimized when there is a single producer. Positive NM is when there is a prediction there will be only a single firm in the market. Thus, e.g., it is quite possible that an unregulated normative natural monopoly would be an oligopoly.

a. NM exists if there are subadditive costs; Economies of Scale (EOS) are not necessary nor sufficient for NM, \( P > MC \) raises revenue & destroys surplus. If homogeneous and everywhere EOS is sufficient. The greater the demand price inelasticity the less surplus is destroyed.

b. Is NM sustainable? EOS are sufficient to be sustainable. There is little empirical evidence NM are unsustainable.
c. **Second-Best or Ramsey pricing** is when you maximize total social benefits subject to the requirement that profits cannot be negative. It is needed when first-best MC pricing produces a revenue deficiency. It is optimal monopoly discriminatory pricing scaled down to TR = TC

\[ \frac{(p - mc)}{p} = \frac{k}{ii} \text{ if unrelated goods.} \]

\[ \frac{(p - mc)}{p} = \frac{k}{(ii - ij)} \text{ if related goods.} \]

If \( k = \text{Ramsey number} = o \), there is perfect competition.

If \( k = 1 \), there is pure monopoly.

Ramsey prices are uniform pricing schemes as all units sold to the same consumer in the same time period are priced the same.

d. Impediments to Ramsey pricing: information intensity, asymmetric information, extent of regulation, second-best considerations, distribution implications, and legal restrictions. Welfare = \( -\pi + CS \) - regulation board’s administrative costs.

e. **Allais Rule**--The price of a product is proportionate to its MC and the proportion is the same for all products. \( P_x = (MC_x)(K) \), where the coefficient of proportionality is determined by the budget constraint. Inefficient as doesn’t consider \( \eta \).

f. **Peak-load** (capacity is fixed, demand is variable and output not storable) In peak periods, prices are high to ration available capacity to those with the greatest willingness to pay. The optimal price reflects the opportunity costs of not having additional capacity. When congestion costs from all periods exceed the costs of another unit of capacity, expansion is warranted. In the U.S. regulated firms avoided peak load pricing because of AJ effects.

g. There are three cases where regulation is unnecessary or harmful. (1) Firms have an incentive to innovate to become a monopolist (2) The market is competitive or contestable (3) The costs of regulation are high or there are inept regulators.

---

2. Prevention of undue price discrimination
3. Externalities
4. Conservation of resources
5. Informational disparities
6. Destructive, ruinous, or cutthroat competition
7. Other justifications

---

II. Privatizing

III. Alternatives to regulation
1. Contestable market
2. Competitive franchising bidding--eliminate excess profit not \( P > MC \) award to bidder offering lowest price. Sell right to highest bidder so government gets monopoly rents. Still need regulation and incumbents have the advantage on repeated bids. The regulators could give it to one offering the lowest rates (e.g., franchises 100 years ago). Why not bid for the regulators jobs?
3. Government ownership - e.g., TVA - 75% of water utilities and 20% electricity utilities are owned by government. There is no evidence that government sets socially maximizing prices.

IV. Price Controls
B. **PRIVATE INTEREST THEORY**

I. Regulation is done to help some private interest group. If not:

(1) Why were inherently competitive industries such as airlines, textiles, and trucking regulated if purpose was to protect the public against monopolist pricing?

(2) Why do unregulated firms persistently wish to enter regulated industries if regulators are pushing prices and profits to levels consistent with competition?

II. Alternative private interest viewpoints.

1. Rent seeking
2. Stability
3. Public choice
4. Industry capture – intentional and unintentional
   a. Regulators previously worked or going to work in utility industry
   b. PSCs have limited resources so rely on others
   c. PSCs are appointed or elected. Does it affect performance?

5. Regulation as taxation
   a. Cross subsidies exist when the revenues from a product are less than its costs. The concerns of cross subsidies are equity & inefficient bypass or entry. In measuring subsidies, you avoid common cost...
allocations if use stand-alone or incremental costs.

(1) George Stigler & Claire Friedland, "What Can Regulators Regulate? The Case of Electricity," Journal of Law and Economics 5 (October 1962) and others found that regulation didn't lower electric prices, stock prices or profits, but that residential users subsidize commercial and industrial users except in nuclear facilities.

(2) Stigler & Friedland error

6. Government Habit
7. Bureaucracy
8. Modern interest group – Abe Lincoln
9. Contract or transactions cost

C. DEREGULATION
1. Deregulation has 2 efficiency gains. (1) eliminates cross subsidies and (2) lower prices overall.
2. Both regulation and deregulation are imperfect with costs and benefits for each.
3. Results in Airlines: Price down, quality up, safety is constant, entry is up but profits are down. But overall safety is up as airline quantity is up and air travel is approximately 100 times less risky per mile than driving an automobile.

D. REGULATION
1. Enabling legislation sets out broad requirements for regulated prices to be just, reasonable, and not unduly nondiscriminatory and investment is based on public convenience and necessity. So this offers little practical guidance for regulators.
2. Two types regulation with focus on profits (cost of service or rate base regulation) or prices (incentive regulation)
3. Cost of service (COS) uses fully distributed costs (FDC) with arbitrary common cost allocations.
4. The problems of COS include: poor incentives for cost efficiency, allocative inefficiency of FDC, insufficient incentives for new products and innovative services, an onerous regulatory burden, excessive incentives for diversification into competitive markets, and lack of effectiveness.
5. Price-cap regulation is the leading example of incentive regulation with a formula for exogenous inflation and technological change. Under price-cap regulation there is a high-powered incentive to minimize costs, introduce new technologies and services, and set Ramsey prices. PC regulation may involve significant allocative inefficiency if there is cost uncertainty and firms want to eliminate products and reduce service quality.
6. The Loeb and Magot mechanism gets around hidden information and actions if the regulator doesn't care about the distribution of the surplus as it gives the firm title to total surplus by paying it a subsidy equal to consumer surplus. By making the firm’s profits equal to total surplus, the firm in maximizing its profits will efficiently select its cost reduction effort and output. This is distributionally inefficient. Revelation principle.

E. THE EFFECTS OF STATIC PRICE REGULATION
1. a. Let \( P_C \) = competitive price
   \( Q_C \) = competitive output
   \( Q_D \) = Quantity Demanded
   \( Q_S \) = Quantity Supplied
   \( P_R \) = regulated price
   \( Q_R \) = regulated output
   \( P_M \) = monopoly price if unregulated
   \( Q_M \) = monopoly output

   (1) \( P_M < P_R < P_C \), no restraint, quantity = \( Q_M \), and there is a deadweight loss (DWL)
   (2) \( P_M > P_R > P_C \), decrease (DWL), but still some DWL as \( Q_M < Q_R < Q_C \)
   (3) \( P_M = P_R = P_C \), best as no DWL as quantity = \( Q_C \)
   (4) \( P_M > P_R < P_C \), DWL can be \( \frac{Q_R}{Q_D} \) unregulated case; \( Q_D > Q_R > Q_S > Q_M \); there is social harm if price too low, e.g., natural gas

2. Averch-Johnson or A-J Effect
   a. Calculate a fair rate or return—undefinable, but close to unregulated return
(1) Revenue Requirement

\[ (RR) = OC + D + T + r(RB) = OC + T + r(V - D) \]

b. Rate of return (ROR) regulation can decrease ROR by lowering profits or increasing capital base.

c. 

\[ ROR = \frac{PQ - wL - uK}{P_K K} = \Pi \]

where \( w = \) wage rate; \( u = \) user cost of capital; \( P_K = \) purchase price of a unit of capital; \( K = \) number of units of capital; \( P = \) price of output; \( Q = \) quantity output; \( L \) and \( K = \) units of labor and capital, and \( \Pi = \) total profits

\[ \frac{\Pi}{K} = \text{value of capital stock} \]

d. A-J effects lead to an increase in capital usage relative to labor (not gold plating)

1. Utilities avoided using peak-load pricing.
2. Utilities invested in capacity that exceeded demand even during peak demand periods.
3. Instead of forming regional power pools to share electricity, power companies preferred to invest in enough capacity to meet their peak requirements.
4. Utilities delayed the introduction of less capital-intensive technologies.
5. Regulated utilities refused to lease facilities even if leasing reduced costs because leased facilities are not included in a firm’s rate base.
6. Public utilities set too high a standard of service reliability.
7. Utilities permitted, even encouraged, outside suppliers to sell inputs at high prices.
8. Utilities invested in capital-intensive areas that increased their rate bases even if the investments resulted in economic losses.

e. Under or over capitalization if sales maximizing goal or dynamic factors such as fear of expropriation or high adjustment costs. Alfred Kahn feels that AJ does more good than harm as offsets the tendency of a monopolist to decrease the quantity. “I have more faith in greed than regulation” (Gordon Gekko).

f. Regulatory lag means delays in the institution enforcing regulation. This is good if costs are decreasing, but bad if increasing.

g. X-inefficiency or organizational slack is alleged to be higher under COS or ROR regulation.

PUBLIC VS PRIVATE INTEREST

I. WHY REGULATE?

A. MARKET FAILURE---Regulation is required to correct failure and serve public interest better.

1. Natural Monopoly---economies of scale
2. External Economies and Diseconomies---autos, chemical plants, steel furnaces pollute the environment
3. Avert Informational Disparities---companies withhold information that might cause investors to value securities less or lack the technical expertise to recognize health or safety hazards in purchased goods

B. GOVERNMENT HABIT--Deep roots in American history no matter how efficiently market is working those who hold political power are displeased or consider the goods too important to be priced and allocated by market. Stronger propensity in Europe though wellhead regulation of natural gas price in 1954.

C. WELL-ORGANIZED VESTED INTERESTS

1. Intentional--producers better organized and able to manipulate political levers than consumers--Producers are the principal benefactors that the regulation produces.
   a. Producers work through legislators--laws passed, e.g., (1) cutthroat competition railroads and trucks to regulate trucks and inland water shipping; (2) avoid spoiling the market through new entry--occupational licensing by states--1,500 occupations
2. Unintentional--even when legislators have public interest at heart--CAPTURE THEORY--agency--friendly regulators appointed; staffs depend on superior technical knowledge of regulated firms; identification and approval by well-organized firms vs remote and unresponsive public.
DIRECT REGULATION

II. GENERAL CHARACTERISTICS OF REGULATED UTILITIES

A. CONTROLLED MONOPOLIES for this class of business “affected with a deep public interest” are obligated to charge fair, nondiscriminatory rates and to render satisfactory service to the entire public on demand in return for freedom from substantial direct competition and a permitted but not assured fair return on investment.

B. THE INDUSTRIES generally classified as public utilities are:
   1. Electric
   2. Gas
   3. Telephone and Telegraph
   4. Water
   5. Transportation
   6. Maybe sewerage disposal, steam heating, cable television, etc.

C. CHARACTERISTICS
   1. Natural monopolies—economies of scale
   2. Regulation: RR = OC + RB x FR
   3. Necessary Service
   4. Single Service—exception gas and electric
   5. Franchises and eminent domain
   6. Site restriction
   7. Nonstorable service—especially electricity and telephone
   8. Large plant investment—capital intensive—average ratio plant to revenues 4.0 electric; 3.0 telephone; 2.0 gas utilities; average manufacturing less than 1.0 (a.75)
   9. High fixed costs and falling marginal costs

D. STATE AND LOCAL REGULATION
   1. MUNICIPAL FRANCHISES were the first form of control exercised over public utilities in this country, except for some attempts at regulation directly by state legislatures; gradual shift to states; local predominate until about 1920. 35 states were regulated between 1907-1970; 50 states were regulated by 1973.
   2. States—weak commissions with no rate authority—safety, statistics, assistance; 1893 Rhode Island; 1844 New Hampshire
   3. States—definite extensive authority—1907 Wisconsin and New York; only Nebraska no state electric regulation now—now private electric industry other than through cooperatives.
   4. Today—3-7 commissions, appointed—budget, $2,000,000, Georgia 5 elected; States regulate—electric, gas, water, transit, telephone, trucking, rails.

E. FEDERAL REGULATION
   1. Interstate Commerce Commission (ICC)—1887 (abolished 1995)—11 members, regulates railroads and other interstate carriers
   2. Federal Communications Commission (FCC)—1934—7 members, interstate communications
   4. Securities and Exchange Commission (SEC)—1934—5 members, utility and non-utility securities transactions

INDIRECT REGULATION

III. FEDERAL ANTITRUST LAWS—DOJ, FTC

A. SHERMAN ANTITRUST ACT 1890 --Senator John Sherman (Ohio)—criminal and civil—treble damages—reasonable or unreasonable—interstate commerce with exceptions. Monopoly and attempts to monopolize illegal—remedial and punitive

B. FEDERAL TRADE COMMISSION ACT 1914 -- preventive—unreasonable methods of competition

C. CLAYTON ACT 1914--specified illegal anticompetitive practices
   1. Discriminatory pricing
   2. Tying contracts
   3. Acquisition of the ownership shares of competitors
   4. Establishment of interlocking directorates (same or related people sit on the board of competing firms)

D. ROBINSON PATMAN ACT 1936 -- bad differential pricing act

E. CELLER ANTIMERGER ACT 1950--closed loophole in Clayton Act—cannot acquire shares or assets if tend to substantially lessen competition or level to create a monopoly. Horizontal, vertical, and conglomerate mergers.

IV. STATE ANTITRUST LAWS

FUTURE DEREGULATION

It is important to note that (1) not all natural monopolies have been regulated (e.g., computer, autos, and aluminum at one time); (2) not all regulated industries are (or perhaps ever were) natural monopolies (e.g., production of natural gas); and (3) where industries are regulated, regulation is often incomplete, not always covering price, entry, quality of service, etc. Moreover, even in stages 2 and 3, a utility may be a natural monopoly in only part of its overall operations. This is especially true for industries such as electricity, natural gas, and telecommunications. The lifecycle idea also implies that
both the public interest and the private interest theories of regulation may have merit at different stages of the lifecycle. See Table 1.
TABLE 1--Stage of Utility Life Cycle: Approximate Intervals

<table>
<thead>
<tr>
<th>Utilities</th>
<th>Competitive period</th>
<th>Begin natural monopoly regulation. Rapid growth often displaced prior utilities, e.g., telephone replaced telegraph</th>
<th>Stability maturity</th>
<th>Deregulation or Reregulation-revert to nonnatural monopoly in favor of natural competition as regulation is no longer needed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Stage 1</td>
<td>Stage 2</td>
<td>Stage 3</td>
<td>Stage 4</td>
</tr>
<tr>
<td>Manufactured gas</td>
<td>1800-1820</td>
<td>1820-1880</td>
<td>1880-1920</td>
<td>1920-1950</td>
</tr>
<tr>
<td>Natural gas</td>
<td>1900-1910</td>
<td>1910-1950</td>
<td>1950-</td>
<td>---</td>
</tr>
<tr>
<td>Telegraph</td>
<td>1840-1850</td>
<td>1850-1916</td>
<td>1916-1930</td>
<td>1930-</td>
</tr>
<tr>
<td>Railways: All</td>
<td>1820-1835</td>
<td>1835-1910</td>
<td>1910-1935</td>
<td>1935-</td>
</tr>
<tr>
<td>Passenger</td>
<td>---</td>
<td></td>
<td>1910-1960</td>
<td>1960-</td>
</tr>
<tr>
<td>Freight</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electricity</td>
<td>1870-1885</td>
<td>1885-1960</td>
<td>1960-</td>
<td>---</td>
</tr>
<tr>
<td>Street railways</td>
<td>1870-1885</td>
<td>1885-1912</td>
<td>1912-1922</td>
<td>1922-</td>
</tr>
<tr>
<td>Telephone: Local</td>
<td>1873-1880</td>
<td>1880-1947</td>
<td>1947-</td>
<td>---</td>
</tr>
<tr>
<td>Long distance</td>
<td>1880-1890</td>
<td>1890-1960</td>
<td>1960-1983</td>
<td>1984-</td>
</tr>
<tr>
<td>Airlines</td>
<td>1920-1925</td>
<td>1925-1960</td>
<td>1965-1975</td>
<td>1975-</td>
</tr>
<tr>
<td>Source: Shepherd (1985) p. 343</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

According to Shepherd (1985) many industries in the United States have passed through the various stages (see Table 2) and in particular, the following have now passed into the fourth stage: railroads, trucking, airlines, television, railways, telegraph, and manufactured gas. In addition, major segment of the telephone, natural gas, cable television, and electricity industries may now be ready for deregulation and/or deregulation. (p. 557)

TABLE 2--Traditional Utility Sectors and Their Current Status

<table>
<thead>
<tr>
<th>Primarily Monopolies</th>
<th>Primarily, Partly, or Potentially Competitive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local telephone service</td>
<td>Long-distance telephone</td>
</tr>
<tr>
<td>Local electric power distribution</td>
<td>Specialized postal services</td>
</tr>
<tr>
<td>Local natural gas distribution</td>
<td>Railroads</td>
</tr>
<tr>
<td>Basic postal services</td>
<td>Waterways</td>
</tr>
<tr>
<td>Cable television</td>
<td>Pipelines</td>
</tr>
<tr>
<td>Urban transit</td>
<td>Airlines</td>
</tr>
<tr>
<td>Water and sewage</td>
<td>Broadcasting</td>
</tr>
<tr>
<td>Ports</td>
<td>Hospitals</td>
</tr>
<tr>
<td>Source: Shepherd (1985) Table 12-1, p. 330</td>
<td>Trucking</td>
</tr>
</tbody>
</table>