ECON 120 – Regulation and Antitrust Policy Drake University, Spring 2023 William M. Boal Blackboard: http://drake.blackboard.com Old exams: http://wmboal.com/antitrust Email: william.boal@drake.edu

# BOAL'S ECON 120 SLIDESHOW HANDOUTS

# **SPRING 2023**

ECON 120 – Regulation and Antitrust Policy Drake University, Spring 2023 William M. Boal Old exams: <u>wmboal.com/antitrust</u> Blackboard: <u>drake.blackboard.com</u> Email: <u>william.boal@drake.edu</u>

### **TENTATIVE COURSE SYLLABUS**

1. Resources | 2. Requirements | 3. Schedule

#### 1. Resources

**Description from Course Catalog:** Economic foundations, history, and recent developments in antitrust policy and economic regulation of monopolies. Emphasis on U.S. policy, with occasional comparisons to the European Union and other countries.

**Prerequisites:** ECON 002 and a course in calculus (MATH 028 or 050). The calculus prerequisite is essential—students must know how to find derivatives.

**CBPA Promises:** "Our graduates will have the skills and experiences to thrive in a complex, diverse, and evolving world. They will be (1) Proficient in their fields, (2) Data-driven, strategic problem solvers, (3) Effective communicators, (4) Ethical stewards, and (5) Global and multicultural citizens." This course addresses all five Promises, but especially Promises (1), (2), and (5).

**University "Engaged Citizen" Area of Inquiry:** In this course, students will learn to participate effectively in the democratic process primarily through these outcomes:

- 2. Establish skills, knowledge, or dispositions that lead them to be active stewards for the common good. Should business be regulated for the common good? If so, how? The loudest voices in democratic society often advocate only for themselves—whether businesses or consumers. This course establishes skills in looking beyond the interests of particular groups to the common good. It begins by developing a framework—economic welfare analysis—for evaluating the impact on all of society of business behavior and government regulation. Then this framework is applied throughout the course to problems of imperfect competition and monopoly and to possible government responses.
- 3. Critically reflect on the social, economic, or political issues that they will face as citizens. As citizens, we face important economic issues about whether and how business should be regulated. For example, how should the government respond if companies coordinate their pricing, if companies grow very large, if big companies try to merge, if companies "tie" or bundle their products so that consumers must buy all or none, or if companies charge different prices to different customers? Some industries, such as electric power, are now heavily regulated. Should they be deregulated and allowed to set their own prices? If not, how should government set prices for them? In this course, we reflect on these issues using economic analysis and data. Then we critically examine important legal cases and current policies followed by the Department of Justice and regulatory agencies which are intended to address these issues.

and to a lesser extent through this outcome:

 Learn to evaluate the mix of diverse values and interests that influence democratic decision-making. Government policies are the outcome of democratic decision-making among people with diverse interests. Even bad policies usually benefit someone. As we study market failure and possible government responses, we use economic theory and examples to determine who wins and who loses, and use economic welfare analysis to evaluate how much they win or lose.

Who should take this course: This course counts as an elective for the following programs:

- Economics major; Quantitative Economics major; and Economics minor
- Law, Politics, and Society major.
- Business Law major; and Law and Business minor.

**Class meetings:** For spring 2023, CRN 9937 meets Mondays and Wednesdays, from 12:30 to 1:45 in Aliber 103. For the week of Jan 31-Feb 2 only, the course meets in Cline Hall 206.

#### How to contact instructor:

- Electronic mail: <u>william.boal@drake.edu</u>
- Office: 319 Aliber Hall
- Telephone and voice mail: 271-3129

The quickest way to reach me is by email, which I check continually throughout the day. Please do *not* send messages by Blackboard, which I check infrequently.

**Office hours:** Office hours are a time when you can get help with homework, ask questions about course material, and discuss your grade or anything related to this course or economics in general. Bring your slideshow handouts. My office hours this semester are **[to be announced]**. Please make an appointment at least 3 hours in advance on Starfish. Zoom links are posted on Starfish and Blackboard. If these hours are inconvenient due to schedule conflicts, please send email to schedule a special appointment and suggest some alternate times.

#### **Resources to purchase:**

- Required: W. Kip Viscusi, Joseph E. Harrington Jr., and David E.M. Sappington, *Economics of Regulation and Antitrust*, 5<sup>th</sup> edition, Cambridge, Massachusetts: MIT Press, 2018, ISBN 9780262038065. Available for purchase at University Bookstore. Alternatively, it can be rented as an online e-textbook at <a href="https://mitpress.ublish.com/">https://mitpress.ublish.com/</a>. Used copies are OK, provided they are 5<sup>th</sup> edition.
- Required: *Boal's Econ 120 Slideshow Handouts*, a course packet. Available for purchase at University Bookstore. Alternatively, you may download and print this packet from Blackboard.
- Required: A simple calculator (capable of addition, subtraction, multiplication and division) for exams.
- Recommended: Your favorite introductory microeconomics textbook, for reference.
- Recommended: Your favorite calculus textbook, for reference.
- Recommended: A three-ring binder and highlighter for your course packet.

#### **Online resources:**

- Drake email. Course announcements will occasionally be sent to this account, so check it daily. Announcements often get diverted to "Junk" or "Clutter" folders, so check them as well as your inbox.
- Blackboard (<u>drake.blackboard.com</u>). If you have difficulty accessing Blackboard, please contact the Drake ITS HelpDesk at 271-3001.
- Course materials page (<u>wmboal.com/antitrust</u>). Old exams are posted here.

#### 2. Requirements

**Course grade:** Each exam and homework exercise is graded on a scale from zero to 100. Your overall course score is calculated as a weighted average, using the following formula:

SCORE = 75% × Exams + 10% × average Slideshow Quiz score + 10% × average Problem Set score + 5% × Presentation score - Absences

A SCORE of 97 or above is required for an A+, 93 for an A, 90 for an A-, 87 for a B+, 83 for a B, 80 for a B-, 77 for a C+, 73 for a C, 70 for a C-, 67 for a D+, 63 for a D, and 60 for a D-. SCORES will not be rounded before awarding letter grades. Extra credit work is not available. Exams, problem sets, and quizzes may not be redone for a better grade.

**Exams:** All exams are closed-book, closed-notes. Simple calculators are permitted, *but graphing calculators, calculators with alphabetical keyboards, wireless devices and mobile phones are not permitted.* If you do not bring a simple calculator, you must take the exam without a calculator. The final exam counts double and is required—students who do not take the final will not pass the course.

**Slideshow quizzes:** These online multiple-choice quizzes cover the slideshows presented in class and are accessed from Blackboard. They consist of 5-10 multiple-choice questions and are due the day after the topic is covered in

class. You can take each slideshow quiz up to three times until the due date, but the questions will change. Blackboard records your *average* score, so don't retake a quiz unless you are confident that you can improve.

**Presentation:** Students will make short presentations of a recent antitrust case. Detailed instructions will be posted on Blackboard.

**Policy on late work:** Early submissions are welcome but *late submissions are not accepted*. If your computer fails, please use a computer in Cowles Library or some other device to complete assignments. Computer problems are *not* an acceptable excuse for late assignments. Students expecting to gone on an athletic trip when an assignment is due should submit that assignment before leaving.

**Policy on absences:** Attendance is taken at every class. Students may miss up to three classes for any reason without penalty (except when exams are given). Thereafter, one point will be deducted from the course SCORE for each absence. Athletic team trips, documented by an official schedule sheet, will not be counted as absences.

**Policy on rescheduling exams:** If your own medical emergency, or a serious illness or death in your family requires you to miss an exam, you may be given a makeup exam. However, you must inform me of the emergency before the exam by email, and soon afterward submit a written explanation (including date of absence and documentation if possible).

Certain other circumstances are acceptable reasons for rescheduling an exam. These include religious observance, medical appointment, interview trip, and athletic team trip. Because these circumstances can be predicted, you must send me an email request to reschedule, with an explanation, at least one week before the date of the exam. *Unacceptable* reasons include family vacation, ride leaving early for break, early plane flight, overslept, etc.

**Policy on grade corrections:** Accurate grading is important. If you find an error, please let me know as soon as possible. The deadline for regrading homework, problem sets, or midterm exams is the day of the final exam.

**Policy on computers and phones in class:** Computers, tablets, and phones must be turned off during class unless I specifically announce otherwise.

**Disability accommodation:** Any student who has a disability that substantially limits their ability to perform in this course under normal circumstances should contact <u>Student Disability Services</u>, 271-1835, to request accommodation. Any request must be received from Student Disability Services at least one week before the necessary accommodation. All relevant information will be kept strictly confidential. If your accommodation requires extra time for exams, you should contact me at least a week before each exam to schedule an alternative time and place.

#### How to succeed in this course:

- Read the textbook before class.
- Study with pencil and paper. Economics is inherently mathematical. Math is difficult to absorb without trying it yourself. As you study your text or notes, try to reproduce any numerical examples and mathematical derivations while covering the page. Everything will make more sense if you work it through yourself.
- Further prepare for exams by working old exams, posted at <u>wmboal.com/antitrust</u>. Don't look at the answer key until after you have solved each problem, or you will become overconfident.
- If you are doing all this but not doing as well as you would like, please ask me for help. Talk to me after class, send email to <u>william.boal@drake.edu</u>, or visit my office hours. I am eager to help!

**Policy on academic integrity:** The CBPA's Academic Integrity Policy (<u>www.drake.edu/cbpa/about/cbpapolicies</u>) applies to this course. The consequences of violating this policy vary, depending on my evaluation of the severity of the dishonesty. A violation (such as cheating, plagiarism, or fabrication) can result in a grade of zero on the test or assignment, an F for the course grade, or even expulsion from the University. Please read the policy and ask for clarification if necessary.

### 3. Schedule

Textbook should be read before class, but skip any mathematical examples—I will present simpler ones in class. Dates below in [brackets] are tentative. If bad weather or an epidemic closes campus, most likely we will have class online using Blackboard Collaborate.

#### Calculus Review (to be completed before course starts)

**Big ideas:** Rates of change are fundamental to modern economic theory. The economic term "marginal" corresponds to the mathematical term "derivative."

Famous quote: «Quiconque connaît la notation algébrique, lit d'un clin-d'oeil dans une équation le résultat auquel on parvient péniblement par des règles de fausse position, dans l'arithmétique de Banque.» ["Anyone who understands algebraic notation, reads at a glance in an equation results reached arithmetically only with great labor and pains."] --A. A. Cournot, *Researches on Mathematical Principles of the Theory of Wealth* (1838)

- □ Read chapter 1 of online lecture notes, entitled "Review of Basic Calculus" (<u>wmboal.com/imicro</u>).
- □ Optionally, if your calculus is rusty, view "AP Calculus AB" videos on derivatives at www.khanacademy.org.
- □ Optionally, review chapters on techniques of differentiation in your favorite calculus textbook.
- □ Slideshow quiz due Jan 24.

#### Part 1: Review of Perfect Competition

Big ideas: Perfect competition is economically efficient because it ensures marginal-cost pricing.

Famous quote: "Every individual ... neither intends to promote the public interest, nor knows how much he is promoting it ...He intends only his own gain, and he is in this ... led by an invisible hand to promote an end which was no part of his intention. Nor is it always the worse for society that it was no part of it. By pursuing his own interest he frequently promotes that of society more effectually than when he really intends to promote it." --Adam Smith, *The Wealth of Nations* (1776)

A. Demand and supply [Jan 24, 26]

- □ Read Viscusi, Harrington, and Sappington chapter 1.
- □ Bring the following slideshow handouts to class: Government regulation of business: introduction. Demand. Supply. Equilibrium. Elasticities. The price elasticity of demand. Price elasticity and revenue. The price elasticity of supply.
- □ Slideshow quiz due Jan 27. (Do the quiz *after* the slideshows are covered in class.)
- $\square$  Problem set due Jan 31.

#### B. Competitive firms [Jan 31]

- □ Bring the following slideshow handouts to class: Cost curves. Profit maximization. Cost curves in the short run. Profit maximization in the short run. Short-run market equilibrium. Long-run market equilibrium.
- □ Slideshow quiz due Feb 1.
- $\Box \quad \text{Problem set due Feb 2.}$
- C. Welfare analysis [Feb 2, 7]
  - □ Bring the following slideshow handouts to class: Willingness-to-pay and consumer surplus. Marginal cost and producer surplus. Economic efficiency and welfare analysis. Perfect competition. Efficiency of perfectly competitive markets. Welfare analysis of price controls and quotas.
  - □ Slideshow quiz due Feb 8.
  - $\Box$  No problem set. Instead, study for exam.

First exam [Feb 9]

- Prepare by reviewing slideshow handouts and studying old exams posted online (<u>wmboal.com/antitrust</u>).
- You may use a simple calculator, but graphing calculators, calculators with alphabetical keyboards, wireless devices and mobile phones are NOT permitted
- Exam seating is assigned, so please check the projector screen before you sit down.

#### Part 2: Antitrust Theory

**Big ideas:** Monopoly, oligopoly and collusive markets are economically inefficient because they push price above marginal cost and reduce the quantity traded. But concentrated markets are not necessarily inefficient.

Famous quote: "People of the same trade seldom meet together, even for merriment and diversion, but the conversation ends in a conspiracy against the public, or in some contrivance to raise prices." --Adam Smith, *The Wealth of Nations* (1776)

A. Monopoly theory and antitrust [Feb 14, 16]

- □ Read Viscusi, Harrington, and Sappington chapter 3.
- □ Bring the following slideshow handouts to class: Monopoly and barriers to entry. The monopolist's marginal revenue. Monopoly pricing. Welfare analysis of monopoly. The structure-conduct-performance paradigm. Antitrust statutes and their enforcement.
- □ Slideshow quiz due Feb 17.
- $\square$  Problem set due Feb 21.

#### B. Theories of oligopoly and collusion [Feb 21, 23]

- □ Read Viscusi, Harrington, and Sappington chapter 4.
- Bring the following slideshow handouts to class: Oligopoly. Basic game theory. Cournot duopoly. Cournot oligopoly. Bertrand duopoly. Joint profit maximization (collusion). Cartels in the real world. Cheating in a cartel. Antitrust law on price-fixing.
- □ Slideshow quiz due Feb 24.
- $\Box \quad \text{Problem set due Feb 28.}$

C. Theories of market structure [Feb 28, Mar 2]

- □ Read Viscusi, Harrington, and Sappington chapter 5.
- □ Bring the following slideshow handouts to class: Measures of industry concentration. Concentration and profits. Scale economies. Entry costs and equilibrium entry. Entry barriers and contestable markets. Preventing entry.
- □ Slideshow quiz due Mar 3.
- $\Box$  No problem set. Instead, study for exam.

Second exam [Mar 7]

- Prepare by reviewing slideshow handouts and studying old exams posted online (wmboal.com/antitrust).
- Bring a straightedge to this exam—a ruler or an extra pencil.
- You may use a simple calculator, but graphing calculators, calculators with alphabetical keyboards, wireless devices and mobile phones are NOT permitted.
- Exam seating is assigned, so please check the projector screen before you sit down.

#### Part 3: Antitrust Policy

Big ideas: Horizontal and vertical mergers have very different effects on prices and economic efficiency, and so are treated differently by the courts. Whether other business practices harm economic efficiency often depends on context, so courts use the "rule of reason."

Famous quote: "Consumption is the sole end and purpose of all production; and the interest of the producer ought to be attended to only so far as it may be necessary for promoting that of the consumer." --Adam Smith, *The Wealth of Nations* (1776).

Another famous quote: "The successful competitor, having been urged to compete, must not be turned upon when he wins."

-- Judge Learned Hand, United States v. Aluminum Co. of America, 148 F 2nd 416 (2d Cir. 1945).

A. Policy on horizontal mergers [Mar 9, 21]

- □ Read Viscusi, Harrington, and Sappington chapter 6.
- Skim 2010 Horizontal Merger Guidelines (at www.justice.gov/atr/public/merger-enforcement.html).
- □ Bring the following slideshow handouts to class: Mergers. Motivations for horizontal mergers. Historic horizontal merger cases. Horizontal merger enforcement today. Changes in concentration. Upward pricing pressure. Other ways to evaluate mergers. Conglomerate mergers.
- □ Enjoy Spring Break, March 13-17!
- □ Slideshow quiz due Mar 22.
- $\square$  Problem set due Mar 23.

B. Policy on vertical mergers and vertical restraints [Mar 23, 28]

- □ Read Viscusi, Harrington, and Sappington chapter 7.
- Skim 2020 Vertical Merger Guidelines (at www.justice.gov/atr/public/merger-enforcement.html).
- □ Bring the following slideshow handouts to class: Vertical mergers and transaction costs. Successive monopolies and double marginalization. Foreclosure for monopoly extension. Other foreclosure. Law and policy on vertical mergers. Vertical restraints. Tying.
- □ Slideshow quiz due Mar 29.
- $\square$  Problem set due Mar 30.

C. Policy on monopolization and price discrimination [Mar 30, Apr 4]

- □ Read Viscusi, Harrington, and Sappington chapter 8.
- □ Bring the following slideshow handouts to class: Law on monopolization. Historic monopolization cases. Predatory pricing. Reputation models of predatory pricing. Law and policy on predatory pricing. Refusal to deal. Monopoly price discrimination. Market-segmenting price discrimination. Law and policy on price discrimination.
- □ Slideshow quiz due Apr 5.
- $\square \quad \text{Problem set due Apr 6.}$
- D. The new economy and global antitrust [Apr 6, 11]
  - □ Read Viscusi, Harrington, and Sappington chapter 9.
  - □ Bring the following slideshow handouts to class: Network effects. Microsoft cases. Two-sided platforms. Google cases. Competition Policy in the European Union. Competition Policy in China.
  - □ Slideshow quiz due April 12.
  - $\Box$  No problem set. Instead, study for exam.

Third exam [Apr 13]

- Prepare by reviewing slideshow handouts and studying old exams posted online (<u>wmboal.com/antitrust</u>).
- You may use a simple calculator, but graphing calculators, calculators with alphabetical keyboards, wireless devices and mobile phones are NOT permitted
- Exam seating is assigned, so please check the projector screen before you sit down.

#### Part 4: Economic Regulation

**Big ideas:** When monopoly is inevitable, regulatory agencies often set prices. To maximize economic efficiency, they should set prices equal to marginal cost, but sometimes they can't or won't.

**Famous quote:** "I can't tell one plane from the other. To me, they're all just marginal costs with wings." --Alfred Kahn

A. Introduction to economic regulation [Apr 18, 20]

- □ Read Viscusi, Harrington, and Sappington chapter 10, and chapter 12 (through page 526).
- □ Bring the following slideshow handouts to class: Brief history of regulation in the U.S. Theories of regulation. Economic theories of regulation. Natural monopoly. Pricing with economies of scale. Multipart tariffs. Multiproduct firms. Ramsey pricing.
- □ Slideshow quiz due Apr 21.
- $\Box$  Problem set due Apr 25.

#### B. Regulation of electric power [Apr 25, 27]

- Read Viscusi, Harrington, and Sappington chapter 12 (pages 531-end), chapter 13, and chapter 17 (through page 683).
- □ Bring the following slideshow handouts to class: *Traditional rate-of-return regulation. Incentive regulation. Common costs and joint costs. Peak-load pricing in theory. Peak-load pricing in practice: electric power. Markets for wholesale electric power. The California energy crisis of 2000-01. Market power in wholesale power markets.*
- □ Slideshow quiz due Apr 28.
- $\square \quad \text{Problem set due May 2.}$

C. Regulation and deregulation of transportation [May 2, 4]

- □ Read Viscusi, Harrington, and Sappington chapters 15 (through page 616) and 16.
- Bring the following slideshow handouts to class: Effects of price regulation in competitive markets. Indirect effects of regulation. Measuring the effects of regulation. Regulation of railroads and trucking. Effects of deregulating railroads and trucking. Regulation of airlines. Effects of deregulating airlines.
- □ Slideshow quiz due May 5.
- $\Box$  No problem set. Instead, study for final exam.

#### Final Exam

The University Registrar (<u>www.drake.edu/registrar</u>) has scheduled the final exam for this course on **Tuesday**, **May 9** from noon to 1:50 PM. The content of the final exam is comprehensive and includes questions from all parts of the course.

- Prepare by reviewing the hour exams you have already taken and old final exams posted online (<u>wmboal.com/antitrust</u>).
- Bring a straightedge to this exam. You may use a simple calculator, but graphing calculators, calculators with alphabetical keyboards, wireless devices and mobile phones are NOT permitted.
- Exam seating is assigned, so please check the projector screen before you sit down.

[end of syllabus]

# PART 1

# Review of Perfect Competition

### GOVERNMENT REGULATION OF BUSINESS: INTRODUCTION

Page 1

### GOVERNMENT REGULATION OF BUSINESS: INTRODUCTION

•Why regulate industry?

### Why regulate business?

- A free market is not necessarily an efficient, competitive market.
- Markets may fail in several possible ways.

### Market failure

- A. *Market power* might threaten economic efficiency.
- B. One side of the market (e.g., consumers) might lack *information* to demand good products.
- C. Businesses might create *external costs or benefits*.

## Kinds of government regulation

- A. Economic regulation and antitrust policy: controlling market power.
  - 1. Antitrust policy: promoting competition.
  - 2. Price and entry regulation: controlling monopoly.
- B. Health and safety regulation: correcting for consumers' lack of information.
- C. Environmental regulation: fixing externalities.

# Antitrust policy: promoting competition

- Originated at state level in 19th century.
- Began at federal level with Sherman Act of 1890.
- Addresses price-fixing, practices that limit competition, and mergers.
- Enforcement through \_\_\_\_\_



# Price and entry regulation: controlling monopoly

- Also originated at state level.
- Began at federal level with Interstate Commerce Commission in 1887.
- Many other regulatory agencies established in early 20th century.
- Enforcement through regulatory \_\_\_\_\_, which decide what firms may \_\_\_\_\_, the market and what they may set.
- Many industries now deregulated.

### GOVERNMENT REGULATION OF BUSINESS: INTRODUCTION

Page 2

Economic evaluation of regulation

- Regulation improves an industry's performance if it increases economic efficiency.
- Growing recognition in government that economic efficiency is important.

### Analyzing regulation

- Normative views: What should be done?
- *Positive views*: What actually happens in regulatory agencies and why?

### Positive views of regulation

- *Naive view*: What actually happens is what should happen to maximize efficiency.
- *Capture theory*: Regulatory agencies are "captured"—that is, controlled—by the firms they are supposed to regulate.
- *Competitive theory*: Regulated firms and their customers compete for influence over regulatory agencies.

# Market failure versus government failure

- Sometimes regulation decreases economic efficiency in an industry.
- Sometimes regulation is a "cure that is worse than the disease."

# Conclusions

- Regulation can increase economic efficiency by
   controlling market never
  - controlling market power,
  - correcting for consumers' lack of information, or
  - fixing externalities.
- We focus here on controlling market power by promoting competition (\_\_\_\_\_\_) and controlling monopoly (\_\_\_\_\_\_)
- However, sometimes government failure is worse than market failure.







### Reasons for Law of Demand

(1) Substitution effect: As price of one good rises, consumers substitute other goods that become relatively cheaper.

- Example: If price of beef rises, consumers switch to \_\_\_\_\_.
- Example: If price of orange juice rises, consumers switch to \_\_\_\_\_

### Reasons for Law of Demand

(2) Income effect: Even if no substitutes are available, a rise in price implies consumer cannot afford as much as before. Purchasing power of income falls, so buy less of everything, including this good.

• Example: If apartments rents go up, consumers cut back on everything, move to

# DEMAND

### Page 2

# Other factors influencing the quantity demanded

- Prices of related goods.
- Income of consumers.
- Expected future prices of same good.
- Population and demographic structure.
- Product quality.
- Preferences.

# Change in demand = shift in demand curve

- When these other factors change, we say there is a change in demand. The demand curve shifts.
- By contrast, when price of good itself changes, no change in demand and no shift in curve



# Effect of prices of related goods on quantity demanded

- Can be positive or negative.
- *Substitute* = good whose price has a effect on quantity demanded of first good.
- Complement = good whose price has a effect on quantity demanded of first good.

# Effect of income on quantity demanded

- Can be positive or negative.
- *Normal good* = good whose demand as income increases.
- *Inferior good* = good whose demand as income increases.

### Conclusions • The Law of Demand states that price and the quantity demanded by consumers are related, ceteris paribus. • It holds because any price change has a \_effect and an \_\_\_\_\_ effect. • Other things can change the quantity demanded, shifting the demand curve,

including the of related goods and the of consumers.







# Reasons for Law of Supply

- Increasing opportunity cost generates the law of supply.
  - As more of the good is produced, the cost of producing an additional unit usually
  - A \_\_\_\_\_ price must be offered to induce suppliers to sell more.

# Other factors influencing the quantity supplied

- Prices of inputs.
- Technology.
- Government regulations.
- Expected future prices of same good.
- Number of suppliers.







# Effect of *technology* on quantity supplied

- New production technology has a positive effect on quantity supplied.
- Reason: Improved production methods \_\_\_\_\_\_\_\_the cost of production, by allowing producers to do more with less.
- Examples:



### **SUPPLY** Page 3

# Effect of government regulations on quantity supplied

- Have a negative effect on quantity supplied to the extent that they increase the cost of production.
- Most government regulations do increase the cost of production-otherwise they would be adopted voluntarily!

### Example: environmental regulations shift supply of electricity to the • Environmental Supply of electricity Price of electricity regulations require electricity generators to put "scrubbers" on

Quantity of electricity

smokestacks.

# Effect of expected future prices on quantity supplied

- Have a negative effect on the quantity supplied.
  - If prices are expected to fall in the future, suppliers sell now.
  - If prices are expected to rise in the future, suppliers sell now.
- Examples:



# Conclusions

- The Law of Supply states that price and the quantity supplied are related, all other things held constant.
- It holds because as more of a good is produced, the cost of producing an additional unit usually
- Other things can change the quantity supplied, shifting the supply curve, including the prices of inputs and the available production



• Let:

- $Q_D =$  quantity demanded.
- $Q_s =$  quantity supplied.
- At any given price,  $Q_{\text{D}}$  might not equal  $Q_{\text{S}}.$
- But in that case, price will tend to

• Not an equilibrium!













Example 2: market for steel			
If price = \$20, excess		_=tons.	
Price per ton	Quantity demanded (tons)	Quantity supplied (tons)	
\$10	800	200	
\$20	700	250	
\$30	600	300	
\$40	500	350	
\$50	400	400	
\$60	300	450	
\$70	200	500	

Example 2: market for steel				
If price = \$70, excess		_=tons.		
Price per ton	Quantity demanded (tons)	Quantity supplied (tons)		
\$10	800	200		
\$20	700	250		
\$30	600	300		
\$40	500	350		
\$50	400	400		
\$60	300	450		
\$70	200	500		

### EQUILIBRIUM

### Page 3

Example 2: market for steel Equilibrium price = \$			
Price per ton	Quantity demanded (tons)	Quantity supplied (tons)	
\$10	800	200	
\$20	700	250	
\$30	600	300	
\$40	500	350	
\$50	400	400	
\$60	300	450	
\$70	200	500	



# How soon do markets reach equilibrium?

- It may *take time* for markets to adjust to a new equilibrium.
- Usually, the better the communication between buyers and sellers,
  - the \_\_\_\_\_\_ the duration of any excess supply or excess demand.
  - the \_\_\_\_\_ the market reaches the new equilibrium.

# Do markets always reach equilibrium eventually?

- *Government policies* may deliberately prevent price from reaching equilibrium.
- Examples:

# Conclusions

- *Equilibrium price and quantity* are determined by the intersection of supply and demand curves.
- Any other price is likely to be unstable because it will create either a shortage (*excess*\_\_\_\_) or a surplus (*excess*\_\_\_\_)

### ELASTICITIES Page 1



- What is an elasticity?
- How are elasticities related to derivatives?

### Elasticity: definition

- Suppose y is a function of x: y = f(x).
- The elasticity of y with respect to x is given by:



• Elasticity can be thought of as *the derivative of a function, corrected for size of y and x.* 



# The meaning of elasticity

- $\varepsilon = \frac{\% \ change \ in \ y}{\% \ change \ in \ x}$
- Percent change in y =  $\epsilon \times$  percent change in x.
- Example: Suppose ε = 3 and x increases by 1%. Then y increases by (approximately)

# Finding formulas for elasticities: example

• Suppose y = 200 - 50x.

• Then 
$$\varepsilon = (dy/dx) (x/y)$$
  
= (-50) (x/y)

# Finding formulas for elasticities: another example

- Suppose y = 1 2/x
- Then  $\varepsilon = (dy/dx) (x/y)$ =  $(2/x^2) (x/y)$ =  $(2/x^2) (x/(1 - 2/x))$

### ELASTICITIES Page 2

# Alternative definition of elasticity using natural logarithms

- Recall differentiation rule for logarithms:
  - d ln(y) / dy = \_\_\_\_\_
  - $d \ln(x) / dx =$ \_\_\_\_\_
- Substituting and canceling gives:

$$\varepsilon = \frac{dy}{dx} \left( \frac{x}{y} \right) =$$

# Elasticity from logarithmic relationship

• Economist Douglas (with help of mathematician Cobb) estimated aggregate production function for U.S. using least squares: ln(output) = constant + 0.74 ln(labor input)

+ 0.26 ln(capital input).

- Elasticity of output with respect to labor input =
- Elasticity of output with respect to capital input =

Cobb, Charles W.; Douglas, Paul H. (1928). "A Theory of Production". *American Economic Review 18* (Supplement): 139–165.

Sign of elasticity = 
$$\left(\frac{dy}{dx}\right)\left(\frac{x}{y}\right)$$

- If x and y are both positive, sign of derivative is the same as sign of elasticity.
- Negatively-related variables have \_\_\_\_\_\_elasticities.
- Positively-related variables have elasticities.
- Unrelated variables have \_ elasticities.



• Proportional variables have unitary elasticity.

# Elasticities of simple power functions

- Suppose y = a x<sup>b</sup>, where a and b are given constants.
- Then  $\varepsilon = (dy/dx) (x/y)$ = (ab x<sup>b-1</sup>) (x/(a x<sup>b</sup>))
- $= ab x^{b-1} x a^{-1} x^{-b}$
- $= ab a^{-1} =$
- Thus, simple power functions have constant elasticities equal to their powers.

# Elasticities of simple power functions: examples

- Suppose  $y = 5 x^4$ . Then  $\varepsilon =$ \_\_\_\_\_.
- Suppose  $y = 7 x^{1/2}$ . Then  $\varepsilon =$ \_\_\_\_\_.
- Suppose  $y = 3 x^{-1/3}$ . Then  $\varepsilon =$ \_\_\_\_\_.
- Suppose y = 27/x. Then  $\varepsilon =$ \_\_\_\_\_.

### ELASTICITIES Page 3

# Slopes and derivatives have units of measure

- Example: Suppose q = quantity of gas (in gallons) and p = price of gas (in dollars).
- Then dq/dp = limit of slope: change in quantity of gas / change in price.
- Units of measure for the derivative (or slope) are \_\_\_\_\_\_("gallons per dollar").

### Elasticities are pure numbers

- Continuing example, elasticity =  $\left(\frac{dq}{dp}\right)\left(\frac{p}{q}\right)$ .
- Units of measure for this elasticity are  $\left(\frac{gallons}{dollars}\right)\left(\frac{dollars}{gallons}\right)$ .
- Elasticity is unit-free because units of measure

# Change in units of measure affects slope, but not elasticity

- Suppose quantity was measured in liters instead of gallons. Then q and dq/dp would both increase by a factor of 3.8.
- Suppose price were measured in cents instead of dollars. Then p would increase by a factor of 100 and dq/dp would decrease by a factor of 100.
- But elasticity = (dq/dp)(p/q) would be

### Conclusions

- The calculus definition of elasticity is
- Negatively-related variables have negative elasticities.
- Proportional variables have elasticities = \_\_\_\_\_
- Power functions have constant elasticities.
- Elasticities are \_\_\_\_\_ numbers, unaffected by units of measure.

### THE PRICE ELASTICITY OF DEMAND

#### Page 1

# THE PRICE ELASTICITY OF DEMAND

- What is the "price elasticity of demand"?
- What does its value reveal?

# Price elasticity of demand

• The price elasticity of demand measures the responsiveness of demand for a good to its price:

$$\varepsilon = \frac{\% \ change \ Q}{\gamma}$$

 $\mathcal{E} = \frac{\mathcal{E}}{\mathcal{H} \text{ change } P}$ where changes are measured along the demand curve.

• "Law of Demand" implies ε < 0 (but many authors drop negative sign).

### Calculus definition

- Given a demand function Q = f(P).
- Price elasticity of demand =  $\varepsilon$  =
- Or equivalently,  $\varepsilon =$







### THE PRICE ELASTICITY OF DEMAND

### Page 2

# What determines $\epsilon$ ? Close substitutes

- Demand is more elastic (  $|\epsilon|$  is larger) if close substitutes for a good are available.
- Examples of goods with close substitutes:
- Examples of goods without close substitutes:

## What determines ε? Share in total budget

- Demand is more elastic ( |ε| is larger) if the good occupies a large share of consumers' total budgets.
- Examples of goods that occupy a large share of consumers' budgets:
- Examples of goods that occupy a small share of consumers' budgets:

# What determines ε? Time to respond

- Demand is more elastic ( |ε| is larger) the more time consumers have had to anticipate and adjust to a price change.
- Examples where consumers have little time to respond to a price change:
- Examples where consumers have ample time to respond to a price change:







### ELASTICITY AND REVENUE



### ELASTICITY AND REVENUE

• When the price of a good rises, does revenue received by sellers also rise?











### ELASTICITY AND REVENUE











- Suppose output of wheat has fallen by 2% and the price elasticity of demand for wheat is -0.4.
- Demand is thus
- Will wheat farmers' revenue fall?



%.

### ELASTICITY AND REVENUE

Page 3

### Conclusions

- If demand is inelastic, then an increase in price will \_\_\_\_\_\_ spending by buyers (or revenue received by sellers).
- If demand is elastic, then an increase in price will \_\_\_\_\_\_ spending.
- If demand is unitary-elastic, then a change in price will \_\_\_\_\_\_ spending.

### THE PRICE ELASTICITY OF SUPPLY



Q

### THE PRICE ELASTICITY OF SUPPLY







Application, eighth edition, Fort Worth: Dryden, 2000, page 258, table 8.3

Conclusions

The price elasticity of supply is defined as
\_\_\_\_\_\_\_, measured along the
supply curve.
It is \_\_\_\_\_\_\_ if the inputs required to
produce the good are freely available and
have many alternative uses, and if producers
have \_\_\_\_\_\_ to adjust to price
changes.

ECON 120 - Regulation and Antitrust Policy





















# COST CURVES











AC



q

### PROFIT MAXIMIZATION

### Page 1



• How should a firm choose its level of output to maximize profit?











### PROFIT MAXIMIZATION













# PROFIT MAXIMIZATION





# Profit-maximization rule for a price-taker

- Suppose firm takes price as given.
  That is, the output market is *competitive*.
- In words: Produce output up to point where cost of last unit starts to exceed \_\_\_\_\_\_ of good.
- Calculus: Choose q so that MC(q) = p.

# Qualification for a price taker and exception

- Qualification: MC(q) must intersect p from below.
  - Otherwise, a profit *minimum*!
- Exception: Profit must not be negative.
  Must have TR(q) > TC(q) or equivalently,
  - p > AC(q).Otherwise, could do better shutting down
  - (q=0)!

# Firm supply: definition

- Function showing how much output a profitmaximizing firm will produce at any given price.
- Graph is identical to MC curve, above its intersection with AC.



# Example 1 • Suppose: • $TC(q) = 2q + (q^2/100)$ • p = \$5. • Then MC(q) = • Setting MC(q) = \$5 yields: q\*=• Profits = Revenue - TC(q) = 5q - TC(q)=


#### PROFIT MAXIMIZATION

Page 4





#### THE FIRM'S COST IN THE SHORT RUN Page 1

Page 1

#### THE FIRM'S COST IN THE SHORT RUN

• What do the firm's cost curves look like when there is not enough time to adjust all inputs?

#### Responding to a drop in price

- Suppose a business like a copy shop faces a sudden change in demand—say, a drop in price.
- It can quickly reduce its costs for paper, toner, electricity, and maybe labor.
- But it may have signed a long-term lease for the copy machine and the store.
- What quantity should it produce now?

#### Adjusting inputs quickly

- All businesses find that some inputs are easier to adjust quickly than others.
- Examples: Easy or hard?
  - Materials inputs \_\_\_\_\_\_
  - Labor inputs \_\_\_\_\_\_
  - Equipment inputs \_\_\_\_\_
  - Buildings and structures \_\_\_\_\_\_

#### "Short-run" versus "long-run" behavior

- *Long run* = period of time over which people \_\_\_\_\_ fully adjust to a change.
- *Short run* = period over which people fully adjust to a change.
- In short run, firm can adjust only *some* inputs to maximize profits.

## Two kinds of inputs in the short run

- *Variable inputs* = inputs that can be adjusted in the short run.
  - Examples: \_
- *Fixed inputs* = inputs that cannot be adjusted in the short run. Levels are dictated by past decisions.
  - Examples:

## Two kinds of cost in the short run

- *Short-run variable cost (SVC)* = payments for variable inputs.
  - Examples: \_
- *Short-run fixed cost (SFC)* = payments for fixed inputs.
  - Examples: \_\_\_\_
- *Short-run total cost (STC)* = SVC + SFC.

#### THE FIRM'S COST IN THE SHORT RUN Page 2











SATC

q

#### THE FIRM'S COST IN THE SHORT RUN Page 3













### THE FIRM'S COST IN THE SHORT RUN Page 4









#### PROFIT MAXIMIZATION IN THE SHORT RUN











#### PROFIT MAXIMIZATION IN THE SHORT RUN







- Revenue: \$9000
- Revenue:
- Costs: \$3000 paper \$5000 labor \$500 electricity

\$1200 rent store

\$300 lease machine

- \$0 • Costs: \$1200 rent store
  - \$300 lease machine







#### PROFIT MAXIMIZATION IN THE SHORT RUN











#### SHORT-RUN MARKET EQUILIBRIUM

Page 1

#### SHORT-RUN MARKET EQUILIBRIUM

- What does a short-run industry supply curve look like?
- Why is a short-run competitive equilibrium efficient?

## Competitive equilibrium: assumptions

- Consumers take prices and income as \_\_\_\_\_\_, choose quantities of goods to maximize individual utility.
- Firms (producers) take prices of inputs and outputs as \_\_\_\_\_\_, choose quantities of inputs and output to maximize individual profit.



inputs, new firms can enter the industry, and old firms can leave.

## Very short run supply: assumptions

- Firms have no time to adjust any inputs or output in response to prices.
  - Thus quantity supplied is given.
- Consumers do have time to adjust purchases.
- Prices are flexible.
- Examples:



## Efficiency of markets in the very short run

- Price P\* rations demand so that output is distributed to its most valued uses.
- Gains from trade are exhausted.
- However, price P\* does \_\_\_\_\_\_ affect quantity supplied.

#### SHORT-RUN MARKET EQUILIBRIUM

Page 2

#### Short-run supply: assumptions

- Some inputs of the firm are fixed, others are variable.
- The number of firms in the industry is fixed.
- Prices of inputs used by the industry are fixed.







## Efficiency of competitive markets in the short run: total output

- As before, price P\* rations demand so that output is distributed to its most valued uses.
- But now, price P\* also determines total output Q\*:
  - Suppliers' MC of last unit = demanders' marginal willingness-to-pay for last unit.

## Allocation of production across firms: the problem

- Suppose a given level of output Q\* must be allocated between two firms (A and B):  $Q^* = q_A + q_B.$
- How should output levels q<sub>A</sub> and q<sub>B</sub> be allocated to minimize combined total costs
   = STC<sub>A</sub>(q<sub>A</sub>) + STC<sub>B</sub>(q<sub>B</sub>) ?

#### SHORT-RUN MARKET EQUILIBRIUM

Page 3



- Must minimize:  $STC_A(q_A) + STC_B(Q^*-q_A)$ .
- To minimize, set derivative = 0:

$$0 = \frac{a}{dq_A} [STC_A(q_A) + STC_B(Q^* - q_A)]$$
  
$$0 = SMC_A(q_A) - SMC_B(Q^* - q_A)$$

 $0 = SMC_A(q_A) - SMC_B(q - q_A)$  $0 = SMC_A(q_A) - SMC_B(q_B)$ 

Conclusion:

Efficiency of competitive markets in the short run: allocation of production

- Do markets automatically allocate production across firms so that MCs are equal?
- \_\_\_\_\_, because to maximize profit, each firm chooses output so that its SMC = market price:

$$SMC_A = P^* = SMC_B$$
.



- The market price efficiently
- rations demand.
- determines \_\_\_\_\_
- \_\_\_\_\_across firms.

#### LONG-RUN MARKET EQUILIBRIUM

- What does a long-run industry supply curve look like?
- Why is long-run competitive equilibrium efficient?





#### Long-run supply: assumption (2)

- Potential firms can *enter* the industry to exploit profit opportunities.
- Existing firms can *exit* the industry to avoid losses.









- no potential entrant could make positive profits.
- no existing firm makes losses.



- If all existing firms have the same cost curves as potential entrants, then
  - all existing firms have \_\_\_\_\_\_
    economic profits.
  - P = MC = \_\_\_\_\_ for all firms.

## The long-run zero-profit condition

- If all existing firms have the same cost curves as potential entrants, then
  - all existing firms have <u>zero</u> economic profits.
  - P = MC = <u>minimum AC</u> for all firms.





#### Long-run supply: assumption (3)

- Suppose all firms' cost curves are identical (or at least have same min AC),
- and each firm's costs curves are unaffected by other firms' behavior.
- "Constant cost industry"











- As in very short run, price P\* rations demand so that output is distributed to its most valued uses.
- As in short run, price P\* determines total output Q\* so that suppliers' MC of last unit = demanders' marginal willingness-to-pay for last unit.
- As in short run, price P\* allocates production across firms to \_\_\_\_\_\_ total costs.
- In addition, in long run, only firms with lowest \_\_\_\_\_ produce output.



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#### WILLINGNESS-TO-PAY AND CONSUMER SURPLUS

• How can we measure the gains from trade for consumers?

## Two ways to read a demand curve

- 1. Horizontally: for any given price, the curve shows how many units consumers are willing to buy.
- 2. Vertically: for any given quantity, the curve shows the maximum price that consumers are willing to pay for the last unit.









#### Page 2

Price on demand curve = willingness-to-pay = consumers' marginal benefit

- Maximum price consumers are willing to pay for a unit = marginal benefit (in \$) that consumers enjoy from that unit.
- Rational consumers buy until marginal benefit equals \_\_\_\_\_.











- Total CS = sum of consumer surpluses for all units purchased.
- Total CS = benefit to consumers of being able to buy as much of the good as they want (at the market price) rather than being unable to buy it at all.
- Often just called "consumer surplus."

Page 3













Page 4









#### MARGINAL COST AND PRODUCER SURPLUS

Page 1

#### MARGINAL COST AND PRODUCER SURPLUS

•How can we measure the gains from trade for producers?

#### Two ways to read a supply curve

- *1. Horizontally*: for any given price, the curve shows how many units producers want to produce and sell.
- 2. *Vertically*: for any given quantity, the curve shows the minimum price producers must be paid to supply that quantity.









#### MARGINAL COST AND PRODUCER SURPLUS

#### Page 2

Price on supply curve = producers' marginal cost of production

- Minimum price producers must be paid = marginal cost to producers of producing the last unit.
- Rational producers sell until their marginal cost equals the market \_\_\_\_\_.







## Total producer surplus: definition

- Total PS = sum of producer surpluses for all units sold.
- Total PS = net benefit to producers of being able to sell as much of the good as they want (at a given price) rather than being unable to sell it at all.
- Often just called "producer surplus."



#### MARGINAL COST AND PRODUCER SURPLUS













Page 1

#### ECONOMIC EFFICIENCY AND WELFARE ANALYSIS

• How can we measure gains and losses from changes in the economy?

#### Economics and public policy

- An important application of economics is deciding whether government policies are worthwhile.
- *Welfare economics* = branch of economics that tries to quantify the benefits and costs of government policies, and other changes in the economy.

#### "Win-win" changes

- Occasionally, a policy or other change in the economy creates one or more winners and \_\_\_\_\_ losers.
- A change that creates at least one winner and \_\_\_\_\_ losers is called a *Pareto improvement.*\*



\*Vilfredo Pareto, 1848-1923, Italian economist working in France

## Example of a Pareto improvement

- Suppose at a particular intersection, cars initially are not permitted to turn right while traffic light is red.
- Then rule is changed so that cars may turn right on red. Assuming no safety issues...
- Drivers wanting to turn right \_\_\_\_\_.
- Other drivers \_\_\_\_\_.

#### "Win-lose" changes

- Unfortunately, most changes in the economy create \_\_\_\_\_\_ winners and losers.
- Example: The invention of radial tires, which last several times as long as older designs, reduced employment in the U.S. tire industry by an estimated 40%.

## Examples of "win-lose" changes Change Winners Losers

Invention of radial tires	
Invention of personal computers	
Quotas on imports of peanuts	
Elimination of quotas on imports of garments	
on imports of garments	

#### ECONOMIC EFFICIENCY AND WELFARE ANALYSIS

#### Page 2

#### Deciding on "win-lose" changes

- If a proposed government policy creates both winners and losers, how can we decide whether it *should* be done?
- This is a problem in \_\_\_\_\_\_ economics.
- Economists in the 1930s proposed a conceptually simple test.



#### The compensation test of Kaldor and Hicks



- If the gains to the winners are greater than the losses to the losers, the change is said to pass the *compensation test*.
- In principle, winners could potentially compensate losers and still come out ahead.
- In practice, winners rarely do so.

Nicholas Kaldor, "Welfare Propositions of Economics and Interpersonal Comparisons of Utility," *The Economic Journal*, Vol. 49, No. 195 (Sept. 1939), p. 550. John R. Hicks, "The Foundations of Welfare Economics," *The Economic Journal*, Vol. 49, No. 196 (Dec. 1939), pp. 710-711.

#### Potential Pareto improvement

- A change that passes the compensation test is also called a *potential Pareto improvement* because if compensation were paid, it would be a *Pareto improvement*.
- Note that for any such change, if we add up the gains and losses to everyone in society, we get a \_\_\_\_\_\_ number.

## Example of potential Pareto improvement

- Suppose a government program benefits farmers by \$5 billion but costs taxpayers \$3 billion.
- This program \_\_\_\_\_ the compensation test.
- It is also called a \_\_\_\_\_ Pareto improvement (even if farmers do not actually compensate taxpayers).





#### ECONOMIC EFFICIENCY AND WELFARE ANALYSIS

Page 3



#### Criticisms of the compensation test: What about the losers?

- In practice, winners rarely compensate losers.
- If you feel the losers are much more deserving than the winners, you might \_\_\_\_\_\_ a policy that passes the compensation test.
- For example, if you feel that tire workers are more deserving than tire consumers, you might banning radial tires.

#### Criticisms of the compensation test: Efficiency versus equity

- Sometimes an increase in economic efficiency brings a decrease in (equality, fairness).
- For example, suppose a policy makes rich people better off by \$2 billion and makes poor people worse off by \$1 billion.
- Passes compensation test but makes society less equal.

But consistent use of the compensation test might spread losses around

- For example, tire workers are also consumers of garments and peanuts.
- If we stick to the compensation test for *all* decisions, maybe \_\_\_\_\_\_ can be a net winner overall.



#### PERFECT COMPETITION Page 1

#### PERFECT COMPETITION

- What is "perfect competition"?
- Why do firms take price as a given?

## Competition and perfect competition: definitions

- *Competition* = process by which each firm tries to increase its own profits at the possible expense of \_\_\_\_\_\_ firms' profits.
- *Perfect competition* = competition among firms that produce perfect \_\_\_\_\_\_ and take the market \_\_\_\_\_\_ as given.

## What it means to "produce perfect substitutes"

- Consumers don't care whom they buy from.
- Products of different firms are identical in consumers' eyes—no brand preference.
- Consumers buy from firm offering lowest
- Examples:

## What it means to "take market price as given"

- Firm must match price charged by rivals.
- Firm believes it will not affect price by changing output.
  - Cannot push price \_\_\_\_\_ by selling less.
  - Cannot push price \_\_\_\_\_ by selling more.
- No "market power" (i.e., pricing power).





#### PERFECT COMPETITION Page 2



What is exact relationship between market elasticity and firm's elasticity?

- Let  $\varepsilon_{\rm M} = \frac{\Delta Q/Q}{\Delta P/P} =$  market elasticity of demand.
- Assume that if firm increases its own output by some amount (Δq), then its rivals do change their outputs.

So  $\Delta q = \Delta Q$ .

• What is the *firm*'s elasticity of demand?

What is exact relationship between market elasticity and firm's elasticity? (cont'd)

- Let S = q/Q = firm's market share. So q = S Q.
- Let  $\varepsilon_{\rm F} = \frac{\Delta q/q}{\Delta P/P}$  = firm's elasticity of demand.
- Substitute:  $\frac{\Delta q/q}{\Delta P/P} = \frac{\Delta Q/(SQ)}{\Delta P/P} = \frac{\Delta Q/Q}{\Delta P/P} \cdot \frac{1}{S}$
- so  $\epsilon_F =$







#### PERFECT COMPETITION Page 3

#### Conclusions

- A firm takes price as given if it thinks the price will \_\_\_\_\_ change if it sells more, either because it will simply take business away from its rivals, or because it is too to make a difference.

Page 1



- Are perfectly competitive markets efficient?
- Do they divide the gains from trade equally between buyers and sellers?
- Why are some groups opposed to competition?



- Suppose equilibrium in the market for teeshirts occurs at Q=500.
- Is this more efficient than, say, Q=300 or Q=600?

























#### Page 3







# Market controls Although total surplus is maximized by competition, groups of buyers or sellers may enjoy higher surplus if the market is controlled in some way. They may try to get government to impose

• Or they may try to gain *market power*.



regulations like

Page 4



Page 1

#### WELFARE ANALYSIS OF PRICE CONTROLS AND QUOTAS

- How can we measure the welfare effects of price controls or quotas?
- Do the gains to the winners exceed the losses to the losers?



#### Effects of market controls

- Price floors, price ceilings, and quotas all create winners and losers.
- Using concepts of consumer and producer surplus, we can measure the \_\_\_\_\_\_ to winners and \_\_\_\_\_\_ to losers.

















- Thus gains to producers from a price floor are less than losses to consumers.
- A price floor fails the test.
- In other words, a price floor is not





Page 2













## Summing gains and losses from a price ceiling

- Thus gains to consumers from a price ceiling are less than losses to producers.
- A price ceiling fails the
  - test.
- In other words, a price ceiling is not













## Summing gains and losses from a quota on sellers

- Thus gains to producers from a quota are less than losses to consumers.
- A quota on sellers fails the test.
- In other words, a quota on sellers is not
## WELFARE ANALYSIS OF PRICE CONTROLS AND QUOTAS

Page 5



# PART 2

# Antitrust Theory

## MONOPOLY AND BARRIERS TO ENTRY



## MONOPOLY AND BARRIERS TO ENTRY

- What is a "monopoly"?
- Why do monopolies arise?







## Government franchise monopoly (cont'd)

- Why do governments grant franchises?
- Historically:
- Today:



## MONOPOLY AND BARRIERS TO ENTRY

## Page 2

## Patent monopoly (cont'd)

• Why do governments provide patent protection?



• Examples today:

## Technical barriers: (2) "natural" monopoly

- DEF: Output is more cheaply produced by one firm rather than by several firms.
- Economies of scale (falling average cost) imply natural monopoly.
- Note: "natural" monopoly has \_\_\_\_\_\_ to do with natural resources.





## Is the software industry a natural monopoly? • Example: Suppose it costs

- \$100 million to develop a new word processing program.
- \$5 per copy to put the program on a CD-ROM, package it, and ship it to retail outlets.
- Then TC = \$100 million + 5Q.
- So AC =\_\_\_\_\_

## MONOPOLY AND BARRIERS TO ENTRY

Page 3





## Conclusions

- A monopolist is a "
- Monopolies arise because of
- Legal barriers include government franchises and patents.
- Technical barriers to entry include: ownership of a unique resource and *monopoly* (economies of scale).

## THE MONOPOLIST'S MARGINAL REVENUE

Page 1



• How is marginal revenue for a monopolist different from marginal revenue for a competitor?











## THE MONOPOLIST'S MARGINAL REVENUE

## Page 2

# Calculus definition of marginal revenue

- Marginal revenue (MR) = increase in total revenue from producing and selling one more unit of output.
- MR = dTR / dQ.
- If a firm takes price as given, then P is constant, so  $TR = P \times Q$  and MR =\_\_\_\_\_.
- But if P changes as a function of Q, then  $MR = d[P(Q) \times Q] / dQ.$











## THE MONOPOLIST'S MARGINAL REVENUE

Page 3



## MONOPOLY PRICING

Page 1

## MONOPOLY PRICING

• How does a monopolist choose what quantity to produce and what price to charge?

## The firm's problem (review)

- Profit = TR(Q) TC(Q).
- As before, assume the firm chooses output level Q to maximize profits:

```
\begin{array}{c} max \quad TR(Q) - TC(Q) \\ Q \end{array}
```

## The firm's first-order condition (review)

• To find profit maximum, set derivative with respect to quantity equal to zero:

$$0 = \frac{d TR}{d Q} - \frac{d TC}{d Q} = MR - MC$$

- Therefore choose  $Q^*$  so that
- But a *monopolist's* marginal revenue is \_\_\_\_\_\_ than price, as we have seen.







## MONOPOLY PRICING

Page 2









- So \_\_\_\_\_\_ of the price represents a markup over marginal cost.
- The bigger the elasticity (in abs. value) the \_\_\_\_\_\_ the markup over marginal cost.





## WELFARE ANALYSIS OF MONOPOLY

## Page 1

## WELFARE ANALYSIS OF MONOPOLY

• What's wrong with monopoly?



## What's wrong with monopoly?

- "Monopoly" has negative connotations in most people's minds.
- Noneconomic arguments against monopoly are often vague and inconsistent.
- Goal here is to clarify economic arguments against monopoly.



## Economic arguments against monopoly

- *Argument:* Because price is greater than marginal cost, some welfare (potential gains from trade) is lost.
- Some buyers who are willing to pay the marginal cost are not served.
- Monopolies are not



## WELFARE ANALYSIS OF MONOPOLY





# More economic arguments against monopoly

- *Argument:* Barriers to entry may reduce incentives for efficiency (e.g., cost minimization).
- *Argument:* May encourage rent-seeking behavior.
  - DEF: *Rent-seeking* = devotion of resources to erect barriers to entry.

# An economic argument in favor of monopoly

- *Argument:* Monopolist may have greater incentive than a competitor to develop lower-cost methods of production (Joseph Schumpeter\*).
- Possible example:
- But evidence for greater technical innovation is weak at best.



Joseph Schumpeter 1883–1950) Austrian-born American economist and political scientist.



## THE STRUCTURE-CONDUCT-PERFORMANCE PARADIGM

Page 1

## THE STRUCTURE-CONDUCT-PERFORMANCE PARADIGM

•What is the traditional view of industries that lie between competition and monopoly?

## Between competition and monopoly

- What about industries that lie between competition and monopoly?
- The *structure-conduct-performance* paradigm was developed by economists at Harvard during the 1930s and 1940s to try to understand such industries.



# Structure: given facts of an industry, as stressed by the Harvard school

- Concentration: number of firms and how equal they are in size.
- patents. barriers to entry: franchises,
- \_\_\_\_\_\_ barriers to entry: ownership of scarce resources, economies of scale ("\_\_\_\_\_\_ monopoly"), cost advantage of more experienced firms ("learning by doing").

# Structure: other possible given facts of an industry

- Price elasticity of market demand.
- Product differentiation: do rival firms produce *perfect* substitutes?
- Brand loyalty of consumers.
- Diversification of firms into multiple product lines.
- Continuous versus lumpy sales.

## Conduct: how firms behave

- Pricing practices: price competition, collusion, or something in between.
- Exclusionary practices: methods of disciplining or excluding rivals.
- Advertising.
- Spending on research and development.

## THE STRUCTURE-CONDUCT-PERFORMANCE PARADIGM

Page 2







Page 1

## ANTITRUST LAWS AND THEIR ENFORCEMENT

•What are the most important laws in the U.S. that protect competition? •How are they enforced?

## The Sherman Act of 1890

- Law was a reaction to large business combinations ("trusts") in 1880s.
- Economic depression had encouraged formation of \_\_\_\_\_\_ to limit competition and raise prices in many industries.
- Farmers' organizations, labor unions, and small business campaigned to make trusts illegal.

## Sherman Act Section 1

- "Every contract, combination in the form of trust or otherwise, or conspiracy, in restraint of trade or commerce among the several States, or with foreign nations, is declared illegal."
- Penalties include imprisonment and fines.

## Sherman Act Section 2

- "Every person who shall monopolize, or attempt to monopolize, or combine or conspire with any other person or persons, to monopolize any part of the trade or commerce among the several States, or with foreign nations, shall be deemed guilty of a felony..."
- Penalties include imprisonment and fines.

## The Clayton Act of 1914

- Sherman Act not as effective as hoped.
- Clayton and FTC Acts passed to strengthen antitrust.
- Clayton Act Sections 2 and 3 specifically outlawed price discrimination and vertical restrictions which tend "to substantially lessen competition or tend to create a monopoly."

## Clayton Act Section 7

- Section 7 outlawed mergers that "lessen competition," but was largely ineffective because of legal loophole.
- Firms could still legally buy all the assets of other firms.
- Loophole plugged by Celler-Kafauver Act of 1950.

## Page 2

## Clayton Act Section 7

- Section 7 outlawed mergers that "lessen competition," but was largely ineffective because of legal loophole.
- Firms could still legally buy all the <u>assets</u> of other firms.
- Loophole plugged by Celler-Kafauver Act of 1950.

Buildings, machines, railroad tracks, etc.

## Federal Trade Commission (FTC) Act of 1914

- Section 5 reinforced other antitrust laws by outlawing "unfair methods of competition."
- Also protected consumers from "unfair and deceptive practices."
- Created new agency that could both investigate and judge cases.
- Commission decisions can be appealed to U.S. Court of Appeals.

## Antitrust laws are vague

- What do these terms mean: "restraint of trade," "monopolize," "lessen competition," and "unfair methods of competition"?
- Courts have been given substantial latitude to interpret laws, and their interpretation has changed over time.
- To know what conduct is illegal, you must study court decisions.

## "Per se rule" versus "rule of reason"

- Courts have judged some business activities to be *per se* illegal—that is, always illegal of circumstances.
- Other activities are judged under the "rule of reason"—that is, \_\_\_\_\_ on circumstances. They may be judged illegal if they appear to lessen competition, but legal otherwise.

## Purpose of antitrust law

- Economists think purpose is to promote
- Courts increasingly agree: "It is competition, not competitors, that the Act protects." \*
- However, other goals—like protection of small business—have sometimes influenced court decisions in the past.

\* Brown Shoe Company v. United States, 370 U.S. 294, 344 (1962).

## Shared enforcement

- The Antitrust Division of the U.S. Department of Justice (DOJ) and Federal Trade Commission (FTC) together enforce federal antitrust laws.
- States also enforce own antitrust laws.
- Private parties can bring suit if they think they were harmed—e.g., by price-fixing.







Outcomes of antitrust cases: fines and prison terms

- Violations of Sherman Act can bring fines or prison terms, especially for price-fixing (Section 1).
- Penalties were mild through early 1990s.
- Fines have since \_\_\_\_\_\_



## Treble (×3) damages in private cases

- Injured parties (e.g., customers victimized by a cartel) can also sue.
- If plaintiff successful, defendant is ordered to pay damages based on plaintiff's loss.
- Damages are then *automatically* multiplied by
- Defendants frequently settle.

## Exemptions from antitrust law

- Agricultural marketing cooperatives.
- Export trade associations.
- Insurance (where regulated by state law).
- Labor unions.
- Fishermen's marketing cooperatives.
- Newspapers ("joint operating agreements").
- Professional sports leagues (when negotiating television rights).

https://www.justice.gov/atr/file/761131/download

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## U.S. Department of Justice (also called "DOJ")

- Argues cases in federal courts for the government.
- Antitrust Division prosecutes cases related to competition policy.
- Criminal suits = actions in court that can lead to fines (money penalties) for companies, and fines or prison for persons.
- **Civil suits** = actions in court that can require companies or persons to do certain things, or stop doing certain things.

## Conclusions

- Key antitrust statutes are Sherman Act, Clayton Act, and FTC Act.
- Dept of Justice and FTC share enforcement.
- Injured private parties can bring suit for \_\_\_\_\_\_ damages.
- Economists think antitrust should promote \_\_\_\_\_\_. Courts increasingly agree.
- Fines for price-fixing have soared recently.

## OLIGOPOLY

## Page 1

## OLIGOPOLY

- What is an oligopoly?
- Why are there many models of oligopoly?

## What is an oligopoly?

- A market with a small number of sellers.
- There may be barriers to entry, but not as high as in monopoly.
- Examples:



own quantity.It has "market power" = power over price.



0

# Why an oligopolist is different from a monopolist

- But an oligopolist has rivals.
- If it raises price, some of the benefit goes to its rivals.
- If it lowers price, some of the harm falls on its rivals.
- Thus an oligopolist has \_\_\_\_\_ incentive to restrict output and raise price than a monopolist has.

## What will the oligopolist's rivals do?

- Exactly how much incentive the oligopolist has to reduce output depends on *how it conjectures its rivals will respond*.
- Will rivals \_\_\_\_\_\_ in restricting output?
- Will rivals \_\_\_\_\_\_ the oligopolist by increasing their output and expanding their market shares?
- Will rivals simply keep their output \_\_\_\_\_?

## A language for oligopoly theory

- To keep track of our assumptions, the language of game theory is useful.
- A "strategy" in game theory is an action by a firm that rival firms take as \_\_\_\_\_\_ when they decide what to do.

## OLIGOPOLY Page 2

## Conclusions

- An oligopolist is one of a \_\_\_\_\_ number of sellers in the market.
- Theories of oligopoly must make assumptions as to what each firm conjectures its rivals will do.
- \_\_\_\_\_ provides a language to keep track of these assumptions.

## Page 1

## BASIC GAME THEORY

•What is "game theory"? •How can it help us think about imperfect competition?

## What is "game theory"?

- A mathematical approach for thinking about human interaction.
- Has been applied to economics, politics, defense policy, and even ecology.
- Very helpful for thinking about incentives facing \_\_\_\_\_\_ firms.
- Helps clarify our assumptions, especially about equilibrium.

## Basic ingredients of a "game"

- *Players* = decision makers (at least 2).
- *Strategies* = choices available to each player (at least 2).
- *Payoffs* = final returns to players at end of game. Payoffs depend on strategies played.

#### Representation of a game in "strategic form" (also called "normal form") Player #2 Strategy Strategy Strategy Payoffs Payoffs Payoffs Strategy Player Payoffs Payoffs Payoffs Strategy #1 Payoffs Payoffs Payoffs Strategy

## Example 1: assumptions

- Suppose a particular market is served by two firms, each enjoying a per-unit profit rate (price avg cost) of \$1.
- Total quantity in market is 100 million units.
- Without advertising, they split the market and each enjoy \$\_\_\_\_\_ million profit.

## Example 1: assumptions (cont'd)

- If one firm advertises, that firm takes 75% market share.
- But advertising costs \$10 million.
- So that firm enjoys a profit of \$75 million - \$10 million = \$\_\_\_\_\_ million.
- The other firm enjoys a profit of \$\_\_\_\_\_ million

## Page 2

## Example 1: assumptions (cont'd)

- If *both* firms advertise, each firm takes 50% market share.
- So each firm enjoys a profit of \$50 million \$10 million = \$\_\_\_\_\_ million.

# What is the likely outcome in example 1?

- Suppose initially neither firm advertises.
  - Firm #1 will want to advertise to increase its profit from \$50 to \$\_\_\_\_\_ million.
- Suppose only Firm #1 advertises.
  - Firm #2 will want to advertise to increase its profit from \$25 to \$\_\_\_\_\_ million.
- Alternatively, suppose only Firm #2 advertises.
  - Firm #1 will want to advertise to increase its profit from \$25 to \$\_\_\_\_\_ million.

Example 1 in strategic form							
			Firm	#2			
		Do no	ot				
		advert	ise	Advertise			
1	Do not	#1 gets \$	_ m,	#1 gets \$	_m,		
Firm <sup>a</sup>	dvertise	#2 gets \$	m.	#2 gets \$	_m.		
#1 A	dvertise	#1 gets \$	_ m,	#1 gets \$	_m,		
		#2 gets \$	<u>m</u> .	#2 gets \$	<u>m</u> .		
		<u> </u>					

## "Best replies"

In the language of game theory,

- If firm #2 does *not* advertise, Firm #1's best reply is to \_\_\_\_\_.
- If firm #2 *does* advertise, Firm #1's best reply is still to
- Firm #2's best replies are similar.

## Nash equilibrium = stable outcome

- A stable outcome—formally, a "Nash equilibrium"—is a situation where *neither player wants to change strategies*.
- Put differently, a Nash equilibrium is a pair of strategies that are \_\_\_\_\_\_ to each other.
- In this game, the Nash equilibrium is for both firms to \_\_\_\_\_.

# Nash equilibrium is not necessarily best for everyone

- Both firms would be better off if they could cooperate and agree not to advertise.
- But if we rule out cooperation, the most likely outcome is for both firms to

## Page 3

## Example 2: assumptions

- Suppose two firms must choose technical standards for their products.
- Each firm favors a different standard.
  - Firm #1 prefers standard A.
  - Firm #2 prefers standard B.
- However both products will sell more if they are compatible—that is, if they use the same standard.

## Example 2: assumptions (cont'd)

- If both firms choose standard A, then Firm #1 enjoys profit of \$20 million and Firm #2 enjoys profit of only \$10 million.
- If both firms choose standard B, then Firm #1 enjoys profit of only \$10 million and Firm #2 enjoys profit of \$20 million.
- If the firms choose different standards, neither firm enjoys any profit.



# What is the likely outcome in example 2?

- Suppose initially that each firm chooses its preferred standard. Will either firm want to change strategies? !
- Firm #1's best reply to "Standard B" is
- Firm #2's best reply to "Standard A" is

## Nash equilibrium

- Suppose both firms choose Standard A. Will either firm want to change strategies?
- Suppose both firms choose Standard B. Will either firm want to change strategies?
- So there are <u>Nash equilibria</u> in this game.

# Interdependence In example 1, the best action for each firm was to advertise, regardless of the other firm's action. "Advertise" was each firm's *dominant strategy*. In example 2, the best action for each firm depended on the other firm's action.

• Interdependence is common feature of oligopoly.

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Page 1

## COURNOT DUOPOLY

• What happens if two firms take each others' *quantities* as given, instead of prices?



- Two firms behave symmetrically.
- Firms do not cooperate, but seek to maximize own profits.

Cournot, A. A. (1838). Recherches sur les principes mathématiques de la théorie des richesses. Paris: Hachette. Chapitre VII «De la concurrence des producteurs».

## Intuitive motivation for the Cournot equilibrium

- Suppose first oligopolist, taking its rival's output level as given, sets its quantity.
- Now suppose second oligopolist, taking first's output as given, sets its quantity.
- Suppose process continues back and forth. What equilibrium price and total output result?





## Cournot firm's best reply function • Each Cournot firm sets MR<sub>i</sub> = its marginal cost, to maximize profit. • But MR<sub>i</sub> depends on the output (q) of its rival. • Thus firm sets its output in *reply* to its rival's output. • Function relating firm's profit-maximizing output to its rival's output is called its "best reply function."\*

\*Also called "reaction function."

### Page 2



## Example 1: firm #2's best reply function • $TR_2 = q_2 \times P =$ • $MR_2 = \partial TR_2 / \partial q_2 =$ • Suppose firm #2's $MC_2 =$ \$2. • Set $MC_2 =$ \$2 = $MR_2$ and solve to get best reply function: $q_2 = f_2(q_1) =$

## Equilibrium in the Cournot model

- Each firm sets its quantity, taking as given the quantity produced by other firm.
- Solving *both* firms' best reply functions simultaneously gives Cournot-Nash equilibrium.
- At this equilibrium, \_\_\_\_\_\_ firm wants to change its own output level.







## Page 3

## Typical characteristics of Cournot equilibrium

- Both firms charge the same price (here, \$5), which is \_\_\_\_\_\_ than the marginal costs of either firm (here, \$2 and \$4).
- This creates \_\_\_\_\_ loss, as some consumers willing to pay the marginal cost are excluded.
- The firm with the lower marginal cost gets the \_\_\_\_\_ market share.

## Symmetry in the Cournot model

- If firms have *identical costs*, then their best reply functions will take identical forms.
- Then they will end up setting the \_\_\_\_\_ quantity levels.
- Symmetric problems are easier to solve!









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# Comparison with price competition

- Under price competition, each firm takes market \_\_\_\_\_ (not quantity) as given.
- Each competitive firm views its marginal revenue as equal to that *price*.
- Each competitive firm sets MC = P.
- As a result, equilibrium output is efficient and \_\_\_\_\_\_ than Cournot level.



- When a Cournot oligopolist expands output, price falls, and part of the harm falls on its
- Monopolist has no rivals. It bears the entire harm from price fall.



- Market demand is P = 8 Q/50, MC=\$2.
- Competition:
  - P = MC =\$2, Q =\_\_\_\_\_.
- Monopoly:
  - Market MR =
  - Setting market MR = MC = \$2 gives Q = \_\_\_\_\_, P = \_\_\_\_\_.





## COURNOT OLIGOPOLY

## Page 1

## COURNOT OLIGOPOLY

• What happens if more than two firms all take each others' *quantities* as given, instead of prices?

## What is Cournot oligopoly?

- A model of market power in which each firm sets its quantity, taking as given the total *quantity* produced by other firm(s).
- All firms move simultaneously. No "dominant firm."
- Firms do \_\_\_\_\_ cooperate, but each seeks to maximize its own profits.

## Intuitively appealing features of Cournot oligopoly model

We will show that the fewer the firms in the industry,

- the \_\_\_\_\_ the equilibrium price,
- the \_\_\_\_\_ the % gap between price and marginal cost (Lerner index),
- and the \_\_\_\_\_ the deadweight loss.



# Equilibrium in Cournot oligopoly with *n* firms

- Each firm sets its quantity according to rule  $MC_i = MR_i$ , taking as given total
  - \_\_\_\_\_ produced by other *n*-1 firms.
- If this equation holds for all *n* firms, then no firm will want to change its output level.
- Solving these *n* equations for all *n* firms simultaneously gives Cournot equilibrium.



## COURNOT OLIGOPOLY

## Page 2





## Symmetric Cournot equilibrium with *n* firms • Suppose each firm #i has *same* MC. • By symmetry, $s_i = 1/n$ (each firm has equal share of total output). • So Lerner index is $\frac{P-MC}{P} =$ .

related to the

· Lerner index is

number of firms.



# Estimates of Lerner indexes• Tobacco:0.65• Food processing:0.50• Electrical machinery:0.20• Retail gasoline:0.10• Textiles:0.07• Rubber:0.05

Timothy Bresnahan, "Empirical Studies of Industries With Market Power," in R. Shmalensee and R.D. Willig, eds., *Handbook of Industrial Organization*, Elsevier Science, 1989, table 17.1, p. 1051.



## COURNOT OLIGOPOLY

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## Conclusions

- Under *Cournot oligopoly*, firms each maximize profit taking take each other's as given.
- A particular firm's Lerner index is (P-MC<sub>i</sub>)/P = \_\_\_\_\_.
- If all firms have same MC, (P-MC)/P = \_\_\_\_\_
- As number of firms *n* increases, equilibrium price approaches \_\_\_\_\_

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## BERTRAND DUOPOLY

• What happens if two firms take each others' *prices* as given, instead of quantities?

## What is Bertrand\* duopoly?

• A model of market power in which each firm sets its price, taking as given the \_\_\_\_\_\_ set by the other firm.



- Two firms behave symmetrically.
- Firms do not cooperate, but seek to maximize own profits.

\*Bertrand, J. (1883) "Revue de Recherches sur les Principes Mathematiques de la Theorie des Richesses", Journal de Savants 67: 499–508. Bertrand's model was later formalized by Francis Edgeworth in 1889.

## Assumptions of Bertrand model

- Homogeneous output: both firms produce same product.
- Both firms have \_\_\_\_\_ marginal cost and average cost.
- If firms set different prices, consumers buy only from \_\_\_\_\_\_ firm.
- If firms set same prices, consumer demand is split evenly between the two firms.







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## Is the Bertrand model realistic?

- Bertrand model assumes homogeneous product—outputs of firms are \_\_\_\_\_\_ substitutes for consumers.
- Consumers all buy from the cheapest firm, even if the price difference  $|p_1-p_2|$  is very

# Bertrand model with differentiated products

- Bertrand model can be adapted to case of substitutes, where not all consumers buy from the cheapest firm.
- Each firm has its own demand equation:  $q_1 = q_1(p_1, p_2)$   $q_2 = q_2(p_2, p_1)$
- Again, each firm chooses its price, taking the other firm's \_\_\_\_\_\_ as given.







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- Solve best reply functions together to find equilibrium.
- This example is symmetric, so both firms set

$p_1 = p_2$	= \$_		,
greater	than	MC.	





## Conclusions

- The *Bertrand duopoly model* consists of two firms that each take the other's \_\_\_\_\_ as given.
- Equilibrium is found by simultaneously solving both firms' \_\_\_\_\_\_\_functions.
- If output is homogeneous, both firms set price \_\_\_\_\_ MC in equilibrium.
- If output is not homogeneous, both firms set price \_\_\_\_\_ MC in equilibrium.

## JOINT PROFIT MAXIMIZATION (COLLUSION)

## Page 1

## JOINT PROFIT MAXIMIZATION (COLLUSION)

• What happens if firms collude to maximize the sum of their profits?

# What is joint profit maximization?

- An oligopoly model in which all firms in an industry collude (cooperate) to maximize the *sum* of their profits, as if they were one big monopoly.
- Rough synonyms:
  - collusion = \_\_\_\_\_



# Profit maximization requires cost minimization

Profit maximization has two steps.

- (1) Choose the right level of total output Q\* to maximize profit.
- (2) Allocate output across firms to minimize



# Output should be allocated so that marginal costs are \_\_\_\_\_

- Let  $TC_1(q_1)$  = total cost of first firm,  $TC_2(q_2)$  = total cost of second firm.
- Let Q = q<sub>1</sub> + q<sub>2</sub> = target total output.
   Then q<sub>2</sub> = Q q<sub>1</sub>.
- Must minimize:  $TC_1(q_1) + TC_2(Q-q_1)$
- Set derivative (w.r.t. q<sub>1</sub>) equal to 0:
  0 =

## Joint marginal cost

- Only when  $MC_1 = MC_2$  are total costs minimized.
- Now suppose total output Q is increased while keeping  $MC_1 = MC_2$ .
- Curve relating Q and MCs is called the curve.
MC

Q

### JOINT PROFIT MAXIMIZATION (COLLUSION)







### Lerner index in JPM is same as in monopoly • Definition of Lerner index = (P-MC)/ P. • Joint profit maximization uses the same pricing rule as a monopolist: $P = \frac{MC_J}{1+\frac{1}{\epsilon}}$ . • So Lerner index is same:

Lerner index =







### CARTELS IN THE REAL WORLD

- How do real cartels operate?
- What makes them successful?







### International public cartels members are countries, not firms

- Organization of Petroleum Exporting Countries (OPEC).
- International Coffee Organization.
- International Tripartite Rubber Organization (Thailand, Indonesia and Malaysia).

Traditional view is that public cartels are \_\_\_\_\_\_ subject to antitrust law.

### Real cartels are not perfect

- Real cartels usually do \_\_\_\_\_\_ share profits, so each member firm wants largest possible market share, even if it has higher cost that other members.
- So real cartels cannot maximize profit—price is usually less than monopoly price, and output is not allocated to minimize total cost.
- But real cartels are usually successful in raising price \_\_\_\_\_\_ competitive price.

### Page 2

### Tasks of a real cartel

- 1. Agree on target price.
- 2. Agree on output allocation or market shares. Often agree to maintain market shares held before the cartel.
- 3. Enforce agreement. Find some way to monitor member firms' prices or quantities and punish firms that cheat.

### How long do cartels last?

- Economists used to think that cartels collapsed quickly from cheating.
- However, a recent study found
  - Median duration = \_\_\_\_\_ months.
  - Mean duration = \_\_\_\_\_ months.
  - These are underestimates according to author.

Connor, John M., "Cartels Portrayed: Cartel Structures, a 21-Year Perspective, 1990 to 2010, AAI Working Paper No. 11-04, 2011.

### Threats to cartel stability

- Members might cheat—that is, violate agreement by decreasing price and increasing market share.
- New firms might enter industry. They must be brought into cartel—if not, cartel might collapse.
- Market demand might shift. Changes in demand require changes in price and output allocations.



- Reason: If there are too many members, their behavior is more difficult to monitor.
- Also, each firm's individual profit from cartel may be only slightly higher than its profit from cheating.
- In fact, most cartels have had fewer than 10 members, though some have had more.

Levenstein, M.C. and Suslow, V.Y., (2006) "What Determines Cartel Success?" Journal of Economic Literature, Vol. 44, No. 1, pp. 43-95.





Page 3

Cartels are more successful...the more the product.

- *Homogeneous product* = all firms produce same product.
- Reason: If member firms produce same product, it is easier to agree on price and monitor prices.
- Example: Suppose computer makers formed a cartel. Products are not homogeneous— computers are big or small, fast or slow, etc. Setting cartel prices would be complicated!

# Cartels are more successful...the more are members' prices.

- Reason: If prices are easier to see, then it is easier to coordinate prices and monitor compliance.
- Example: In early 1990s, U.S. airlines set prices (fares) through a common computer system. System allowed airlines to submit prices before they were available to customers.
- If one airline submitted a price increase, others could follow. If they did not follow, first airline could withdraw its price increase.

# Cartels are more successful...the more \_\_\_\_\_\_ is demand.

- Reason: If market demand decreases, then cartel members will each sell fewer units.
- Some members might suspect that other members are secretly stealing their business.
- Others might decide to cheat because they are making losses.
- Example: A German cement cartel collapsed in 2002 because of decreasing demand.

Viscusi, W.K., Harrington, J.E. and Sappington, D.E.M., Economics of Regulation and Antitrust, 5th edition, MIT Press, 2018, pp. 145-146.

Cartels are more successful...the smaller and more numerous are

- Reason: Big buyers may exert pressure for lower prices.
- Example: A cartel for electrical equipment, including circuit breakers, existed in the 1950s.
- Cartel collapsed when Florida Power & Light Company obtained a low price from Westinghouse, below the cartel price, for a large order of circuit breakers.

Viscusi, W.K., Harrington, J.E. and Sappington, D.E.M., Economics of Regulation and Antitrust, 5<sup>th</sup> edition, MIT Press, 2018, pp. 144-145.

### Number of buyers

A recent study found

- \_\_\_\_\_ cartels with > 100 buyers.
- \_\_\_\_\_ cartels with  $\leq$  30 buyers.
- \_\_\_\_\_ cartels with 31-99 buyers or unknown number of buyers.

Connor, John M., "Cartels Portrayed: Cartel Structures, a 21-Year Perspective, 1990 to 2010, AAI Working Paper No. 11-04, 2011. See note to slide 14.

### Beyond price and quantity

Real cartels sometimes make other kinds of agreements to limit competition.

- Agreements not to advertise.
- Agreements to divide sales territory.
- Agreements to standardize quality or pricing, to make it easier to enforce cartel pricing.

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### Conclusions

- Cartels are not unusual in the real world.
- Real cartels raise price, but usually not to the monopoly level.
- Tacit collusion or "conscious parallelism" also occurs.





## Cartel's MR versus individual firm's $MR_i$ • Suppose firm #i increases its output by one unit. • Revenue of the cartel changes by this much: $MR = \frac{dTR}{dQ} = \frac{d}{dQ} \left( Q \cdot P(Q) \right) = P + Q \frac{dP}{dQ}$ • But revenue of firm #i changes by this much: $MR_i = \frac{dTR_i}{dq_i} = \frac{d}{dq_i} (q_i \cdot P(Q)) = P + q_i \frac{dP}{dQ}$ • Which is larger, MR or MR; ?





### Page 2



### Example: duopoly

- Suppose P = 8 (Q/50) and  $AC_1 = AC_2 = MC_1 = MC_2 =$ \$2.
- It is easy to show that if firms collude and each produce 75 units, price is \$5 and each enjoys profit of \$
- In another slideshow, we showed that if firms act as a Cournot oligopoly, each produces 100 units, price is \$4, and each enjoys profit of S



### Example: cheating as a game

- Obviously, firms can choose from many different quantities of output.
- But let's consider just these two output levels as alternative strategies and write the game in strategic (or normal) form.



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### Example: Nash equilibrium

- Suppose each firm initially abides by the cartel and produces 75 units.
- Note that each firm's best reply is to cheat.
- The Nash equilibrium of this game is for to cheat.
- But if both firms cheat, both are worse off.

### Enforcing a cartel

- Each cartel member has strong incentive to cheat and produce too much.
- Joint profit-maximizing agreements therefore tend to fall apart, unless they find a mechanism to keep discipline.
- Most effective mechanisms:

### Can a cartel police itself?

- Consider a cartel that *continues over time*.
- Suppose each firm can choose a "strategy" where its output in any period depends on output of other firm in previous periods.
- Then it might be possible for cartel to maintain collusion without merger or government help.

### A "trigger strategy"

- Suppose firm #1 chooses the following strategy: "Produce 75 units unless firm #2 cheated in the last period, in which case produce 100 units every period forever."
- Any cheating by firm #2 will thus \_\_\_\_\_\_ end of cartel.
- What is firm #2's best reply to this strategy?





### Page 4

### More than one Nash equilibrium

- Of course, trigger strategies are not the only Nash equilibria.
- Another Nash equilibrium is for both firms to choose Cournot quantities forever, but this results in lower total profit.
- Choosing the *profit-maximizing* equilibrium requires communication and coordination.

### Methods of coordination

- Explicit collusion:
  - Meetings.
  - Written or oral agreements.
- Tacit collusion
  - Geographic market division.
  - Price leadership (airlines).
  - Special pricing rules ("basing point pricing" in steel, 1/4 quotes in NASDAQ).

### Occasional cartel breakdowns

- Difficult for cartel members to detect cheating in real world.
- Prices might decrease from random fluctuation in demand, even if no one is cheating.
- "Trigger" could be pulled by mistake.
- Trigger strategies might have to be modified to return to collusion after a few periods of Cournot output ("price wars").



### Conclusions

- Every member of a cartel has an incentive to cheat and produce \_\_\_\_\_\_ than its allocated quantity.
- Cartel discipline might be maintained by merger, government enforcement, or perhaps by the cartel itself through strategies.
- Even if such strategies are used, a cartel requires communication and coordination.

Page 1

### ANTITRUST LAW ON PRICE-FIXING

•How have the courts treated pricefixing (cartels)?

### Adam Smith (1776) on collusion

"People of the same trade seldom meet together, even for merriment and diversion, but the conversation ends in a conspiracy against the public, or in some contrivance to raise prices.

"It is impossible indeed to prevent such meetings, by any law which either could be executed, or would be consistent with liberty and justice. But though the law cannot hinder people of the same trade from sometimes assembling together, it ought to do nothing to facilitate such assemblies; much less to render them necessary."

The Wealth of Nations, New York: Modern Library, 1937, Book I, Chapter X, p. 128.

### Sherman Act Section 1

• "Every contract, combination in the form of trust or otherwise, or conspiracy, in restraint of trade or commerce among the several States, or with foreign nations, is declared to be illegal. Every person who shall make any contract or engage in any combination or conspiracy hereby declared to be illegal shall be deemed guilty of a felony..."

https://www.law.cornell.edu/uscode/text/15/1

### "Per se" rule versus "rule of reason"

- U.S. Courts have held that some practices are *per se* (Latin: "in itself," always) illegal under antitrust laws.
- Other practices *might* be illegal, depending on the purpose and effect. For these practices, the "rule of reason" is used to determine legality.





### Page 2

### Price fixing is *per se* illegal

- Practices which are unlikely to have any beneficial effects (such as cost savings) are often held by courts to be *per se* illegal.
- Price fixing is best example—it only creates deadweight loss.
- Here are some important cases establishing that price fixing is *per se* illegal.

### U.S. v. Addyston Pipe & Steel Co. (1899)

- Six manufacturers of cast iron pipe divided up U.S. cities and rigged bids.
- Court of Appeals decided the practice was *per se* illegal under Sherman Act, regardless of the "reasonableness" of resulting prices.
- Upheld by Supreme Court.

### United States v. Trenton Potteries Co. et al. (1927)

- 23 manufacturers of vitreous pottery fixtures (bathroom bowls, tubs, etc.), having 82% of the market, belonged to an association that attempted to fix prices.
- Supreme Court again ruled that this practice was *per se* illegal, that government did not have to show prices were unreasonable.

### Anomaly: Appalachian Coals Inc. v. U.S. (1933)

- Company created to act as joint selling agency for 137 coal producers, having 54% of market in Appalachian region.
- District court found the company in violation of Sherman Act in 1932.
- But, strangely, reversed by Supreme Court, probably influenced by Great Depression.
- Strange decision, hard to understand today!

Appalachian Coals, Inc. v. U.S., 288 U.S. 344, 360 (1933).

### U.S. v. Socony-Vacuum Oil Co. et al. (1940)

- Major oil refiners agreed to purchase surplus gasoline of independent refiners to keep price up.
- Found guilty by district court.
- Sustained by Supreme Court, which reiterated that "price-fixing agreements are unlawful *per se* under the Sherman Act."

U.S. v. Socony-Vacuum Oil Co. et al., 310 U.S. 150, 218 (1940).

### Recent trends

- Sherman Act applied to professions (doctors, lawyers, etc.) since Goldfarb v. Virginia State Bar (1975).
- "Rule of reason" used for collegiate sports since NCAA v. University of Oklahoma et al. (1984).

### Page 3

### Legal status of tacit collusion

- "Consciously parallel" pricing sometimes held illegal.
  - Interstate Circuit, Inc. et al. v. U.S. (1939).
  - American Tobacco Co. et al. v. U.S. (1946).
- And sometimes not.
  - Theatre Enterprises, Inc. v. Paramount Film Distributing Corp., 1954).
  - Charles Pfizer & Company, Inc. et al. v. U.S. (1973).

### Penalties for price-fixing

- If Department of Justice prosecutes, then penalties can include fines and prison.
- Conviction typically followed by private suits by injured parties to collect damages.
- Clayton Act Section 4 entitles injured parties to collect \_\_\_\_\_ (×3) damages.

### Why treble damages?

- One rationale might be that only a fraction of violators are actually caught.
- To maintain deterrent, must inflate damages.

# How damages are typically computed

- Let  $P_C = price$  set by collusion.
- Let  $Q_C =$  quantity sold with collusion
- Let P\* = "but for" price—that is, the price likely charged without collusion.
- $P_C P^* =$  "overcharge."
- $(P_C P^*) Q_C$  = typical formula for damages.





Page 4

### The corporate leniency program

- DOJ began program in 1978 giving lenient treatment to corporations and individuals who fully cooperate with investigation.
- Cooperators avoid criminal prosecution and fines, but not private lawsuits.
- Few applications—about one per year.
- Reason: corporations wary because leniency not granted if DOJ could have "reasonably expected" to learn of cartel through other sources.

### 1993 revised corporate leniency program

- Requires only that DOJ "has not received information about the illegal activity being reported from any other source."
- DOJ may even grant leniency *after* investigation has started.
- Only \_\_\_\_\_\_ firm per cartel granted leniency.
- Big increase in applications—more than one per *month*. "Race to courthouse."

http://www.usdoj.gov/atr/public/guidelines/0091.htm

Defendant	Product	Fine (Million \$)
Archer Daniels Midland	Lysine & Citric Acid	\$100
Haarmann & Reimer Corp.	Citric Acid	\$50
HeereMac v.o.f.	Marine Construction	\$49
Showa Denko Carbon, Inc.	Graphite Electrodes	\$29
Fujisawa Pharmaceuticals	Sodium Gluconate	\$20
Dockwise N.V.	Marine Transportation	\$15
F. Hoffmann- LaRoche, Ltd.	Citric Acid	\$14
Jungbunzlauer International	Citric Acid	\$11
Akzo Nobel Chemicals, BV &	Sodium Gluconate	\$10
Glucona, BV		
ICI Explosives	Explosives	\$10
Dyno Nobel	Explosives	\$10
Mrs. Baird's Bakeries	Bread	\$10
Ajinomoto Co.	Lysine	\$10
Kyowa Hakko Kogyo, Ltd.	Lysine	\$10
URCE: Gary R. Spratling, "Are the of the iceberg?" March 6, 1998, htt nic-fines-antitrust-cases-just-tip-ice	e recent titanic fines in ar ps://www.justice.gov/atr/ berg	ntitrust cases just /speech/are-recen

# Success In recent years, DOJ has focused on large international cartels. To coordinate prosecutions, U.S. has encouraged other countries to adopt similar leniency programs. European countries, the EU, Canada, and other countries have already adopted programs. Example: P&G and Unilever fined \$450 million by EU in 2011 for operating a laundry detergent cartel (Henkel AG cooperated and was not fined).



### Page 1

### MEASURES OF INDUSTRY CONCENTRATION

- What is industry concentration?
- How is it measured?



# Why industry concentration matters

- If an industry has just a few large firms, they may start to behave less like competitors and more like a Cournot oligopoly or a tacit cartel.
- If an industry has one relatively large firm, it may start to behave like a monopoly.



### Concentration ratios

- *Concentration ratio* is the total market share of the top firms.
- U.S. Bureau of the Census reports
  - 4-firm concentration ratio = total market share of top 4 firms.
  - 8-firm concentration ratios = total market share of top 8 firms.
  - Also 20-firm and 50-firm concentration ratios.

### Examples of concentration ratios in U.S. manufacturing (2012)



### Page 2

# Limitations of concentration ratios

- *n*-firm concentration ratios reveal nothing about concentration *within* the top *n* firms.
- Example 1: Suppose industries A and B each have 6 firms: A: 4 with 20% shares, 2 with 10% share.
  - A: 4 with 20% shares, 2 with 10% shares. B: 1 with 50% share 5 with 10% shares.
  - B: 1 with 50% share, 5 with 10% shares.

# Example 1: Limitations of concentration ratios • Thus, A's 4CR = B's 4CR = \_\_\_% • But which is really more concentrated?

### Hirschman-Herfindahl index

- An alternative concentration measure that sums the *squares* of the market shares in percent of *all* firms in the industry.
- Let  $s_i = market share$ . Then  $100s_i = market share in percent$ .
- HHI =  $(100s_1)^2 + (100s_2)^2 + \dots + (100s_n)^2$ .

### Hirschman-Herfindahl index: hypothetical examples

Number of firms	HHI formula	Value
1 (monopoly)	100 <sup>2</sup>	
2 firms, same size	$50^2 + 50^2$	
10 firms, same size	$10^2 \times 10$	
<i>n</i> firms, same size	$(100/n)^2 \times n$	

### HHI applied to example 1

- Industry A: HHI = 20<sup>2</sup> + 20<sup>2</sup> + 20<sup>2</sup> + 20<sup>2</sup> + 10<sup>2</sup> + 10<sup>2</sup> = \_\_\_\_
- Industry B: HHI =  $50^2 + 10^2 + 10^2 + 10^2 + 10^2 + 10^2 =$ \_\_\_\_\_
- Which industry is more concentrated according to the HHI?
- HHI gives extra weight to large firms.

# HHI often computed neglecting small firms

- In U.S. Census publications, HHI is computed using only top 50 firms.
- The error is very small, because...
  - If a firm has less than 1% market share, it contributes less than \_\_\_\_\_ to the HHI.
  - If a firm has less than 0.1 % market share, it contributes less than \_\_\_\_\_ to the HHI.

### Page 3

Examples of HHIs in U.S manufacturing (2012)		
Industry	HHI	
Automobiles & light duty vehicles	1505.7	
Breakfast cereals	2332.5	
Petroleum refineries	786	
Apparel	54	

### Lerner index and HHI

- Suppose an industry has *n* firms of varying sizes.
- Each firm has its own Lerner index, or price-cost margin:  $L_i = (P-MC_i)/P$ .

### Lerner index and HHI (cont'd)

- What is the *industry* Lerner index (L)?
- A weighted average of Lerner indexes for all firms, where weights = market shares s<sub>i</sub>.
- Industry Lerner index =  $L = s_1 L_1 + s_2 L_2 + s_3 L_3 + \ldots + s_n L_n .$

### Lerner index and HHI (cont'd)

- If Cournot model describes the industry, then  $L_i = s_i / |\epsilon|$ , where  $\epsilon$  = market elasticity of demand. So substitute:
- $$\begin{split} \bullet \ & L = s_1 L_1 + s_2 L_2 + s_3 L_3 + \ldots + s_n L_n \\ & = s_1^{2/} |\epsilon| \ + \ s_2^{2/} |\epsilon| \ + \ s_3^{2/} |\epsilon| \ + \ \ldots \ + \ s_n^{2/} |\epsilon| \\ & = \left(s_1^2 \ + \ s_2^2 \ + \ s_3^2 \ + \ \ldots \ + \ s_n^2\right) \ / \ |\epsilon| \ . \end{split}$$

### Lerner index and HHI (cont'd)

- If Cournot model describes the industry, then  $L_i = s_i / |\epsilon|$ , where  $\epsilon$  = market elasticity of demand. So substitute:
- $$\begin{split} \bullet \ & L = s_1 L_1 + s_2 L_2 + s_3 L_3 + \ldots + s_n L_n \\ & = s_1^{2/} |\epsilon| \ + \ s_2^{2/} |\epsilon| \ + \ s_3^{2/} |\epsilon| \ + \ \ldots \ + \ s_n^{2/} |\epsilon| \\ & = (s_1^2 \ + \ s_2^2 \ + \ s_3^2 \ + \ \ldots \ + \ s_n^2) \ / \ |\epsilon| \ . \\ & = \underline{(HHI/10,000) \ / \ |\epsilon|}. \end{split}$$

### Importance of market definition

- All measures of concentration are only accurate if market is defined accurately.
- In many antitrust cases, market definition is key issue.
- If many firms are included, 4CR, 8CR, and HHI will be \_\_\_\_\_.
- If few firms are included, 4CR, 8CR, and HHI will be \_\_\_\_\_.

### Page 4

### Market definition in the Census

- U.S. Census reports concentration by industry, not by market, and includes only production in U.S.
- Example: "Motor vehicles."
- Includes compact cars, luxury cars, sport utility vehicles, and light trucks, etc., so concentration is estimated.
- Excludes imported cars, so concentration is estimated.

### Market definition in the Census

- U.S. Census reports concentration by industry, not by market, and includes only production in U.S.
- Example: "Motor vehicles."
- Includes compact cars, luxury cars, sport utility vehicles, and light trucks, etc., so concentration is <u>under-</u> estimated.
- Excludes imported cars, so concentration is <u>over-</u>estimated.

### Ideal market definition

- Should recognize close substitution possibilities in consumption. Examples:
- US automobiles:
- Aluminum siding: \_\_\_\_\_\_.
- Cable television:
- Traditional landline telephones:

### Conclusions

- Firms in a *concentrated* industry are \_\_\_\_\_\_\_ likely to act as competitors.
- *Concentration ratios* are crude measures of concentration.
- The *Hirschman-Herfindahl Index*, a better measure, equals the sum of \_\_\_\_\_\_\_ market shares of all firms in an industry.
- In principle, market definition should include close \_\_\_\_\_.

### CONCENTRATION AND PROFITS

### Page 1

### CONCENTRATION AND PROFITS

•Why are profits high in concentrated industries?

### Concentration and profit

- Numerous studies have shown that highly concentrated industries tend to have high price-cost margins.
- Why?
- 1. Collusion or market power hypothesis
- 2. Differential efficiency hypothesis

### (1) Collusion hypothesis

- Claims that concentration *causes* high prices.
- The more concentrated an industry, the more likely the firms in that industry are to act like a tacit \_\_\_\_\_\_.

### Collusion hypothesis (cont'd)

- Even if they do not collude, the Cournot model predicts that the fewer the firms in an industry, the \_\_\_\_\_\_ the Lerner index (or price-cost margin).
  - If all firms have same MC, then  $L = 1 / (n |\epsilon|)$ .
- If one firm has very large market share, it might act like a \_\_\_\_\_.

### Implications of collusion hypothesis

- Decreasing concentration will increase economic efficiency.
- How can the government decrease concentration?

### (2) Differential efficiency hypothesis

Р

- Claims that concentration and high price-cost margins are *caused by* a third factor.
   In some industries,
  - factor.

     In some industries,

     some firms have much

     lower marginal costs

     than others.

Harold Demsetz, "Industry Structure, Market Rivalry, and Public Policy," Journal of Law and Economics, Vol. 16, No. 1 (April 1973), pp. 1-9.  $-MC_2$ 

 $-MC_1$ 

Q

### CONCENTRATION AND PROFITS

Page 2











- Both L and HHI are higher in industry B.
- But which industry generates more consumer + producer surplus?
  - Price is the same in both industries (\$6).
  - But profit is higher in industry B .
- So industry \_\_\_\_\_ generates more surplus.

# Implications of differential efficiency hypothesis

- Decreasing concentration does necessarily increase economic efficiency.
- Government should \_\_\_\_\_ necessarily stop mergers (if mergers result in lower costs).
- Government should \_\_\_\_\_ subsidize small firms or new entrants.
- Government should \_\_\_\_\_ necessarily break up large firms (if this raises their costs).

### CONCENTRATION AND PROFITS

Page 3

### Which hypothesis is correct?

- The data generally show that often *differential costs* explain the link between concentration and price-cost margins.

### Conclusions

- Why do highly-concentrated industries have higher price-cost margins?
- The \_\_\_\_\_\_hypothesis says highly concentrated industries are less competitive.
- The hypothesis says costs differences across firms cause both high concentration *and* high average price-cost margins.
- We need to know why industries are concentrated before making policy.

### SCALE ECONOMIES

### Page 1 Explaining concentration • Why are some industries more concentrated than others?

- One possible explanation: in some industries, available technology favors large-scale production.
- If viable firms must be large relative to total demand, then the industry can hold only a small number of firms.



•What are "scale economies"?

are highly concentrated?

•Do they explain why some industries



# Reasons for economies of scale (1) Efficiency from labor specialization. Example: automobile assembly lines. (2) Engineering factors. Input requirements increase more slowly than output capacity in many situations. (3) Quasi-fixed (up-front) costs.

# Engineering factors in economies of scale: example of pipe

- Consider a pipe for oil, gas, water, etc.
- Area of cross section determines output (capacity).
- Circumference determines input (metal) required to make pipe.
- What must happen to input for output to double?

Only

increases

by factor of

### SCALE ECONOMIES









# "Span of control" problems in large organizations: example

- Suppose every six production workers must have a supervisor, and the organization must have an overall boss.
- Six workers require 1 manager.
- Twelve workers require \_\_\_\_\_ managers.

Manager

Manager

Manager

### SCALE ECONOMIES

### Page 3

### Plant versus firm

- Many firms have more than one plant.
- Economies of scale can occur at the firm level or the plant level or both.
- The engineering factors might explain -level economies of scale.
- The "loss of control" problem might explain -level diseconomies of scale.

# Firm economies of scale without plant economies of scale?

- Many firms have multiple plants.
- In some industries it might be the case that the more plants you operate, the more efficient you are at operating each one.

### Economies of scale in fact

- Scherer and co-authors\* interviewed industry experts to estimate the minimum efficient scale plant and firm in a variety of industries.
- Then compared these estimates to the total market, to see if economies of scale explain concentration.

\* Scherer, Beckenstein, Kaufer, and Murphy, *The Economics of Multi-Plant Operations*, Cambridge: Harvard Univ. Press, 1975.

# Do scale economies explain concentration?

Industry	MES plant as % of market	MES firm as % of market	4CR
Beer brewing	3.4	10-14	40
Petroleum refining	1.9	4-6	33
Cement	1.7	2	29
Steel works	2.6	3	48
Refrigerators and freezers	14.1	14-20	73

\* Scherer, Beckenstein, Kaufer, and Murphy, *The Economics of Multi-Pu Operations*, Cambridge: Harvard Univ. Press, 1975.

### Conclusions

- Economies of scale are savings from largescale operation.
- Economies of scale imply a \_\_\_\_\_\_\_\_ sloping average cost curve .
- But economies of scale do not explain concentration in most industries.

Page 1

### ENTRY COSTS AND EQUILIBRIUM ENTRY

•What are "entry costs"?

•Do they explain why some industries are highly concentrated?

### Explaining concentration

- Why are some industries more concentrated than others?
- Another possible explanation: in some industries, entry may not be free.
- Firms will enter this industry *only if* they expect sufficient future economic profit to pay for costs of entry.

### Willingness-to-pay for entry

- Q: How much would investors be willing to pay to enter an industry?
- A: Present discounted value of expected profit.
- Note: Under price competition, if MC=AC, then profits are always zero. But other market structures yield positive profits.

### Present discounted value of profit

- Let π denote annual profit of each firm in industry, which is expected to continue indefinitely into the future.
- Then present discounted value of expected profit = \_\_\_\_\_.
- Example: If  $\pi = \$1,000$  and r = 5%, then  $\pi/r = \$$ \_\_\_\_\_.

# Profit per firm and the number of firms (n)

- In several models we have studied, n has a effect on  $\pi$ , the profit of each firm.
- As more firms enter industry, price and profit are driven down. Examples:































Page 4





Page 1

### ENTRY BARRIERS AND CONTESTABLE MARKETS

•If scale economies are very large, can they be a barrier to entry?

### What are barriers to entry?

- Everyone agrees that these are barriers to entry:
  - patents and exclusive government franchises.
  - Exclusive ownership of a necessary resource.
- But not everyone agrees that very large scale economies are a barrier to entry.

### The view of the Harvard School

- Joe Bain (1968) defined an entry barrier as that anything that allowed incumbent firms to raise price above average cost, without encouraging entry.
- By definition, an entry barrier causes higher prices.
- Bain believed scale economies could be an entry barrier.

J.S. Bain, Industrial Organization, 2nd edition, New York: Wiley, 1968, p. 252.

### The view of the Chicago School

- George Stigler (1968) argued that any cost that must be born by new entrants, but not by incumbent firms, could be a barrier to entry.
- Stigler believed scale economies could not be an entry barrier.

G.J. Stigler, *The Organization of Industry*, Homewood, Illinois: Richard D. Irwin, 1968, p.67.











# Traditional view: scale economies are a barrier to entry

- Anticipating this low price, the entrant would stay out.
- Scale economies *are* a barrier to entry that maintains prices above average cost.
- But this conclusion rests on the assumption that the incumbent would
- So-called "Bain-Sylos postulate".

Joe S. Bain, *Barriers to New Competition*, Harvard Univ Press, 1956. Paulo Sylos-Labini, *Oligopoly and Technological Progress*, Harvard Univ Press, 1962.



### Contestable markets: assumptions

- New entrants have same costs as incumbents.
- Any fixed costs of entry can be recovered on exiting the market. Not sunk.
- For example, assume any firm can sell off its factory at original price.

# Contestable markets: assumptions (cont'd)

- Incumbent maintains its existing \_\_\_\_\_\_ (not quantity) in the face of entry, at least for the short run.
- Entrant can begin supplying market \_\_\_\_\_\_ incumbent can adjust price.











### Are assumptions of contestablemarkets view reasonable?

- Can fixed costs of entry be recovered?
- Examples of entry costs:
  - \_\_\_\_\_
    - \_\_\_\_\_
  - \_\_\_\_\_
- If not, a brief "hit-and-run" attack might not be profitable.



- Does it take longer for the incumbent to adjust price than for the entrant to begin production?
- If not, entrant cannot capture market even in short run.

### Page 4

### Conclusions

- Whether very large scale economies are a barrier to entry is controversial.
- The \_\_\_\_\_\_ view assumes the incumbent can deter entry by fixing its quantity and adjusting price. The incumbent can set P > AC.
- The \_\_\_\_\_\_ view assumes the incumbent must fix price in the short run and is therefore vulnerable to hit-and-run attacks. The incumbent must therefore set P = AC.

Page 1

### PREVENTING ENTRY

•Can an incumbent prevent entry, even if it is similar to new firms?

# Entry is bad news for a monopolist

- When new firms enter an industry, the incumbent firm (the former monopolist) will suffer a fall in price and profit.
- This is predicted by many different models:

# How can a monopolist prevent entry of new firms?

- Threaten to cut off distributors who sell any new firms' products.
- Threaten to start a "price war" if any new firm enters the industry.
- What else can a monopolist do?

### Special situations

- In special situations, incumbent might have advantages that keep it profitable when prices fall, but would cause an entering firm to make losses.
- These would discourage any firms from entering the market and would allow the incumbent to maintain monopoly profit.

# Examples of advantages for incumbent in special situations

- *Learning-by-doing:* If production experience leads to lower cost, incumbent might have lower AC than any potential entering firm.
- *Consumer switching costs:* It might be costly for consumers to switch to a new brand.

### What else can a monopolist do?

- But what if incumbent has no special advantages? What can the monopolist do to discourage entry of new firms?
- Traditional view: can keep output high.
- Contestable-markets view: must keep price low, sacrificing monopoly profit.
- Alternative view: keep capacity high.







### What is a "credible threat"?

Credible = believable.

- Example 1: Suppose I drive through McDonalds. They threaten not to give me my meal unless I pay first. Credible threat?
- Example 2: Suppose I hire a moving company to haul my goods to California. After arriving in California, they threaten to take my goods back to Iowa unless I pay first. Credible threat?







### Page 3

# Committing to high output without special advantages for the incumbent

- In many situations, the incumbent *can* adjust quantities or prices quickly, so the traditional and contestable-markets views do not make sense.
- Can the incumbent still commit itself to maintain high output after entry, as in the traditional view?
- Can the threat to maintain high output and a low price be made \_\_\_\_\_?

# Commitment through prior investment in capacity

- Suppose the incumbent firm first invests in "capacity."

# What if the other firm enters the market?

- If new firm actually enters, then market becomes perhaps Cournot or maybe even price competition.
- But now, incumbent has \_\_\_\_\_ marginal cost.
- Profit-maximizing choice for incumbent will be to maintain high output even if price is low.

A. Dixit, "The Role of Investment in Entry Deterrence," *Economic Journal*, Vol. 9 (1980), pp. 95-106.



- So the equilibrium after entry will be a very \_\_\_\_\_ price.
- Incumbent might make small profit.
- Or incumbent might suffer a loss, but fixed costs of capacity are sunk, so incumbent will persist with high output in short run.
- But entering firm will make \_\_\_\_\_\_

A. Dixit, "The Role of Investment in Entry Deterrence," *Economic Journal*, Vol. 9 (1980), pp. 95-106.





!

Page 4

### Conclusions

- Even if the incumbent is basically similar to new firms, it might be able to prevent entry through a \_\_\_\_\_\_ threat to maintain high output.
- Learning-by-doing or consumer switching costs could help the incumbent.
- Alternatively, prior investment in \_\_\_\_\_, to be used only if a new firm enters, can insure that the new firm never does.

# PART 3

# Antitrust Policy
# **MERGERS**

# Page 1 Types of mergers • Horizontal • Vertical **MERGERS** • Conglomerate · Product extension •How are mergers classified? · Market extension •What have been the historical trends • Pure (unrelated firms) in mergers?

# Horizontal mergers

- Combine firms in the same market (competitors).
- Greatest threat to competition.
- Examples:

# Vertical mergers

- Combine companies that have a buyer-seller relationship.
- Less threat to competition.
- Examples:

# Conglomerate mergers

- Combine firms which are neither direct competitors nor buyer-sellers.
- Subcategories
  - Product extension mergers
  - Market extension mergers
  - Pure conglomerate mergers
- May perhaps remove potential competition.

#### First merger wave: 1890s and 1900s

- Mostly horizontal mergers for monopoly.
- Most striking example: US Steel (1901) gained 65% market share.
- Other examples: General Electric, DuPont, American Tobacco, etc.

# MERGERS

#### Page 2

## Early merger cases

- *US v Northern Securities (1904).* Attempt to merge two railroads found illegal under Sherman Act sections 1 and 2.
- US v Standard Oil (1911). Broken up under Sherman Act.
- US v American Tobacco (1911). Broken up under Sherman Act.

#### Limitations of Sherman Act

- Sherman Act did not explicitly prohibit mergers—only "restraint of trade" (section 1) and "monopolization" (section 2).
- In cases just cited, the government argued that the merged firm was so large as to *monopolize* market.
- But no law addressed mergers to *oligopoly*.

# Clayton Act

- Clayton Act passed in 1914. Section 7 contains explicit ban on acquiring \_\_\_\_\_ of another corporation if effect is to "lessen competition."
- Loophole: Could still buy \_\_\_\_\_\_\_\_\_(factories, mills, track) of another firm.

# Second merger wave: 1920s

- Mostly horizontal mergers for oligopoly.
- Example: \_\_\_\_\_\_ purchased Lackawanna Steel in 1922, to become second-largest steel company.

# Celler-Kefauver Act

- Celler-Kefauver Act passed in 1950.
- Amended Clayton Act to prohibit purchase of \_\_\_\_\_\_ of another corporation if effect is to "lessen competition."
- Result was to prohibit most large horizontal and many vertical mergers.

#### Recent merger waves

Mostly conglomerate mergers.

- Third wave: 1960s.
- Fourth wave: 1980s. Included many leveraged buyouts.
- Fifth wave: 1990s.
- Sixth wave: early 2000s.

# MERGERS

#### Page 3





Page 1

## MOTIVATIONS FOR HORIZONTAL MERGERS

What are the good and bad reasons for mergers?How should we balance them?

# Why do firms merge?

- In most cases, mergers occur because they increase profit. But how?
- 1. Market price might rise due to increased *market power*.
- 2. Merging firms' costs might fall due to *efficiencies*.

# 1. Market power

Price might rise after a merger due to

- Unilateral effects: even though each firm continues to act on its own, market price might rise after a merger according to some models.
- Coordinated effects: the chances of collusion might rise after a merger.

# Market power: unilateral effects

- Assume the merged firm acts *on its own* to increase profit.
- Will price rise after the merger?
- Will industry quantity fall?

# Unilateral effects according to Cournot model

- Under Cournot oligopoly, Lerner index is  $\frac{P-MC}{P} = , \text{ where } n = \text{number of firms.}$
- So if n decreases, price will
- Assuming demand curve is unchanged, market quantity will \_\_\_\_\_.

# Unilateral effects according to Cournot model

- Under Cournot oligopoly, Lerner index is  $\frac{P-MC}{P} = \frac{1}{n |\varepsilon|} , \text{ where } n = \text{number of firms.}$
- So if n decreases, price will <u>rise</u>.
- Assuming demand curve is unchanged, market quantity will <u>fall</u>.

#### Page 2

# Unilateral effects according to Cournot model (cont'd)

- How exactly does market quantity fall?
- The merged firm will decrease its total quantity, which will increase price.
- But this will cause nonmerging firms to their quantity,\* partly offsetting the rise in price.
- So a merger might be unprofitable.
- \* Cournot best reply functions slope down.



Unilateral effects according to Bertrand model with differentiated products

- Firms produce close substitutes.
- Each firm's demand depends positively on other's price:

 $q_1 = q_1(p_1, p_2)$   $q_2 = q_2(p_2, p_1)$ 

• So if one firm raises price, that increases demand for the other's product.

#### Unilateral effects according to Bertrand model with differentiated products

- Firms produce close substitutes.
- Each firm's demand depends positively on other's price:

$$q_1 = q_1(p_1, p_2)$$
  $q_2 = q_2(p_2, p_1)$   
- + - +

• So if one firm raises price, that increases demand for the other's product.

Unilateral effects according to Bertrand model with differentiated products (cont'd)

- As separate firms, they don't care about each others' profit.
- But once merged, they have a greater incentive to raise price.
- This will cause nonmerging firms to \_\_\_\_\_\_ their prices,\* increasing demand for the merging firms' products.
- So mergers are always profitable.
- \* Bertrand best reply functions slope up.

#### Unilateral effects according to Bertrand model with differentiated products (cont'd)

- As separate firms, they don't care about each others' profit.
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- \* Bertrand best reply functions slope up.

#### Page 3

# Market power: coordinated effects

- Firms are less likely to act on their own when the number of firms is small.
- Easier to collude:
  - Tacit collusion.
  - Formal cartel.

#### 2. Efficiencies

Costs might fall at the merging firm due to

- Economies of scale.
- Rationalization of production.
- Pecuniary economies.







# Efficiencies: pecuniary economies

- Pecuniary economies: pay less for inputs.
  - Take advantage of volume discounts.
- Exercise buyer market power in input markets.
- Example:















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Page 6

# Conclusions Mergers typically bring both increases in market power and efficiencies. In principle, the government should evaluate both and compute the net effect on \_\_\_\_\_\_\_ welfare (=PS+CS). In practice, the US government currently considers only the net effect on \_\_\_\_\_\_\_ welfare (=CS).

#### HISTORIC HORIZONTAL MERGER CASES

#### Page 1

# HISTORIC HORIZONTAL MERGER CASES

•What cases have influenced US merger policy since the Celler-Kefauver Act of 1950?

# US v Bethlehem Steel (1958)

- Bethlehem Steel tried to buy Youngstown Sheet & Tube. Would become #2 steel company in US (after US Steel).
- Combined steel ingot capacity would have been 21%. But companies argued that they operated in different regional markets.
- District court disagreed, saying market must be defined on the basis of where *potentially* they could make sales. \_\_\_\_\_\_.

## Brown Shoe v US (1962)

- Brown Shoe tried to buy G.R. Kinney.
- Both firms made shoes and owned retail shoe stores, each with tiny national market shares.
- Supreme Court found that merger would produce high combined market shares in a few cities.
- But Court disapproved even when merger would produce market share of just 5%! Court wanted to halt a "trend" toward concentration.

# US v ALCOA (1964)

- ALCOA, a maker of aluminum electrical cable, wanted to buy Rome Cable, a maker of mostly copper cable, but some aluminum.
- Supreme Court considered many market definitions. Finally chose aluminum cable (excluding copper cable, a close substitute), of which ALCOA had 27.8% and Rome 1.3%.
- Court found combined market share too high.

# US v Continental Can (1964)

- Continental Can, 2<sup>nd</sup> largest maker of tin cans, tried to buy Hazel-Atlas Glass, 3<sup>rd</sup> largest maker of glass bottles.
- Supreme Court defined market as including both cans and bottles, even though it admitted cross-elasticities were low in short run.
- In this combined market, Continental Can had 22% market share and Hazel-Atlas had 3%.

# US v Von's Grocery (1966)

- Von's, 3<sup>rd</sup> largest grocery chain in Los Angeles, tried to buy Shopping Bag Food Stores, 6<sup>th</sup> largest chain.
- Combined firm had only 7.5% market share in Los Angeles, second to Safeway.
- But Supreme Court said Celler-Kefauver Act was intended "to prevent economic concentration in American economy by keeping a large number of small competitors in business." \_\_\_\_\_\_.

#### HISTORIC HORIZONTAL MERGER CASES

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#### Conclusions

- In *Brown Shoe* and *Von's* cases, Supreme Court showed interest in keeping concentration
- In *Bethlehem Steel*, *ALCOA*, and *Continental Can* cases, courts chose somewhat contradictory market definitions in order to enjoin mergers.
- Common thread is that Supreme Court has had a fairly \_\_\_\_\_\_ attitude toward horizontal mergers.

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## HORIZONTAL MERGER ENFORCEMENT TODAY

•What is the policy of the Department of Justice and the FTC toward horizontal mergers?

http://www.justice.gov/atr/public/guidelines/hmg-2010.html

## Legal authority for policy

Section 7 of Clayton Act (1914) prohibits mergers if "in any line of commerce or in any activity affecting commerce in any section of the country, the effect of such acquisition may be substantially to lessen competition, or to tend to create a monopoly."

# What does "lessen competition" mean?

- In the past, as we have seen, a merger has been viewed as lessening competition if it causes an increase in
- In recent decades, a merger has been viewed as lessening competition mainly if it causes an increase in \_\_\_\_\_.

# Procedure under Hart-Scott-Rodino Act of 1976

- Merging companies must give prior notification to FTC and Antitrust Division of U.S. Dept of Justice.
- One agency then reviews merger.
- If not satisfied, may request more information.
- If still not satisfied, may oppose merger.

https://www.ftc.gov/enforcement/premerger-notification-program

FY 20	FY 2019 figures		
	FTC	Antitrust Division	Total
Notifications received			2030
Preliminary investigations	149	88	237
Second Request investigations	30	31	61
Mergers challenged	21	17	38
Source: Hart-Scott-Rodino Annual Re Exhibit A, table I.	port, Fiscal	Year 2019, page 2 ar	ıd

# What happens if a merger is challenged?

- Companies may \_\_\_\_\_ anyway, and face a court battle.
- Companies may try to \_\_\_\_\_ with govt. Typical settlements include
  - Divestiture of facilities in overlapping markets.
  - If merger has vertical component, some agreement to treat in-house and other suppliers equally.

#### Page 2

# Example: Dollar Tree + Family Dollar Stores

- Both are discount general-merchandise chain stores.
- Merger challenged by FTC.
- FTC said the chains competed in local markets in 35 states.
- To maintain competition, chains agreed to sell 330 Family Dollar stores to third party.

Source: Hart-Scott-Rodino Annual Report, Fiscal Year 2015, page 2.

#### Merger guidelines

- FTC and Antitrust Division agreed in 1992 to publish common guidelines for merger review.
- Based on previous guidelines issued in 1982 by Antitrust Division alone.
- Guidelines updated periodically.
- Now two documents:
  - "Horizontal Merger Guidelines" (revised 2010).
  - "Vertical Merger Guidelines" (2020).

https://www.justice.gov/atr/merger-enforcement

# Possible anticompetitive effects of a merger

- "\_\_\_\_\_\_effects" = elimination of competition between merging firms. Merged firm may have incentive to increase price, reduce output, or slow innovation.
- "\_\_\_\_\_effects" = increased risk of explicit collusion or tacit collusion (parallel price increases without an agreement). Entire industry may compete less vigorously.

https://www.justice.gov/atr/horizontal-merger-guidelines-08192010, section 1.

#### How Guidelines define a market

- A horizontal merger is evaluated according to its likely effect on price in a particular
- Guidelines define a market as a group of products and a geographic area which, if monopolized, would give the seller power over
- Choose the smallest such group.

https://www.justice.gov/atr/horizontal-merger-guidelines-08192010, section 4.1.1.

#### How Guidelines define a market

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https://www.justice.gov/atr/horizontal-merger-guidelines-08192010, section 4.1.1.

#### "SSNIP test"

"... a hypothetical profit-maximizing firm, not subject to price regulation, that was the only present and future seller of those products ("hypothetical monopolist") likely would impose at least a small but significant and non-transitory increase in price ("SSNIP") on at least one product in the market, including at least one product sold by one of the merging firms."

https://www.justice.gov/atr/horizontal-merger-guidelines-08192010, section 4.1.1.

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How big is a "small but significant and nontransitory increase in price"?

- In practice, about 5%.
- Note that a bigger price increase might require a \_\_\_\_\_ market definition.
- Monopoly would have to control all substitutes to succeed in raising price a lot.

# Profitability of increase in price

- Agencies also consider whether the increase in price would increase \_\_\_\_\_\_.
- This requires estimating how many sales would be lost at the higher price (demand elasticity), and what profit would otherwise be earned on them.
- Also, possibly, whether lost customers would purchase another of the merged firm's products instead.

https://www.justice.gov/atr/horizontal-merger-guidelines-08192010, section 4.1.3.

# Offsetting factors

Even if a merger appears anticompetitive, there may be offsetting factors that preserve competition.

- Potential new entry.
- Cost savings from combined production.
- One firm might have failed without the merger.

## Offsetting factor: potential new entry

Guidelines \_\_\_\_\_\_ a merger if any new market power would be limited by entry of new firms, if such entry would be

- · profitable for entrant.
- "rapid enough to make unprofitable" any attempt by merged firm to raise prices.
- sufficient to keep prices to premerger levels.

https://www.justice.gov/atr/horizontal-merger-guidelines-08192010, section 9.

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# Offsetting factor: cost savings

• Guidelines consider cost savings ("efficiencies") *only* if they result in lower prices for consumers.

"In conducting this analysis, the Agency will not simply compare the magnitude of the cognizable efficiencies with the magnitude of the likely harm to competition absent the efficiencies."

• Do *not* consider cost savings at all if they could be obtained by means other than merger.

https://www.justice.gov/atr/horizontal-merger-guidelines-08192010, section 10.

# Exception for failing firms • If a firm or a division of a firm is failing and likely to exit the market anyway, its merger with a viable firm will \_\_\_\_\_ be challenged.

https://www.justice.gov/atr/horizontal-merger-guidelines-08192010, section 11.

# Conclusions

- Under the \_\_\_\_\_\_ Act, firms planning to merge must notify the U.S. government.
- Government evaluates "unilateral effects" and "coordinated effects" of merger on a market.
- Government defines a market according to substitution in \_\_\_\_\_.
- Cost savings are considered only if they lead to lower prices.

#### CHANGES IN MARKET CONCENTRATION

Page 1

## CHANGES IN MARKET CONCENTRATION

•How do Department of Justice and FTC evaluate horizontal mergers?

http://www.justice.gov/atr/public/guidelines/hmg-2010.html, section 5.

## Changes in market concentration

- Department of Justice and FTC "seek to identify and challenge competitively harmful mergers while avoiding unnecessary interference with mergers that are either competitively beneficial or neutral."
- "Market concentration is often one useful indicator of likely competitive effects of a merger."

http://www.justice.gov/atr/public/guidelines/hmg-2010.html, sections 1 and 5.3.

## Dangers of high concentration

- "Unilateral effects" = elimination of competition between merging firms. The fewer the firms in the industry, the higher the price, according to the Cournot model.
- "Coordinated effects" = increased risk of collusion. The fewer the firms, the easier it is to maintain explicit or tacit collusion.

# Market participants

According to the 2010 Horizontal Merger Guidelines, "market participants" are

- firms currently earning revenue in the relevant market.
- firms that could enter the market rapidly if the price were to rise.

# Market shares

- Market shares are computed for all market participants.
- Market share of firm #i is usually computed from *revenues* as  $\frac{Firm \#i's revenue}{Total market revenue}$ .
- Market share sometimes computed from *units sold* or from *production capacity*.

# Market concentration

- Hirschman-Herfindahl index (HHI) is used.
- Recall HHI = sum of *squares* of market shares in percent of *all* firms in the industry.
- Let  $s_i = market share$ . Then  $100s_i = market share in percent$ .
- HHI =  $(100s_1)^2 + (100s_2)^2 + \dots + (100s_n)^2$ .

## CHANGES IN MARKET CONCENTRATION

Page 2









effect on calculations.



Page 1

## UPWARD PRICING PRESSURE

•How do Department of Justice and FTC evaluate horizontal mergers?

https://www.justice.gov/atr/horizontal-merger-guidelines-08192010, section 6.1.

# What is unsatisfactory about the market concentration approach?

- Market concentration approach classifies all firms as in or out of the market.
- Suppose firms produce \_\_\_\_\_\_, not perfect substitutes.
- Typically, some firms' products compete closely with each other, but others do not.
- Need a more subtle approach.

# The "upward pricing pressure" (UPP) approach

- Assumes firms produce differentiated products, so any firm can raise prices by itself without losing all its customers.
- Focuses on "\_\_\_\_" of merger—that is, increased incentives for merged firm to raise prices, without collusion.
- Tries to determine simply \_\_\_\_\_ prices will rise because of the merger, not how much.





# What are included in marginal costs?

- Marginal cost includes production costs, delivery costs, perhaps selling costs, etc. related to selling one more unit.
- Marginal cost does NOT include the impact on \_\_\_\_\_\_ firms' profits of Firm A selling one more unit.
- Other firms' profits are external to Firm A.

#### Page 2

# Impact of Firm A on Firm B's profit

- When Firm A sells more output (e.g., by cutting price), it likely diverts customers from Firm B.
- Let D<sub>AB</sub> = the number of units lost by Firm B when Firm A sells one more unit.
- Let  $P_B$  and  $MC_B$  = Firm B's price and marginal cost, assumed held constant.
- Then Firm A sells one more unit, profit at Firm B falls by \_\_\_\_\_\_.

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- Let  $P_B$  and  $MC_B$  = Firm B's price and marginal cost, assumed held constant.
- Then Firm A sells one more unit, profit at Firm B falls by  $D_{AB}(P_B-MC_B)$ .

# What determines the value of $D_{AB}(P_B-MC_B)$ ?

- D<sub>AB</sub> ("diversion ratio") is large if products A and B are close substitutes, but usually less than one.
- P<sub>B</sub>-MC<sub>B</sub> ("Firm B markup") is large if Firm B's price is much higher than its marginal cost.
- So if A and B are not close substitutes, or Firm B's price is close to its marginal cost, then  $D_{AB}(P_B-MC_B)$  will be close to \_\_\_\_\_.

# What if Firms A and B merge?

- Firms become Division A and Division B of single merged firm.
- Division A must now take account of the impact of its sales on Division B's profit ("cannibalization").
- Merger creates the equivalent of an increase in Firm A's marginal  $cost = D_{AB} (P_B-MC_B)$ .





#### Page 3

# Merger efficiencies

- Merging firms usually claim that merger will also decrease marginal costs.
- Real cost savings = economies of scale or scope, rationalization of production.
- Pecuniary cost savings = paying less for inputs by negotiating better prices, buying in bulk, etc.

#### Offsetting efficiencies

- Let  $E_A$  = decrease in MC<sub>A</sub> due to efficiencies.
- Net change in virtual MC is called "upward pricing pressure"
   LIPP

$$= D_{AB}(P_B - MC_B) - E_A.$$





# Computing UPP<sub>A</sub> = $D_{AB}(P_B-MC_B) - E_A$ .

- P<sub>B</sub> and MC<sub>B</sub> are typically obtained directly from merging companies' HSR filing.
- Diversion ratio  $D_{AB}$  is obtained from
  - Surveys of customers.
  - Runner-up bids from procurement auctions.
  - Very rough estimate from market shares.



#### Page 4

# Numerical example (cont'd)

- Further suppose  $P_B = $10$  and  $MC_B = $4$ .
- So  $D_{AB}(P_B-MC_B) = (1/3)(\$10-\$4) = \$2.$
- If  $E_A = -\Delta MC_A = \$2$  (a 33% drop) then UPP<sub>A</sub> =  $D_{AB}(P_B-MC_B) - E_A =$
- If efficiencies from the merger were any less, then  $UPP_A > 0$  and  $P_A$  would \_\_\_\_\_\_



# Example: U.S. v. Electrolux & GE (2014)

- Economist Michael Whinston computed estimates of  $D_{AB}(P_B\mathchar`-MC_B)$  , as percent of MC.
- Much higher than merging companies' claimed efficiencies, so UPP was clearly positive.
- Parties dropped merger.

$D_{AB}(P_B-MC_B)$	Electrolux	GE
Ranges	16%	15%
Cook-tops	47%	13%
Wall ovens	33%	17%

# Conclusions

- Government sometimes evaluates unilateral effects of a horizontal merger by computing "\_\_\_\_\_\_" to determine if merger will increase or decrease price.
- This method assumes firms produce differentiated products in a price-setting (Bertrand) market.
- Same method can be used to compute hypothetical reduction in MC required to keep price constant.

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## OTHER WAYS TO EVALUATE MERGERS

•How do Department of Justice and FTC evaluate horizontal mergers?

## Effects on prices

- The Horizontal Merger Guidelines describe a variety of methods the FTC and DOJ have used to estimate the effect of mergers on prices, depending on circumstances and available data.
- Here, two are described:
- (1) Auction bids (unilateral effects)

(2) Comparisons across markets (unilateral and coordinated effects)

# (1) Auction bids

- In many industries, firms compete in auctions to supply products.
- If two firms frequently bid against each other, they can potentially raise price by merging.
- "These effects are likely to be greater, the greater advantage the runner-up merging firm has over other suppliers in meeting customers' needs."

https://www.justice.gov/atr/horizontal-merger-guidelines-08192010, section 6.2.







#### Page 2

## Case: milk suppliers

- Four milk suppliers to schools in Wisconsin and neighboring areas: Dean Foods, Foremost, Kemps, and Prairie Farms.
- Dean and Foremost were often winner and runnerup, especially in northern Wisconsin.
- DOJ Antitrust Division therefore argued the merger would raise prices.

Baye, M. R., Hunter, G., & Walden, E. (2018). Case 7: Under the Radar: The Dean Foods-Foremost Farms Consummated Merger (2011) p. 147. In J. E. Kwoka, Jr. & L. J. White (Eds.), *The antitrust revolution: economics, competition, and policy* (7 ed., pp. 147-164). New York: Oxford University Press.

#### (2) Comparisons across markets

"For example, if the merging firms compete in some locales but not others, comparisons of price charged in regions where they do and do not compete may be informative regarding post-merger prices."

https://www.justice.gov/atr/horizontal-merger-guidelines-08192010, section 2.1.2.

# Case: office superstores in the 1990s

- In mid-1990s, there were three large chains of office superstores: Staples, Office Depot, and Office Max.
- Each operated hundreds of stores.
- In 1996, Office Depot proposed to merge with Staples.
- FTC computed Staples prices in various markets.

# Case: office superstores in the 1990s

Benchmark market	Comparison market	Price reduction
Staples only	Staples, Office Depot	11.6%
Staples, Office Max	All 3 chains	4.9%
Office Depot only	Staples, Office Depot	8.6%
Office Depot, Office Max	All 3 chains	2.5%

Dalkir, S., & Warren-Boulton, F. R. (2018). Case 9: Prices, Market Definition and the Effects of Merger: Staples, Office Depot, and Office Max (1997, 2015, and 2016). In J. E. Kwoka, Jr. & L. J. White (Eds.), *The antitrust revolution: economics, competition, and policy (° ed., pp. 189-210)*. New York: Oxford University Press. Table 9-2, p. 196.

## Conclusions

- FTC and DOJ use a variety of methods to estimate the likely price increase resulting from a merger. Here are two.
- Where merging firms frequently bid against each other, it can be estimated as the price gap between the and other suppliers.
- Where merging firms compete against each other in some markets but not others, it can be estimated as the price difference \_\_\_\_\_ markets.

#### CONGLOMERATE MERGERS

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# CONGLOMERATE MERGERS

•Why do firms engage in conglomerate mergers?

•When can conglomerate mergers harm competition?

#### What are conglomerate mergers?

- Combine firms which are neither direct competitors nor buyer-sellers.
- Subcategories
  - Market extension mergers
  - Product extension mergers
  - Pure conglomerate mergers



# Examples of market extension mergers

- Bank of America and NationsBank (1998).
- New AT&T (including SBC) and BellSouth (2006).



# Examples of product extension mergers

- Pepsico and Pizza Hut (1977).
- DuPont and Pioneer (1999).
- Travelers Group and Citicorp (1998).
- SBC and old AT&T (long distance only) (2005).

#### CONGLOMERATE MERGERS

#### Page 2

#### Pure conglomerate mergers

- · Firms have no obvious relationship.
- Possible motivations:
- *1. Better allocation of capital.* Internal management may have better information than external capital markets.
- 2. Replace inefficient management at acquired firm. Acquiring firm can replace board of directors and inefficient top management.

# Examples of pure conglomerate mergers

- International Telephone & Telegraph (IT&T).
  - Began as a telecommunication equipment manufacturer and telephone system operator.
  - Acquired Hartford Fire Insurance, Continental Baking, Sheraton Hotels, etc.
  - Has since spun off most businesses.

# Anticompetitive effects of conglomerate mergers

- Possibly facilitate anticompetitive practices such as reciprocal dealing and predatory pricing (to be discussed later in course).
- Possibly eliminate potential competition in an already highly concentrated market.
  - Threat of potential competition (new entry) may be only force keeping price low.

#### FTC v Procter and Gamble (1967)

- P&G, a very large company, was largest producer of soaps and detergents, but did not produce bleach.
- Clorox was largest producer of household liquid beach.
  - 49% market share.
  - HHI > \_\_\_\_
- P&G tried to acquire Clorox.

# Why the Supreme Court ruled against the merger

- Said P&G could easily have entered the bleach market without acquiring Clorox.
- Found evidence that P&G's management had even considered doing so.
- Said few firms other than P&G could have challenged Clorox.
- Concluded that threat of entry by P&G was helping to keep Clorox's prices down in the highly concentrated bleach market.

# Merger with potential entrant may be challenged

• "A merger between an incumbent and a potential entrant can raise significant competitive concerns. The lessening of competition resulting from such a merger is more likely to be substantial, the larger is the market share of the incumbent, the greater is the competitive significance of the potential entrant, and the greater is the competitive threat posed by this potential entrant relative to others."

https://www.justice.gov/atr/horizontal-merger-guidelines-08192010, section 5.3.

#### CONGLOMERATE MERGERS

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#### Conclusions

- Conglomerate mergers may be motivated by economies of scale or \_\_\_\_\_\_, better allocation of capital, or replacement of inefficient management.
- The main anticompetitive effect, as stated in the P&G case and the "Merger Guidelines," is elimination of \_\_\_\_\_\_ competition in a highly concentrated industry.

#### VERTICAL MERGERS AND TRANSACTION COSTS

Page 1

# VERTICAL MERGERS AND TRANSACTION COSTS

•What is a "vertical" merger?•Does it hurt or help society?

#### What is a vertical merger?

- Merger of firms in buyer-seller relationship.
- Also called "vertical integration."
- Buyer firm is called "\_\_\_\_\_ firm."
- Seller firm is called "\_\_\_\_\_ firm."
- After merger, market transactions are replaced by internal transactions.



## Key questions about vertical mergers

- Does the vertical merger increase profit?
- Does it decrease social welfare?

# Why would a vertical merger be profitable?

As with horizontal mergers, there are two possibilities.

- 1. Production efficiencies.
- 2. Increased market power through anticompetitive unilateral effects or coordinated effects.

# 1. How could a vertical merger create production efficiencies?

- A downstream firm will merge with an upstream firm if it prefers to \_\_\_\_\_\_\_ (in-house) the supplies it needs, rather than \_\_\_\_\_\_\_ them on the open market ("outsourcing").
- If the merger merely lowers costs, then it also \_\_\_\_\_\_ social welfare.

#### VERTICAL MERGERS AND TRANSACTION COSTS

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## Make or buy?

- Should an auto company make its own parts, or simply buy and assemble them?
- Should a supermarket chain own vegetable farms or simply buy vegetables on the open market?
- Should a university own and maintain its photocopy machines, or simply pay another firm to supply photocopying services?

## Advantages of buying

- Lower supervision costs.
- Better \_\_\_\_\_. Each firm keeps profits from its efforts.
- For downstream (buying) firm, \_\_\_\_\_\_ may work to keep costs low.
- For upstream firm, opportunity to enjoy \_\_\_\_\_\_, selling to

many firms.

## Advantages of making

- Direct control.
- Fewer \_\_\_\_\_: no need for contract negotiation.
- Greater : don't need to keep to the contract if conditions change.

# Another advantage of *making*: spreading risk

- Spread risk of failure.
  - If both firms engage in risky projects (such as research and development) then combining the firms spreads risk.
- Spread risk from price fluctuation.
  - If price of the product increases, seller firm \_\_\_\_\_\_ and buyer firm \_\_\_\_\_\_\_
  - If price decreases, seller firm \_\_\_\_\_ and buyer firm \_\_\_\_\_.
  - If merged, no risk from price fluctuation.

# Yet another advantage of making

- If both upstream and downstream firms are monopolies, final output price will be set too\_\_\_\_\_\_, above the monopoly price an integrated firm would choose.
- Bad for both producers and consumers.
- Problem is called "successive monopolies" or "double marginalization."

# 2. How could a vertical merger have anticompetitive effects?

#### Unilateral effects

- *Foreclosure,* that is, vertical merger for the purpose of harming or excluding rival firms. Coordinated effects
- Vertical merger to facilitate *tacit collusion* through information-sharing.

## VERTICAL MERGERS AND TRANSACTION COSTS

Page 3

## Evolution of economic analysis

- *Traditional view:* Vertical mergers assumed to be anticompetitive and thus harmful to social welfare, without rigorous analysis.
- *Chicago School:* Rigorous analysis showed that under simple assumptions vertical mergers were either unprofitable or harmless to welfare.
- *Post-Chicago view:* Vertical mergers might be profitable and harmful to welfare under alternative assumptions.

# Conclusions A vertical merger unites a \_\_\_\_\_\_ and a \_\_\_\_\_\_. After merger, some trade bypasses the market. Vertical mergers can sometimes reduce cost or eliminate successive monopolies—good for both \_\_\_\_\_\_. But vertical mergers might also have anticompetitive effects.

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## SUCCESSIVE MONOPOLIES AND DOUBLE MARGINALIZATION

- Suppose both upstream and downstream markets are monopolies.
- Does a vertical merger harm social welfare?

Wh "successive	at are monopolie	s"?
Successive monopolies = upstream firm (seller) and downstream firm		Successive monopolies
(buyer) which are each monopolies in their output markets.	Upstream market	Monopoly
	Downstream market	Monopoly
	L	

# Key questions about vertical merger of successive monopolies

- Does vertical merger of successive monopolies increase profit?
- Does it decrease social welfare?

# Which is worse: two monopolies or one?

	Successive monopolies	Vertical integration
Upstream market	Monopoly	
Downstream market	Monopoly	Monopoly

# A model of successive monopolies

#### Assumptions

- Upstream firm (seller) and downstream firm (buyer) are *both monopolies* in their output markets.
- Downstream firm uses upstream firm's product in *fixed proportion* with other inputs.

#### Implications of the model

- When monopolies sell to monopolies, final output price is too high to maximize profit: "double marginalization."
- We will show by example that profit can be increased *and* final price reduced with vertical merger.
- Problem first identified by Augustin Cournot (1838).

Cournot, A. A. (1838). Recherches sur les principes mathématiques de la théorie des richesses. Paris: Hachette. Chapitre IX «Du concours des producteurs».

#### Page 2

# Example: upstream firm

- Suppose a chip producer enjoys a monopoly for a special type of electronic chip.
- Assume average cost equals marginal cost =  $MC_C =$ \$40.
- Being a monopoly, however, the chip producer sets price at P<sub>C</sub> \$40.





# Downstream firm's output choice

- To maximize profit, downstream firm chooses Q so that  $MC_D = MR_D$ .
- So  $P_C + 20 = 120 (Q/500)$ .
- Solve to get Q = \_\_\_\_\_.





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two m	onopolies o	r one?	
	Successive monopolies	Vertical integration	
Upstream market	Monopoly	Monopoly	
Downstream market	Monopoly		



- Special contractual arrangements might accomplish the same result.
- Upstream firm might lower its price to  $P_C=$ \$40 and then charge an additional fixed annual fee to the downstream firm.
- Or upstream firm might impose some sort of maximum price  $P_D=$ \$90 on downstream firm.

## Conclusions

- Double marginalization occurs when both upstream and downstream firms enjoy market power (successive monopolies).
- Result is that final output price is too \_\_\_\_\_\_ to maximize total profits.
- If successive monopolies vertically integrate,
  - price \_\_\_\_\_, benefiting consumers,
  - profits \_\_\_\_\_, benefiting producers.

#### FORECLOSURE FOR MONOPOLY EXTENSION

Page 1

## FORECLOSURE FOR MONOPOLY EXTENSION

- Suppose upstream market is a monopoly but downstream market is competitive.
- Can a vertical merger hurt society?

#### What is "foreclosure"?

- *Foreclosure* = vertical merger for the purpose of harming or excluding rival firms.
- Historically, this is the most frequent complaint against vertical mergers.
- The most extreme form of foreclosure is sometimes called "monopoly extension."

# What is "monopoly extension"?

*Monopoly extension* = vertical merger for the purpose of using an existing monopoly in an upstream market to create a monopoly in a downstream market.

Upstream market		Monopoly	
Downstream market	Competitor	Competitor	Competitor



- Does it decrease social welfare?
- Only if answers to both questions are should we worry.

W	hich is wors	se?
	Upstream monopoly only	Monopoly extension
Upstream market	Monopoly	Vertically-
Downstream market	Competition	monopoly



## FORECLOSURE FOR MONOPOLY EXTENSION







# Implications of fixed-proportions assumption

- It can be shown that profit would *not* increase after monopoly extension.
- Monopoly in the upstream firm is sufficient to maximize profit—no need to monopolize downstream market.
- Numerical example follows.

# Fixed-proportions: example

- Consider again the example of upstream chip-maker and downstream device makers.
- Chip-maker's marginal cost is \$40.
- Device-maker's  $MC_D = \$20 + P_C$  as before.
- This time, assume this time that downstream market is *competitive*, so  $P_D = MC_D =$





#### FORECLOSURE FOR MONOPOLY EXTENSION







- Profit =  $(P_C 40) 30,000$ = (70 - 40) 30,000 =
- But this is the *same* profit we computed for the vertically-integrated firm in previous slideshow.
- Conclude monopoly extension does \_\_\_\_\_\_ increase profit or decrease social welfare in fixed-proportions case.








#### FORECLOSURE FOR MONOPOLY EXTENSION





Depends or	downstream	L
	Upstream monopoly only	Monopoly extension
Upstream market	Monopoly	Vertically-
Downstream market	Competition	monopoly

- Monopoly extension has no effect if the upstream firm's product is used in \_\_\_\_\_ proportion by the downstream industry.
- However, monopoly extension *may* be anticompetitive in the \_\_\_\_\_\_ proportions case.

#### OTHER KINDS OF FORECLOSURE

#### Page 1

## OTHER KINDS OF FORECLOSURE

- Can vertical mergers be used to harm or exclude rival firms?
- Do such mergers harm society as a whole?

## What is "foreclosure"?

- *Foreclosure* = vertical merger for the purpose of harming or excluding rival firms.
- We now consider less extreme foreclosure, when neither market is initially a monopoly.

Upstream market	Competitor	Competitor	Competitor
Downstream market	Competitor	Competitor	Competitor

## Key questions about foreclosure through vertical merger

- Does foreclosure of downstream markets through vertical merger raise the profit of the acquiring firm?
- Does it decrease social welfare?
- Only if answers to both questions are should we worry.

## How might foreclosure be profitable and decrease welfare?

Unilateral effects

- Excluding rival firms.
- · Raising rival firms' costs.
- Coordinated effects
- · Facilitating collusion through exchange of information. (Not covered here.)

## Possible settings for foreclosure

- 1. Many upstream and downstream firms.
- 2. Complete foreclosure in one market.
- 3. Few upstream firms.
- 4. Vertical merger by all firms in both markets.
- 5. Merger of complements.
- 6. Diagonal merger.

#### 1. Many upstream and downstream firms Upstream Many firms in both Firm,#1 Firm #2 industries, which are Firm #3 perfectly competitive. Firm #4 Firm #5 Example: Firm #6 • Upstream industry is Downstream furniture makers. Firm A Firm B Firm F · Downstream industry Firm E Firm C is furniture retailers.

Firm D

#### OTHER KINDS OF FORECLOSURE





Should we worry about foreclosure if both markets remain competitive?

- Is it profitable?
- Does it decrease social welfare?





## Should we worry about complete foreclosure?

- Is it profitable?
- Does it decrease social welfare?
- But even an unrelated firm could acquire all downstream firms to create a monopoly this way. The vertical component is irrelevant.
- In a sense, this is really a \_\_\_\_\_\_ merger.

Firm #2

Firm #3

#### OTHER KINDS OF FORECLOSURE









#### Should we worry about foreclosure with few upstream firms?

- Is it profitable?
- Does it decrease social welfare?
- · But integrated firm's costs are reduced so it will likely
- Also, remaining firms might also vertically integrate, problem of imperfect competition in upstream market.



#### OTHER KINDS OF FORECLOSURE







• Effect of merger might be to exclude potential rival firms.





## Should we worry about merger of firms producing complements?

- But if neither upstream industry was competitive before, then merged firm would have incentive to \_\_\_\_\_\_each price to boost demand for the other product.
  - Situation is similar to successive monopolies.



#### OTHER KINDS OF FORECLOSURE





- Since not a true vertical merger, this merger cannot alleviate double marginalization.
- But to boost demand for its rakes, merged firm might try to \_\_\_\_\_ price of leaf blower parts, raising cost of leaf blowers.
- So might be profitable and decrease welfare.

- Vertical mergers can sometimes be profitable *and* decrease social welfare if they \_\_\_\_\_\_ rivals or \_\_\_\_\_\_ their costs.
- Effects on welfare can be complex and depend on details, especially
  - initial degree of competition,
  - production (fixed proportions or not).

#### LAW AND POLICY ON VERTICAL MERGERS

Page 1

# LAW AND POLICY ON VERTICAL MERGERS

What has been past policy on vertical mergers?What is current policy?

#### Law on vertical mergers

• As with horizontal mergers, key law is Clayton Act (1914) as amended by Celler-Kefauver Act (1950), which prohibits mergers whose effect is to "lessen competition."

## Policy until late 1970s

- Courts attacked vertical mergers even when merging firms had fairly small market shares.
- Reflected traditional negative view of vertical mergers, without careful economic analysis.
- *Brown Shoe Co. v US*: Supreme Court prevented merger with Kinney, a shoe retailer (1962).
- *Ford Motor Co. v US*: Supreme Court prevented merger with Electric Autolite, a spark plug maker (1972).

## Policy in 1980s and early 1990s

- DOJ and FTC became extremely lenient on vertical mergers.
- Reflected Chicago School view that vertical mergers were \_\_\_\_\_ or \_\_\_\_\_, based on simple models
  - (successive monopolies, monopoly extension).
- Only one vertical merger stopped in 12 years of Reagan and Bush Administrations.

## Current policy

- In between: less aggressive than 1960s but slightly more aggressive than 1980s.
- Reflects subtle models of post-Chicago view (exclusion, raising rivals' cost).
- Does not reject concept of double marginalization, but recognizes other forces at work.

#### https://www.justice.gov/atr/merger-enforcement



programming).

#### LAW AND POLICY ON VERTICAL MERGERS

#### Page 2

# TCI, a third company, also involved in merger

- TCI: largest cable television system operator (and producer of some programming).
- TCI already owned 7.5% of Turner Broadcasting, and so would own part of merged company.
- Together, Time Warner and TCI would have 40% market share of programming and 44% market share of cable systems.

## Time Warner and Turner Broadcasting System: outcome

- FTC feared that TCI and Time Warner together would foreclose market for programming.
- In fact, research shows vertically integrated cable companies offer fewer programming channels and favor their own.\*
- So FTC required merged company to purchase more outside programming.

\* Chipty, T. (2001). Vertical Integration, Market Foreclosure, and Consumer Welfare in the Cable Television Industry. *American Economic Review*, 91(3), 428-453.

## 2020 Vertical Merger Guidelines

- DOJ and FTC issued new "Vertical Merger Guidelines" in June 2020.
- Guidelines describe situations in which vertical mergers might pose concerns.
- As with other antitrust policies, harm to \_\_\_\_\_\_ is sole criterion.

## 2020 Vertical Merger Guidelines

- DOJ and FTC issued new "Vertical Merger Guidelines" in June 2020.
- Guidelines describe situations in which vertical mergers might pose concerns.
- As with other antitrust policies, harm to <u>consumers</u> is sole criterion.

## 2020 Vertical Merger Guidelines (cont'd)

- Recognize that vertical mergers can benefit consumers by eliminating double
- But mergers can also have unilateral (or even coordinated) effects that lessen competition in either upstream or downstream market.

## 2020 Vertical Merger Guidelines (cont'd)

- A given merger could have both beneficial and harmful effects on consumers, so analysis can be complex.
- Agencies try to determine whether a vertical merger gives merged firm (a) \_\_\_\_\_\_ to lessen competition and (b) \_\_\_\_\_\_ to do so.
- Potential entry might limit ability.

#### LAW AND POLICY ON VERTICAL MERGERS

Page 3

Conclusions
<ul> <li>Until the late 1970s, courts aggressively opposed vertical mergers with little economic analysis.</li> <li>In the 1980s and early 1990s, vertical mergers were treated very leniently, inspired by Chicago School view.</li> </ul>
Today, vertical mergers may be challenged if they allow merged firm to rivals, raise rivals', or create to entry.

#### Page 1

## VERTICAL RESTRAINTS

•What are "vertical restraints"? •Why do firms impose them on their customers? •Are they illegal? What are vertical restraints?
Vertical restraints = restrictions imposed on downstream firms (usually \_\_\_\_\_\_) by an upstream firm (usually a \_\_\_\_\_\_) as a condition of doing business.
Vertical restraints are a rough substitute for vertical mergers. Upstream firm exerts partial, not complete control over downstream firm.

Upstream market	Competitor	Competitor	Competitor
Downstream market	Competitor	Competitor	Competitor



## 1. Resale price maintenance (RPM), also called "Fair Trade"

- RPM can in principle be either a minimum price or maximum price.
- *Maximum* retail price easy to understand: manufacturer ...
  - wants to sell as many units as possible.
  - may fear "\_\_\_\_\_ monopolies," so may compel retailers to keep price low.
  - But NOT focus of law and policy.

### RPM: the minimum price case

- *Minimum* retail price harder to understand. Wouldn't it *reduce* sales?
- Possible explanations:
  - Marketing and promotion by retailers.
  - Quality certification by retailers (similar).
  - Cartel forced on manufacturer by retailers.

## RPM: marketing and promotion explanation

- If manufacturer imposes a minimum price above cost, then retailers are forced to compete on dimensions other than price.
- Retailers will offer attractive showrooms, test models, attentive and informed sales personnel, etc. which will \_\_\_\_\_\_ total sales.

Lester Telser, "Why should manufacturers want fair trade?" Journal of Law and Economics, Vol 3 (October 1960), pp. 86-105.

#### Page 2

#### RPM: marketing and promotion explanation (cont'd)

- Without RPM, some retailers would offer only basic service.
- Customers would visit showroom retailers for information, then turn to barebones discount retailers or online stores for purchase.
- Basic discount retailers would thus "\_\_\_\_\_\_" on showroom retailers.

## RPM: quality-certification explanation

- High-quality retailers certify to consumers the quality and stylishness of the brands they carry (e.g., Lenox brand china).
- Manufacturers wishing to enter a market with a high-end product use RPM to entice high-quality retailers to carry their brand.

Howard P. Marvel and Stephen McCafferty, "Resale price maintenance and quality certification," *The RAND Journal of Economics*, Vol. 15, No. 3 (Autumn 1984), pp. 346-359.

## RPM: cartel explanation

- Retailers somehow force RPM on manufacturer.
- RPM is really a device for maintaining a cartel at the retail level.
- But does this explanation make sense?
  Why would the manufacturer agree?
  - How can the cartel stave off competition from other brands?

## Legal status of RPM

- RPM *per se* illegal from *Dr. Miles v. Dohn D. Park & Sons* (1911) case until 2007.
- - Courts still permitted manufacturers to unilaterally stop doing business with retailers who set prices too low.\*
- In 1937, Miller-Tydings Act permitted states to legalize RPM if they passed "Fair Trade" laws.

\*U.S. v. Colgate & Co., 250 U.S. 300 (199).

## Later developments in RPM

- Congress repealed Miller-Tydings Act in 1975, effectively making RPM *per se* illegal in all states.
- Then Supreme Court reversed Dr. Miles in Leegin v. PSKS Inc. (2007).
- RPM now judged under

## 2. Territorial restraints

- Manufacturer assigns territories to retailers, protecting them from competition from other retailers of the same brand.
- Common in auto industry.

#### Page 3

Territorial restraints: explanations

- Benefits to manufacturer may be similar to RPM—encourage marketing and promotion.
- Another possible benefit is to allow retailers to enjoy economies of scale.
- Alleged anticompetitive effect also similar to RPM—device for maintaining a cartel at the retail level.

#### Legal status of territorial restraints

- \_\_\_\_\_applies.
- Key case is *Continental TV Inc. v. GTE Sylvania* (1977).
- Generally permitted.

## 3. Exclusive dealing

- Buyer and seller sign contract requiring buyer to purchase all supplies from that same seller.
- Buyer usually receives a payment or discount in return.
- Buyer may pay a penalty for purchases from other sellers.

## Key questions about exclusive dealing

- Does the exclusive dealing contract increase profit of both buyer and seller?
- Does it decrease social welfare?
- Only if answers to both questions are should we worry.

# Possible motivations for exclusive dealing

- Motivation may be same as vertical integration: better coordination of product design, etc.
- Motivation may also be to foreclose rivals.
- Whether social welfare increases depends on which motivation is more important.

#### Exclusive dealing as foreclosure · In signing exclusive-Р dealing contract, buyer Demand essentially agrees to a monopoly. • But loss of buyer MC surplus > gain in monopoly profit. ۱MR • Puzzle: why sign contract if net benefit Q Q<sub>M</sub> is negative?

#### Page 4

## Chicago School's skeptical view of exclusive dealing

- Net benefit is negative UNLESS the exclusive-dealing contract provides some other benefit, such as coordination.
- The value of that coordination must greater than the deadweight loss, or there is no room for a deal.
- But if that value is greater than deadweight loss, the contract \_\_\_\_\_\_\_ social welfare.

# Post-Chicago view of exclusive dealing

- In many markets, new firms must pay fixed costs to enter a market.
- So entrants need a minimum market share to survive.
- Economic models incorporating fixed entry costs show that exclusive-dealing contracts can be acceptable to both parties AND forestall entry AND reduce social welfare.

## Law on exclusive dealing

Clayton Act (1914) section 3:

"It shall be unlawful ... to lease or make a sale or contract for sale of goods ... on condition ... that the lessee or purchaser thereof shall not use or deal in the goods ... of a competitor ... where the effect ... may be to substantially lessen competition or tend to create a monopoly."

https://www.law.cornell.edu/uscode/text/15/14

# Courts' treatment of exclusive dealing

- In early cases, courts automatically viewed most exclusive-dealing contracts as anti-competitive.
- In later cases, courts made exceptions if contracts affected only small fractions of the total market.
- Now courts require clear evidence that seller has \_\_\_\_\_\_, and that contract lessens competition.

### Important cases: U.S. v. Visa (1999)

Facts:

- Visa and Mastercard combined market share was about 73%.
- Visa and Mastercard prohibited member banks from issuing cards of certain competitors, including American Express and Discover.

Outcome:

• Visa and Mastercard were required to eliminate prohibition from contracts.

## EU v. Intel (2009) U.S. v. Intel (2010)

#### Facts:

- In market for CPUs, Intel's market share > 80% and AMD's market share < 15%.
- Intel offered rebates to OEMs (IBM, Dell, HP, etc.) if they bought > 95% of their CPUs from Intel.

Outcome:

• Intel was ordered to stop rebates, and not retaliate if OEMs bought from AMD, and pay \$2 billion in fines and damages to AMD.

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## TYING

•What is "tying"?

•Why do firms tie their products?

•How have courts treated tying?

#### What is "tying"?

- *Tying* = downstream firms that purchase one item from manufacturer are required to also purchase other items as well.
- Purchases of one item are *tied* to purchases of other items.
- Synonym: \_\_\_\_\_.

## Types of tying: examples

- Variable proportions: If you buy our machine (the \_\_\_\_\_ product) you must also buy our supplies for that machine (the product).
- *Fixed proportions:* If you (a theatre) book one of our movies, you must simultaneously book another movie—the movies are a tied package or \_\_\_\_\_\_.

## Explanations of tying

- 1. Competitive markets
  - 1A. Efficient distribution
  - 1B. Quality control
  - 1C. Evasion of price controls
- 2. Tying product is monopolized
  - 2A. Price discrimination-variable proportions
  - 2B. Price discrimination—fixed proportions
  - 2C. Extension of monopoly

#### Explanations of tying: 1A. Efficient distribution

- Some products are less costly to sell as a package.
- Almost everyone wants both items, so transaction costs are reduced by tying.
  - Cars are sold with \_\_\_\_\_
  - Computers are sold with

#### • Left shoes are sold with \_\_\_\_

#### Explanations of tying: 1B. Quality control

- Suppose an upstream firm sells a machine (the \_\_\_\_\_\_ product).
- Upstream firm believes that if poor-quality supplies are used, machine will perform poorly.
- Customers might blame machine. This would harm reputation ("goodwill") of upstream firm.
- So upstream firm requires customers to also buy supplies (the \_\_\_\_\_ product) from it.

## TYING Page 2

#### Explanations of tying: 1C. Evasion of price controls

- Suppose tying product's price is controlled by law.
- Upstream firm could exploit excess demand by requiring customers to also purchase an overpriced tied product.
- Example: Suppose there is a price ceiling on gasoline, causing excess demand. Gasoline station requires customers who want to buy gasoline to also buy an expensive drink.

#### What is "price discrimination"?

- *Price discrimination* = monopolist charges \_\_\_\_\_\_prices to different customers, according to willingness to pay.
- Some customers get higher prices than with ordinary monopoly.
- Other customers may get lower prices.
- Effect on social welfare is uncertain.

#### Explanations of tying:

2A. Price discrimination-variable-proportions

- Suppose heavy users of a machine are willing to pay more for the machine than light users.
- Monopolist can set higher price for heavy users than for light users by requiring all users to purchase supplies from monopolist.
- Simply set price of supplies cost.
- Then heavy users effectively pay \_\_\_\_\_\_ for machine.

#### Explanations of tying:

2B. Price discrimination—fixed-proportions

- Suppose willingness-to-pay for goods A and B is negatively correlated.
- Some customers are willing to pay a lot for good A, but little for good B.
- Other customers are willing to pay a lot for good B, but little for good A.

George Stigler, "A Note on Block Booking," in Stigler, *The Organization of Industry*, Chicago: University of Chicago Press, 1968, pp. 165-170.

## Price discrimination in the fixedproportions case: example

- Suppose two theatres are willing to pay the following for movies. Assume MC=0.
- If film distributor (upstream firm) must price them separately, it will price action movie at \_\_\_\_\_\_, and romantic comedy at \_\_\_\_\_\_,

for total revenue of \_\_\_\_\_

Willingness to pay	Action movie	Romantic comedy
Downtown theatre	\$100	\$50
Suburban theatre	\$70	\$120



#### TYING Page 3

## Explanations of tying: 2C. Extension of monopoly

- Suppose market for product A is a monopoly, but market for product B is competitive.
- Monopolist might tie product A to product B, hoping to gain a monopoly for product B.
- Tying can exclude competitors from market for product B.

## Legal status of tying

- Supreme Court said tying was *per se* illegal in 1958, under Section 1 of Sherman Act.
- Since then, Court has become more lenient.
- Tying is now usually illegal, but may be judged legal if firm has no \_\_\_\_\_\_ in tying product.
- *Quality control* has sometimes been used as a successful defense.

- Most common motivations for tying are probably efficiency, quality control, and price discrimination.
  - \_\_\_\_\_\_ serious threats to social welfare.
- But tying could be used for monopoly extension.
- Courts have found that tying is \_\_\_\_\_\_ illegal, with a few exceptions.

#### LAW ON MONOPOLIZATION

Page 1

## LAW ON MONOPOLIZATION

•What exactly does the Sherman Act Section 2 forbid?

#### Sherman Act Section 2

- "Every person who shall monopolize, or attempt to monopolize ... any part of the trade or commerce among the several states, or with foreign nations ... shall be deemed guilty of a felony."
- Note that "monopolizing" is forbidden, but being a \_\_\_\_\_\_ is not.

#### Awkward problem for enforcement

- How to distinguish socially-harmful "monopolization" from socially-beneficial competition?
- "The successful competitor, having been urged to compete, must not be turned upon when he wins."\*

\*United States v. Aluminum Co. of America, 148 F 2nd 416 (2d Cir. 1945).

## Distinguishing "monopolization"

Rule of reason is used by courts to detect "monopolization."

In general, courts use two-part test.

- *1. Possession of market power*: power to raise price.
- 2. *Intentional acquisition*: actions taken to exclude rivals.

Standard Oil Co. of New Jersey v. United States, 221 U.S. 1 (1911). United States v. Grinnell Corps., 384 U.S. 563 (1966).

- 1. Ways to determine possession of market power: market share
- Courts traditionally focus on this.
- First define the market.
- Then determine firm's market share.
- If market share is above some threshold, then conclude firm has market power.

#### How to define the "market"

- In principle market should include *all products and firms that a hypothetical cartel would need to control, in order to raise price permanently.*
- "Market" should include close substitutes in
- Should also consider \_\_\_\_\_--side substitution, too. What firms would supply the market if price where raised?

### LAW ON MONOPOLIZATION

#### Page 2

## Misplaced focus?

- In real world, market boundaries not sharp.
- But determining which products and firms are in the market may be wrong approach.
- Question is not *whether* a firm faces close substitutes, but *how* close they are.
- Question is not *whether* a firm has potential rivals, but *how quickly* they could respond to a price increase by increasing their output.

## Ways to determine possession of market power: Lerner index

- Let  $\varepsilon = \text{the}$  long-run demand elasticity.
- Then  $L = (P-MC)/P = 1/|\epsilon|$ , measures firm's market power.
- Most reliable measure of market power, if  $\,\epsilon\,$  can be estimated.
- For competitive firm,  $\varepsilon = -\infty$ , so L =\_\_\_\_.

## 2. Ways to determine intent to monopolize

Infer intent from exclusionary practices, such as

- Predatory pricing.
  - But must somehow distinguish this from vigorous competitive pricing!
- Refusal to deal.
- Other practices tending to exclude rivals.

- Sherman act forbids "monopolizing," not being a monopoly.
- Courts use a two-part test:
- 1. \_\_\_\_\_ of monopoly power, traditionally measured by \_\_\_\_\_
- 2. <u>to acquire monopoly</u>—actions taken to exclude rivals.

#### HISTORIC MONOPOLIZATION CASES

Page 1

## HISTORIC MONOPOLIZATION CASES

How have the courts treated monopolization cases?What evidence has been necessary to show intent to monopolize?

## Evolution of policy

- 1890-1940. Courts required evidence of both large market share and abusive or predatory conduct showing intent to monopolize.
- 1940-1970. Market share important. Evidence of abusive or predatory acts not required to show intent.
- 1970-present. Courts more lenient, more skeptical of intent.

## Standard Oil v. US (1911)

- Standard Oil grew from 1872 to 1899 to control 90% of US refining capacity by acquiring more than 120 rivals.
- Accused of predatory pricing, buying up pipelines, industrial espionage, etc.
- Supreme Court found that these tactics demonstrated intent to monopolize.
- Standard Oil found guilty and dissolved into 34 separate companies.

Standard Oil Co. of New Jersey v United States, 221 U.S. 1 (1911)

## US v. United States Steel (1920)

- US Steel formed through chain of mergers in 1901, giving it 65% share of steel output.
- Judge E H Gary, Chairman of US Steel, held dinners with other steel leaders to create goodwill and stabilize prices.
- Falling market share and lack of predatory behavior led Supreme Court to acquit in 1920.
- "... the law does not make mere size an offense..."

United States v. United States Steel Corp., 251 U.S. 417 (1920).

## US v. Alcoa (1945)

- Alcoa dominated primary aluminum ingot sales in US due to
  - patents on production process (through 1909)
  - ownership of key bauxite reserves,
- economies of scale in extracting alumina from bauxite.
- 2<sup>nd</sup> Circuit Court was designated court of last resort due to lack of quorum on Supreme Court.
- Opinion written by Judge Learned Hand.

United States v. Aluminum Co. of America, 148 F. 2d 416 (2d Cir. 1945).



#### HISTORIC MONOPOLIZATION CASES

Page 2





## US v. Alcoa (1945): judgment

- Judge Hand chose the last market definition, implying a \_\_\_\_\_ market share.
- Moreover, Judge Hand found intent was shown simply by Alcoa's pattern of building capacity ahead of demand. Evidence of predation was unnecessary.
- Alcoa found guilty but not dissolved. Instead, government sold its own wartime aluminum plants to new entrants.

### US v. United Shoe Machinery (1953)

- United Shoe held 75% to 85% market share of shoe manufacturing machinery.
- Company held extensive patents.
- Company never sold its machines, but leased them for 10 years with some restrictions. Provided free repairs. Required that lessees had to use its machinery if work was available.

United States v. United Shoe Machinery Corp., 110 F. Supp. 295 (D. Mass. 1953).

## US v. United Shoe Machinery (1953): judgment

- Court admitted that "United's power does not rest on predatory practices," but still criticized its leasing policies.
- United found guilty, ordered to sell as well as lease its machines, modify terms of leases, and divest some assets.
- However, unclear whether United Shoe's leases really were anticompetitive.

## Berkey Photo v. Kodak (1979)

- Eastman Kodak made cameras, film, and provided photofinishing services. Had 60%-90% shares of most segments.
- Berkey, a photofinisher, claimed that Kodak exploited its vertical integration to hurt its rivals in film and photofinishing.
- Cited Kodak's surprise introduction of the 110 compact camera system, which required new Kodacolor II film.
- Berkey said Kodak should have disclosed information to rivals before introduction.

Berkey Photo, Inc. v. Eastman Kodak Co., 603 F. 2d 263 (2d Cir. 1979).

#### HISTORIC MONOPOLIZATION CASES

#### Page 3

### Berkey Photo v. Kodak (1979): sharing information

- Circuit court decided Kodak did \_\_\_\_\_ have a duty to predisclose information acquired through its own investment in research and development.
- A vertically-integrated firm does not "offend the Sherman Act whenever one of its departments benefits from association with a division possessing a monopoly in its own market."

#### Berkey Photo v. Kodak (1979): competing aggressively

- Retreated from Alcoa standard, admitted right of dominant firm to "compete aggressively."
- Case decided in favor of Kodak. Supreme Court declined to review.

## US v. IBM

- Dept of Justice filed case in 1969.
- Enormous resources expended before case dismissed in 1982.
- IBM was unquestionably the dominant firm in computers, but government and IBM disagreed about market definition.

## US v. IBM (cont'd)

- Government alleged IBM's practices were intended to exclude rivals.
- Included leasing, bundling, selling special low-priced "fighting machines," tying products, etc.
- However, in 1982 government decided it could not win.

- Early government victories against Standard Oil (and American Tobacco) were based on both market share and \_\_\_\_\_\_.
- Mid-century victories against Alcoa and United Shoe required \_\_\_\_\_\_evidence of abusive conduct to prove intent.
- In recent cases, courts have required more evidence of intent.

#### PREDATORY PRICING Page 1

## PREDATORY PRICING

•What is "predatory pricing"? •Why is it controversial?

## • In 1994, Frontier Airlines entered the Billings-Denver route with a fare of about \$100.

- Incumbent United Airlines had been charging about \$200, but lowered its fare to about \$100. A year later, Frontier withdrew from the route.
- United Airlines raised its fare within 6 months to over \$200.
- Is this vigorous competition or anti-competitive behavior?



## What is "predatory pricing"?

- *Predatory pricing* = increasing quantity and cutting prices in order to
  - force rival firms to exit or merge.
  - deter entry by making an example.
  - discipline uncooperative firms in a cartel or tacit cartel.

# Predatory pricing similar to dumping

- Predatory pricing is similar to "dumping" in international trade.
- "Dumping" means exporting a product at a price below cost, in order to drive out rival producers in the importing country.

# Pricing below cost need not be predatory

- Companies often offer new products at "promotional pricing" or give away free samples to build demand.
- Two-sided networks (newspapers, Facebook) offer access below cost or for free, but charge for advertising.
- Purpose is obviously not to force exit or deter entry.

#### PREDATORY PRICING Page 2

# Key questions about predatory pricing

- Is predatory pricing profitable?
- Does it decrease social welfare?





# McGee's critique of predatory pricing

- McGee (1958), in famous study of the Standard Oil case of 1911, questioned whether company really engaged in predatory pricing.
- Argued that predatory pricing would have been too \_\_\_\_\_\_ to be profitable for the following reasons.

John S. McGee, "Predatory Price Cutting: The Standard Oil (N.J.) Case," Journal of Law and Economics, Vol. 1 (October 1958): 137-69.

## McGee's critique of predatory pricing (cont'd)

- *1. Cost:* Predator usually has larger output than victim. Thus losses are \_\_\_\_\_\_ for predator than for victim.
  - Predator must have a "deep pocket" to finance losses for an extended period.
  - If target firm is truly more efficient, capital markets should provide necessary financing to resist predator.

### McGee's critique of predatory pricing (cont'd)

- 2. *Effectiveness:* Predator must prevent victim from re-entering (or another rival from entering) the market when price is finally raised.
- *3. Alternatives:* Cheaper to buy out the target firm (though this would not deter entry by other firms).

#### PREDATORY PRICING Page 3

#### Impact of McGee's critique

- For many years after McGee, most economists were skeptical of predatory pricing.
- Predatory pricing did not seem to be both and

#### Post-Chicago responses to McGee

- *1. Cost:* Capital markets may not be efficient enough to finance target firm's resistance.
  - Potential lenders (banks, investors) may not have enough information to evaluate target firm's management.
  - May not be able to determine whether losses are due to predation attempt, or some long-term problem.

## Post-Chicago responses to McGee (cont'd)

- 2. *Effectiveness:* Reputation models can explain why re-entry is deterred (see next slideshow).
- 3. Alternatives: Predatory pricing may have reduced Standard Oil's cost of acquiring target firms. (Of course, such mergers would probably be challenged today.)

- Predatory pricing means increasing quantity and lowering price to drive out a rival or deter entry.
- To be profitable, predation must be followed by a period of \_\_\_\_\_\_.
- McGee (1958) argued that predation is too costly to be in the predator's interest.
- But recent game-theory models show that predatory pricing can be both \_\_\_\_\_\_ and \_\_\_\_\_.

Page 1

## REPUTATION MODELS OF PREDATORY PRICING

•When might predatory pricing be both profitable and bad for social welfare?

## Definition of predatory pricing

- Increasing quantity and cutting prices in order to
  - force rival firms to exit or merge.
  - deter entry by making an example.
  - discipline uncooperative firms in a cartel or tacit cartel.

## Asymmetric information

- Definition: Information known by some but not all economic agents.
- Beginning in the 1970s, asymmetric information was shown to cause a variety of market imperfections.
- \_\_\_\_\_-Chicago asymmetric information models show that predatory pricing may be profitable if incumbent firm's costs are not known to entering firm.

How asymmetric information models of predatory pricing work

- Incumbent firm increases quantity and lowers price beyond its ordinary profitmaximizing point.
- Tries to make entrant think it has low costs.
- Purpose is to drive out entrant, or prevent entry in another market, by cultivating a for low cost.

## A simple model

- Market A: \_\_\_\_\_ market. Incumbent uses this market to try to convince entrant it is a tough competitor.
- Market B: \_\_\_\_\_ market. If incumbent succeeds in deterring entry, enjoys monopoly profit.
- Entrant in market B can be same firm as in market A, or a different firm.
- Market B can be same market, different product or different location.



#### Page 2

### Assumptions: production cost

- Assume AC = MC for both firms.
- Incumbent's marginal cost MC<sub>1</sub> is known to incumbent but not to entrant.
- Entrant believes that incumbent's marginal cost is either  $MC_1$ =\$1 or  $MC_1$ =\$4, and attaches a 50% chance to each.
- Entrant's marginal cost =  $MC_2 = \$1$  is known to everyone.

#### Assumptions: entry cost

- Entrant pays an entry cost of \$150 if it enters market B.
- Entry cost includes advertising and other costs required when a market is first entered.
- Incumbent has no entry cost.









#### Page 3

# Should the entrant also enter market B?

• If entrant *knows* that incumbent has MC<sub>1</sub> = \$4, then entrant should enter market B because

profit = \$160 > entry cost =\_

• But if entrant is *uncertain* whether MC<sub>1</sub> = \$1 or \$4, then entrant should stay out because expected profit = \$125 < entry cost =





## Influencing entrant's decision

- If incumbent *accommodates* entrant in market A, producing q<sub>1</sub>=10, entrant learns it has MC<sub>1</sub>=\$4 and \_\_\_\_\_ market B.
- If incumbent *predates* in market A, producing q<sub>1</sub>=30, entrant remains unsure about MC<sub>1</sub> and \_\_\_\_\_\_ of market B.
- Which strategy is more profitable for incumbent?

mark	et A if $MC_1 = S$	\$4 ?
	Accommodate	Predate
Profit in market A	\$10	\$0
Profit in market B	\$10	\$90
Total profit		



#### Page 4

Does predatory pricing decrease social welfare in this example?

- Clearly, strategy of producing q<sub>1</sub>=30 in market A pays off for incumbent even if it has high marginal cost (MC<sub>1</sub>=\$4).
- But does predation reduce welfare?
- Must sum producer and consumer surplus.
- Here, producer surplus = net profit.

#### Social welfare comparison

	Accommodate	Predate
Incumbent's profit in market A	\$10	\$0
Incumbent's profit in market B	\$10	\$90
Entrant's profit in market A	\$160	\$90
Entrant's net profit in market B	\$10	\$0
Consumer surplus in market A	\$125	\$180
Consumer surplus in market B	\$125	\$45
Total social welfare		

- Predatory pricing means increasing and lowering to drive out a rival or deter entry.
- It can be profitable and welfare-reducing if entrants are unsure of incumbent's cost.
- Incumbent cultivates a \_\_\_\_\_\_ for having low cost by increasing quantity and lowering price, beyond its ordinary profitmaximizing point, to deter entry.

Page 1

## LAW AND POLICY ON PREDATORY PRICING

•What is the legal status of predatory pricing?•How can predatory pricing be detected?

## Legal status of predatory pricing

- In principle, predatory pricing is \_\_\_\_\_ under the Sherman Act Section 2 and Clayton Act.
- In practice, it is difficult to distinguish predatory pricing from vigorous price competition.

## Identifying predatory pricing

- Need a test that identifies predatory pricing in the real world.
- Also need to screen out false claims. Firms harmed by falling market prices are often quick to accuse their rivals of predatory pricing.

## Marginal cost

- Competitive firms set price = MC.
- A predator might set price \_\_\_\_ MC in the short run.
- However MC is difficult to measure precisely in practice.
- Easier to measure short-run fixed, variable, and total cost.

# Two kinds of inputs in the short run (review)

- *Variable inputs* = inputs that can be adjusted in the short run.
  - Examples: \_
- *Fixed inputs* = inputs that cannot be adjusted in the short run. Levels are dictated by past decisions.
  - Examples:

# Two kinds of cost in the short run (review)

- *Short-run variable cost (SVC)* = payments for variable inputs.
  - Examples: \_
- *Short-run fixed cost (SFC)* = payments for fixed inputs.

• Examples: \_

• *Short-run total cost (STC)* = SVC + SFC.

#### Page 2

#### Short-run average costs (review)

- Short-run average fixed cost (SAFC) = fixed cost per unit of output = SFC / q.
- *Short-run average variable cost (SAVC)* = variable cost per unit of output = SVC / q.
- *Short-run average total cost (SATC)* = short-run total cost per unit of output = STC / q = SAFC + SAVC.





## Areeda-Turner AVC Rule

- A competitive firm *might* produce when P < SATC, but *never* when P <
- Areeda and Turner (1975) therefore suggest that predation be assumed whenever price is less than average variable cost.
- Areeda-Turner rule has been adopted in a number of court cases.

P. Areeda and D.F. Turner, "Predatory pricing and related practices under Section 2 of the Sherman Act," *Harvard Law Review*, Vol. 88 (Feb. 1975): 697-733.

## The ATC rule

Greer (1983) and others believe the Areeda-Turner rule is too lenient.

He suggested that predation be assumed whenever two conditions hold:

- 1. price is less than average total cost, and
- 2. there is evidence of \_\_\_\_\_\_ to harm rivals.

#### Williamson's output-restriction rule

- Williamson (1977) suggested a rule that does not require information on cost.
- Focus is on predation to deter entry.

O.E. Williamson, "Predatory pricing: a strategic and welfare analysis," Yale Law Journal, Vol. 87 (Dec 1977): 284-334.

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Matsushita v. Zenith (1986) and Brooke Group v. Brown & Williamson Tobacco (1993)

- In these two cases, the Supreme Court applied a two-tier rule.
- Not only must prices be \_\_\_\_\_ cost, but predators must be able to \_\_\_\_\_ profits lost during predation. Recoupment requires market concentration and entry barriers.
- Now much more difficult to prove predatory pricing.

Matsushita Electric Industrial Co. v. Zenith Radio, 475 U.S. 574, 589 (1986). Liggett Group Inc. v. Brown & Williamson Tobacco Corp., 509 U.S. 209 (1993).

## Spirit Airlines v. Northwest Airlines (2005)

- Northwest Airlines dominated routes between Detroit and Philadelphia (DTW-PHL).
- December 1995: Spirit Airlines entered market at much lower fare (price).
- June 1996: Northwest decreased fare and added flights and seats.
- August-September 1996: Spirit left market.

Spirit Airliness, Inc. v. Northwest Airlines, Inc., 431 F.3d 917 (6th Cir. 2005).

## Spirit Airlines v. Northwest Airlines (2005): the arguments

- Spirit sued Northwest in 2000. Said
  - Northwest's prices < cost.
  - There were entry barriers because no gates were available at airport in Detroit.
  - Northwest could recoup its losses.
- Northwest's defense:
  - Its low price > average variable cost.
  - No entry barriers: gates could be leased from other airlines at Detroit.

## Spirit Airlines v. Northwest Airlines (2005): the outcome

- District Court decided for Northwest in 2005 on summary judgement.
- Spirit appealed.
- Court of Appeals noted Northwest's large market share and barriers to entry. Returned case back to District Court for full trial.
- Northwest Airlines filed for bankruptcy.
- Spirit dropped the case.
- Spirit re-entered market in 2016.

#### Page 4

## Anti-dumping laws: a related issue

- Anti-dumping laws in international trade compare price that goods are sold in U.S. with price they are sold in home (exporting) country.
- Assumption is that retail price in home country is approximately equal to product's true MC.
- But in fact, some countries' home retail markets are much less competitive than U.S., so retail price in home country could be much greater than MC.

## Policy lags behind theory

- Note that lost profits need not be recouped in the \_\_\_\_\_ market according to reputation theories.
- These theories argue that predatory pricing functions to deter entry in \_\_\_\_\_ markets.
- But courts have been slow to recognize and apply reputation theories.

- In practice it is difficult to distinguish predatory pricing from vigorous competition.
- The Areeda-Turner \_\_\_\_\_ rule is widely used to identify predatory prices.
- In recent decisions, courts have also required evidence of \_\_\_\_\_\_ and
- Courts have been slow to recognize and apply reputation theories of predation.

#### REFUSAL TO DEAL Page 1

## REFUSAL TO DEAL

•Is it legal for a firm to refuse to deal with other firms?

•What is the "essential facilities doctrine"?

#### Definition of refusal to deal

- *Refusal to deal* = A firm refuses to supply a complementary product, an input, or valuable information to a rival firm.
- Can be a violation of Sherman Act Section 2 ("monopolization") if intent is anticompetitive.

#### Aspen Skiing Co v. Aspen Highlands Skiing (1985)

- Aspen Skiing Co dropped out of a ski pass program allowing skiers to use both companies' ski areas.
- Aspen Highlands lost market share as result.
- However, decision remains controversial.

Aspen Skiing Company v. Aspen Highlands Skiing Corporation, 472 U.S. 585 (1985)

## US v. Terminal Railroad (1912)

- Certain railroads acquired bridges, terminals and other rail approaches to St. Louis.
- Same railroads then denied access to competing railroads.
- Supreme Court decided this was \_\_\_\_\_\_ and required that access be given to competing railroads.

United States v. Terminal Railroad Ass'n. 224 U.S. 383 (1912).

## MCI v. AT&T (1982)

- MCI competed with AT&T in long-distance telephone service.
- However, MCI needed to interconnect with local network, which AT&T had blocked.
- Seventh Circuit Court of Appeals agreed with MCI and required AT&T to interconnect with all competing longdistance carriers.

MCI Communications Co. v. AT&T, 708 F.2d 1081 (7th Cir. 1982).

## "Essential facilities" doctrine

According to Court of Appeals, to show antitrust liability one must show

- 1. Monopolist \_\_\_\_\_\_ facility.
- 2. Competitor cannot \_\_\_\_\_\_ facility.
- 3. Monopolist has \_\_\_\_\_\_ facility to competitor.
- 4. It is \_\_\_\_\_\_ for monopolist to provide facility to competitors

MCI Communications Co. v. AT&T, 708 F.2d 1081 (7th Cir. 1982).

#### REFUSAL TO DEAL Page 2

*Networks* are most likely to be viewed as "essential facilities"

Examples of networks:

# Limitations of "essential facilities" doctrine

- "Essential facilities" doctrine was never explicitly endorsed by Supreme Court.
- Recently, Supreme Court ruled that if an industry is already regulated to promote competition (in this case, the telecommunications industry), then courts need not act.

Verizon Communications, Inc. v. Law Offices of Curtis V. Trinko LLP, 02-682 540 U.S. 398 (2004).

## Intellectual property rights

• "The Court has held many times that power gained through some natural or legal advantage such as a patent, copyright or business acumen can give rise to [antitrust] liability if a seller exploits his dominant position in one market to expand his empire into the next."

Eastman Kodak Co. v. Image Technical Services, Inc., 504 U.S. 451 (1992).

## Intergraph v. Intel (1999)

- Intergraph, a maker of computer workstations, was a customer of Intel, a maker of microprocessors.
- Intergraph sued Intel for patent infringement.
- In response, Intel withheld proprietary technical information needed by Intergraph.
- FTC charged Intel with antitrust violation.
- FTC and Intel settled, but Intergraph continued suit.

Intergraph Corp. v. Intel Corp., 195 F. 3d (Fed. Cir. 1999).

# Intergraph v. Intel (1999): decision

- Third Circuit Court of Appeals sided with \_\_\_\_\_\_ because Intel did not directly compete with Intergraph.
- Intel's action was \_\_\_\_\_ anticompetitive because it did not create or maintain a monopoly.

Intergraph Corp. v. Intel Corp., 195 F. 3d (Fed. Cir. 1999).

## Kodak v. Image Technical Services (1992)

- Kodak sold photocopiers.
- "Aftermarket" consisted of service and repair, in which Kodak and independent firms competed.
- After a price war, Kodak refused to sell parts, protected by patents, to independents, who then sued Kodak.

Eastman Kodak Co. v. Image Technical Services, Inc., 504 U.S. 451 (1992).

#### REFUSAL TO DEAL Page 3

## Kodak v. Image Technical Services (1992): decision

- Case took 10 years to resolve.
- Kodak finally found \_\_\_\_\_\_ of monopolization, ordered to pay damages, and required to sell parts to independents at nondiscriminatory prices.
- Case has implications for other aftermarkets: computers and software, etc.

####
#### MONOPOLY PRICE DISCRIMINATION

Page 1

# MONOPOLY PRICE DISCRIMINATION

- What is "price discrimination"?
- What are its impacts on individual consumers and social welfare?

# Price discrimination: general definition

- Charging multiple prices (for reasons unrelated to costs) in order to increase profits.
- Types of price discrimination (PD): 1<sup>st</sup>-degree (perfect PD)
   2<sup>nd</sup>-degree (self-selecting PD or multipart prices)
   3<sup>rd</sup>-degree (market-segmenting PD)









#### MONOPOLY PRICE DISCRIMINATION

#### Page 2

# Key questions about price discrimination

- Does price discrimination increase monopoly profit?
- Does it decrease social welfare?
- Only if answers to both questions are \_\_\_\_\_\_ should we worry.









# Welfare analysis of perfect price discrimination

- Monopolist serves all customers willing to pay at least the marginal cost of production.
- Thus there is *no deadweight loss!* 
  - Output is \_\_\_\_\_\_ as under competition.
- But distribution of gains from trade is very different from competition.
  - Consumer surplus is \_\_\_\_\_\_

#### MONOPOLY PRICE DISCRIMINATION

#### Page 3

# But perfect price discrimination is impractical

- Monopolist must know how much each buyer is willing to pay for each unit.
- Are buyers likely to reveal this information?
- The most that monopolist knows (usually) is the price-sensitivity (elasticity) of different market *segments*.



# Examples of self-selecting price discrimination

- Examples: quantity discounts, volume discounts, "membership" fees, monthly service fees, etc.
- Average price (buyer's bill/quantity) thus varies depending on quantity purchased.
- Widely used in public utilities.
- Will be discussed in "Regulation" section of course.



- *Price discrimination* means charging multiple prices to maximize profits.
- Types include
  - \_\_\_\_\_-degree, or perfect price discrimination.
  - \_\_\_\_\_-degree, or self-selecting price
  - discrimination.
  - \_\_\_\_\_-degree, or market-segmenting price discrimination.

## MARKET-SEGMENTING PRICE DISCRIMINATION

#### MARKET-SEGMENTING PRICE DISCRIMINATION

How are prices for each segment set?
Which segment gets the lower price?
How does market-segmenting price discrimination affect consumer welfare?



# Pricing and elasticity

- We previously showed that for any monopolist,  $MR = P\left(1 + \frac{1}{\varepsilon}\right)$ .
- Setting MR=MC gives  $MC = P\left(1 + \frac{1}{c}\right)$ .
- Solving for P gives a rule for monopoly pricing: P =

# Different elasticities $\rightarrow$ different prices

- Suppose different market segments have different elasticities of demand ( ε ).
- To maximize profit, monopolist should set different prices according to  $\epsilon$ , even if MC is the same.
- Market segment with most elastic demand should get \_\_\_\_\_ price.

## Market segmentation: example

- Consider a symphony orchestra or a theatre.
- Suppose MC of seat = \$10, general public's  $\varepsilon = -2$ , and students'  $\varepsilon = -5$ .
- To maximize profits, should set:
  - Price for general public =  $\frac{10}{(1+\frac{1}{-2})} =$ \$\_\_\_\_\_.

• Price for students 
$$=\frac{10}{\left(1+\frac{1}{-5}\right)}=$$
 \$\_-

# Why market-segmenting price discrimination works

- Customers with more elastic demand typically are more sensitive to price, perhaps because have close substitutes available. They get \_\_\_\_\_ price.
- Customers with less elastic demand are less sensitive to price, perhaps because have no close substitutes. They get \_\_\_\_\_\_ price.

# MARKET-SEGMENTING PRICE DISCRIMINATION

#### Page 2

# Market-segmenting price discrimination in the real world

- Movie theaters and performing arts:
- Airlines:
- Supermarket products:

# Welfare effects of marketsegmenting price discrimination Is price discrimination (PD) good or bad for society? Depends on the shapes of the market segment demand curves. But we can show that if PD does not increase total output, then welfare







- If  $D_A > D_B$ , then consumer A is willing to pay more for the last unit than consumer B is.
- Output should be shifted to consumer \_\_\_\_\_\_ to increase welfare.
- Example: If  $D_A = \$6$  and  $D_B = \$4$ , then shifting one unit of output from consumer A to consumer B increases social welfare by \$2.
- Similarly, if D<sub>A</sub> < D<sub>B</sub>, then output should be shifted to consumer \_\_\_\_\_ from consumer \_\_\_\_.



## MARKET-SEGMENTING PRICE DISCRIMINATION

#### Page 3

Output should be allocated so that heights of demand curves are

- Total welfare is maximized only when  $D_{\rm A} = D_{\rm B}$  .
- If a single price is offered to all consumers, this condition will hold automatically.
- Thus if PD does not increase output, it will cause a \_\_\_\_\_\_ in welfare.

## The case of linear demand curves

- If demand curves are straight lines in both market segments, and both markets are actually served at the single price, it can be shown that total output will not increase.



#### The case of nonlinear demand curves

- With nonlinear demand curves, total output *can* increase under PD.
- Welfare can increase or decrease.



# Conclusions 3<sup>rd</sup>-degree price discrimination (PD) means setting different prices for different market segments. The market segment with the lowest elasticity of demand gets the \_\_\_\_\_\_ price. If total quantity does not increase, social welfare \_\_\_\_\_\_ with PD. But social welfare can increase with PD, particularly if one segment was excluded under the single-price regime.

#### LAW AND POLICY ON PRICE DISCRIMINATION

#### Page 1



What law governs price discrimination?How have the courts interpreted it?





# Motivation for Robinson-Patman Act (cont'd) • Act outlawed brokerage fees unless an independent broker is involved. • Efficiency gains or cost differences from chain stores was irrelevant.

Types of illegal discrimination under Robinson-Patman Act

- *Primary-line discrimination:* injury to rival firms. (Mild form of predatory pricing.) Example is \_\_\_\_\_\_ case.
- Secondary-line discrimination: injury to (high-price) customers. Example is case.

#### Possible defenses under Robinson Patman Act

- Different prices are due to cost differences. This defense is permitted under the law in principle, but very difficult in practice.
- Prices were reduced in some markets but not others to meet competition.

#### LAW AND POLICY ON PRICE DISCRIMINATION



#### Utah Pie case (1967): judgment

- Utah Pie\_\_\_\_\_ the case, despite its still-large market share.
- Another instance where Supreme Court made the mistake of "protecting competitors, instead of competition" (Justice Potter Stewart).

## Morton Salt case (1948)

- Morton Salt offered quantity and volume discounts to wholesalers and chain stores.
- However, only very large chains could qualify for the lowest discounts.
- FTC sued Morton Salt, alleging *secondary-line discrimination*.
- Court decided \_\_\_\_\_ Morton Salt.

Federal Trade Commission v. Morton Salt Co., 334 U.S. 37 (1948).

- Robinson-Patman Act governs price discrimination.
- Often used to protect small firms, rather than to promote \_\_\_\_\_.
- Not vigorously enforced in recent years.

# NETWORK EFFECTS

Page 1

# NETWORK EFFECTS

•What are network effects?

•Why do they transform "competition in the market" into "competition for the market"?



## Cost economics in the "new economy"

Products like

- Computer software
- Informational websites
- Social media
- Search engines

require very \_\_\_\_\_ up-front or fixed costs to develop, but near-\_\_\_\_\_ incremental cost per customer.



#### Scale and quality improvement

- Firms in new economy can easily collect information on customer behavior.
- Can be used to improve service—more efficient searches, more relevant ads, fewer errors, etc.
- "Big data" allows larger firm to improve faster—another source of \_\_\_\_\_

# Demand economics in the "new economy"

For some products, the value of the product to each user depends on the number of users who consume the product.

Examples:



# NETWORK EFFECTS

Page 2











### NETWORK EFFECTS Page 3



## Coping with network effects

Users' expectations affect demand. Achieving a critical mass of users can determine profitability.

- Keep quality high and price low to grow.
- Might even price below MC at first.

"Tipping"—once a critical mass is reached, more and more users join.

# Markets with network effects

Dominant firm becomes highly profitable due to economies of scale.

Competition to *become* dominant firm (that is, competition \_\_\_\_\_\_ the market) leads to low price, at least at first.

Having dominant firm

consumers, even if firm eventually raises price, because consumers value product more if there are many other users.

# Antitrust issues with network effects

*Dominance* is normal and often beneficial outcome.

*Abuse* of dominance—lessening of competition for the market—is potential problem.

- Network effects occur in markets where users' willingness to pay is greater, the \_\_\_\_\_\_ other users choose the product.
- Network effects lead to competition \_\_\_\_\_ the market, tipping, and eventual market dominance.
- Dominance by itself is good for consumers because they value the product \_\_\_\_\_\_ if there are many users.
- Antitrust problems occur when dominance is abused to thwart competition for the market.

# MICROSOFT CASES

Page 1

# MICROSOFT CASES

•Why was Microsoft accused of

- monopolization?
- •What familiar issues did this case raise?
- •What new issues did it raise?
- •What was the court's decision?

## Microsoft's lines of business in 1990s

- Operating systems (OSs): DOS, Windows.
  Very high market share—over 90% by most
- measures.Applications:
- Web browsers:

# Microsoft products with network effects

- Applications—because people share documents and spreadsheets.
- Operating systems—because software developers prefer to write applications for operating systems with many users.
  - \_\_\_\_\_-sided platform.

#### Why application developers prefer to write for popular OSs Economies of scale: • Large up-front development costs for each OS. • Near-zero costs of producing one more copy of software for same OS. • But major costs of "porting" applications between OSs!

#### Implications of network effects

- A \_\_\_\_\_\_ of consumers is necessary for product success.
- Consumers' demand depends on expectations what product they think everyone else will choose.
- "Tipping" leads to market dominance. (Like economies of scale but from consumer side.)
- Difficult to dislodge incumbent with large market share—even with a better, cheaper product.

# Antitrust issues for markets with network externalities

- Dominance is almost inevitable because of economies of scale and network effects.
- - exclusionary vertical restraints (exclusive dealing, tying),
  - predatory pricing, or
  - refusal to deal.

# MICROSOFT CASES

#### Page 2

#### "Microsoft I": exclusion

- Early 1990s: government alleged Microsoft used exclusionary practices.
- PC manufacturers required to pay a fee *per computer sold*, regardless of whether Windows installed.
- Thus customers who want another operating system (e.g., IBM's OS/2, or Linux) must pay for \_\_\_\_\_\_.

#### 1995 Consent Decree

• Microsoft agreed to stop charging manufacturers per computer sold.

#### • Also:

"Microsoft shall not enter into any License Agreement in which the terms of that agreement are expressly or impliedly conditioned upon: (i) the licensing of any other Covered Product, Operating System Software product or other product (provided, however, that this provision in and of itself shall not be construed to prohibit Microsoft from developing integrated products)..." In other words, no !

## "Microsoft II": tying

- 1996: Microsoft bundled Internet Explorer (IE) with Windows. Tying or not?
- Microsoft claimed IE should be part of Windows for technical reasons for better user experience.
- DOJ disagreed and sought injunction.
- 1997: District Court ordered Microsoft to offer IE and Windows separately.
- 1998: Appeals Court reversed decision, saying DOJ had not refuted technical argument.

#### "Microsoft III": monopolization

- 1998: DOJ accused Microsoft of
  - Exclusive dealing.
  - Tying IE to Windows 95 and 98.
  - Maintenance of monopoly for operating systems.
  - Attempting to monopolize market for web browsers.

#### Background: JAVA versus Windows

- JAVA was an interpretive language bundled with browsers like Netscape or IE.
- Permitted application developers to write for JAVA rather than a particular operating system like Windows, Mac OS, or Linux.
- Internal memos show Microsoft feared that Netscape + JAVA would "commoditize the underlying operating system."

## "Microsoft III": monopolization

- Microsoft engaged in contracts with computer manufacturers and internet service providers to favor Internet Explorer (IE) over other browsers. Monopolization or not?
- DOJ said it was.
- District Court agreed.
- But Appeals Court reversed decision, saying DOJ had not defined the relevant market nor shown there were barriers to further entry.

## MICROSOFT CASES Page 3

#### Market definition

- What was the market for Windows?
- According to DOJ: OSs on Intel or Intelcompatible computers.
- According to Microsoft: "platforms" including other OSs, JAVA, etc.
- Microsoft's broader definition would imply a market share.

## Pricing of Windows

- Microsoft's price for Windows was lower than one might expect for a dominant firm. Why?
- Microsoft witness said Microsoft was not a genuine monopolist.
- Government witnesses said price was low to encourage complementary products and discourage software piracy.

# Contracts favoring Internet Explorer (IE)

- Microsoft had agreements with computer manufacturers, website developers, and internet service providers to favor IE over other browsers. Why?
- Was Microsoft raising its rivals costs?
- Or reducing transactions costs?

# Predatory conduct

- Microsoft gave IE away for free.\* Why?
- Since most customers need both an operating system and a web browser, this *may* be a response to a problem with "successive monopolies."
- But does not explain why Microsoft wanted manufacturers and others to *favor* IE over other browsers.

\*This forced Netscape to give away its browser for free, and eventually forced Netscape out of business.

# Polluting the JAVA language

- After SUN\* released JAVA, a new computer language designed for internet applications, Microsoft released its own nonstandard version of JAVA.
- Programs written for MS JAVA would not run properly on SUN's standard JAVA, and vice versa.
- Government viewed this as predatory because Microsoft was incurring costs to undermine a competitive threat.

\*SUN is now part of Oracle Corporation.

# Monopolization or not?

- Giving away IE by Microsoft might be defended as *improving* consumer welfare.
- But other actions taken by Microsoft to *penalize rival* browser maker Netscape are harder to defend.

# MICROSOFT CASES

#### Page 4

#### Initial District Court decision (2000)

- District Court Judge Jackson found Microsoft not guilty of exclusive dealing but guilty of other charges.
- · Accepted government's proposed remedies
  - · restrictions on conduct
  - dissolution of Microsoft into two separate companies (one with OS, one with applications)
- But stayed implementation pending appeal.

#### Appeals Court decision (2001)

- Upheld maintenance of monopoly, reversed decision on monopolization, and remanded decision on tying to District Court.
- Also remanded remedy.
- Judge Jackson replaced by Judge Kollar-Kotelly due to improper conduct.

# Settlement (2001)

DOJ decided to abandon Microsoft breakup but imposed restrictions on Microsoft's conduct.

- Must offer same prices to all manufacturers—no retaliation for dealing with competitors.
- Must release more technical information for interoperability with Windows.
- Must allow manufacturers to change appearance of desktop and to automatically boot non-Microsoft products.

# Ongoing issues for Microsoft

- Microsoft is continually accused of tying and "refusal to deal."
- A case in Europe involved
  - tying Media Player to Windows
  - refusal to provide free information on protocols used to connect servers to Windows computers.

"Microsoft loss in Europe raises American fears," *Wall Street Journal*, September 18, 2007, pp. A1, A10.

- The Microsoft cases included familiar issues of market definition, exclusion, predation, and tying.
- The case also introduced less familiar issues of externalities and extreme economies of scale, typical of software industries.
- The government originally asked for breakup of Microsoft, but the settlement of 2001 included only restrictions on

# TWO-SIDED PLATFORMS

Page 1

## TWO-SIDED PLATFORMS

What is a two-sided platform?What special pricing issues arise?



Two-sided platforms in the old economy			
	User group 1	User group 2	
Credit cards	Consumers		
Newspapers	Readers		
Temporary employment agencies	Workers		
Nightclubs	Women		

Buyers

Consignment shops

# Two-sided platforms in the new economy

	User group 1	User group 2
eBay, auction sites	Buyers	
Search engines	Users	
Operating systems	Computer owners	
Uber, Lyft	Travelers	
Airbnb, Booking.com	Travelers	

# Conventional wisdom on pricing (Does it apply?)

- Efficiency requires price close to marginal cost.
- High price-cost margin reflects market power.
- Price below marginal cost is not profitmaximizing, and is evidence of predatory pricing.



# TWO-SIDED PLATFORMS

#### Page 2

# Pricing schemes at a two-sided platform

- Platforms can charge users on either side in different ways.
  - Charge for access.
  - Charge for transactions (purchases or clicks).
- Or of course, platform can be free.
- Ignore these complications and let  $p_1 = price$  for user group 1, and  $p_2 = price$  for user group 2.



# Marginal revenue with network effect

- Suppose q<sub>2</sub> has a positive effect on demand by user group 1, but q<sub>1</sub> has no effect on demand by user group 2.
- $TR = p_1q_1 + p_2q_2 = p_1q_1(p_1,q_2) + p_2q_2.$
- Holding  $p_1$  constant, MR for group 2 =  $p_1 \partial q_1 / \partial q_2 + (p_2 + dp_2 / dq_2 q_2)$ .

# Pricing to maximize profit

- The network effect creates "downward pricing pressure" on price for group 2.
- Platform will choose a lower price for user group 2 than without network effects.
  p<sub>2</sub> maybe < MC<sub>2</sub>.



#### Pricing to maximize profit (cont'd)

- Platform may succeed in attracting many people of user group 2, raising demand by user group 1.
- Demand by user group 1 may become less elastic.
- Then  $p_1 >> MC_1$ .

#### Conventional wisdom on pricing does NOT apply to two-sided platforms

- Efficiency requires price close to marginal cost. Or \_\_\_\_\_.
- High price-cost margin reflects market
   power. Or \_\_\_\_\_\_
- Price below marginal cost is not profitmaximizing, and is evidence of predatory pricing. Or \_\_\_\_\_

# TWO-SIDED PLATFORMS

## Page 3

- Two-sided platforms connect users from different groups.
- Network effects occur *across* groups: demand and WTP by group 1 may depend on number of users in group \_\_\_\_\_.
- Network effects cause two-sided platforms to price differently from a conventional monopolist.

# GOOGLE CASES Page 1

# GOOGLE CASES (2012-16)

•What antitrust violations was Google accused of in 2012-16?

#### Relevant Google businesses

- Google operates a broad, general-purpose search engine, which is dominant in many countries.
- Google also operates narrower shopping search engine, "Google Shopping," that competes with many other "vertical" search engines.

# Monopolization in vertical search?

- Google accused of abusing dominance in general search to benefit Google Shopping.
- EC\* said Google Search placed links to its own Google Shopping ahead of links to other "vertical" search engines.
- FTC staff agreed that this practice harmed Google's rivals.

\*European Commission, Directorate-General for Competition.

#### Impact on consumers

- But were *consumers* harmed by Google's conduct?
- EC concluded that Google's conduct prevented consumers from receiving most relevant search results, and stifled innovation by Google's rivals.
- FTC was not sure.

# Monopolization in managing ads?

- Firms placing ads on Google Search (or any platform) use software to access the search platform.
- Google prevented advertisers from using same software to manage ads simultaneously on Google Search and rival platforms.

#### Impact on customers

- Firms placing ads would clearly find Google's restriction to be an inconvenience.
- Raising rivals' costs: Google's restriction raised cost for its customers of dealing with its rivals.
- FTC found this to be monopolization, got Google to remove this restriction.

# GOOGLE CASES Page 2

# Tying and exclusive dealing with Android?

- Android is dominant mobile OS in Europe.
- As a condition of installing Android and the Google Play Store, Google required phone manufacturers to install the Chrome browser and Google Search.
- Gave financial incentives to manufacturers that exclusively installed Google Search.

# Familiar situation

- These practices remind us of Microsoft, which tied IE to Windows and penalized customers who bought rivals' products.
- Similar issues will likely arise in many antitrust cases to come.
- Authorities must balance potential benefits to consumers of products and practices with potential harm from stifling challengers.

# Dominance in the new economy

- Microsoft and Google cases typify issues.
- Dominance is \_\_\_\_\_, due to extreme economies of scale and network effects.
- Dominance brings \_\_\_\_\_\_ to consumers due to same network effects.
- But dominance can be \_\_\_\_\_\_

# Rapid and disruptive innovation in new economy

- In addition, new economy features rapid and disruptive innovation.
- New technologies bring benefits to consumers.
- New technologies launch new firms, creating competition *for* the market.

# Antitrust policy in the new economy

Antitrust policy must simultaneously

by incumbents by excessively restricting their conduct.

from

exclusionary practices by incumbents, which also slow innovation.

- Google has been accused of extending its monopolies in general search and mobile operating systems to other markets.
- Google and Microsoft cases typify challenges for antitrust in the new economy: encouraging vigorous competition *for* the market.

#### Page 1

#### COMPETITION POLICY IN THE EUROPEAN UNION

- What are TFEU Articles 101 and 102?
- What do they prohibit?
- How are they enforced?

# **Competition Policy**

"Competition policy" promotes economic efficiency in markets by encouraging competition and preventing monopolies.

In all countries, it has 3 broad goals:

- 1. Control horizontal mergers that increase concentration substantially.
- 2. Stop collusion (price-fixing, cartels).
- 3. Stop monopolization (including abuse of dominant market position).

#### Law in the European Union (E.U.)

Treaty on the Functioning of the European Union

- Article 101 agreements between firms.
- Article 102 abuse of dominant position.
- Articles 103-109 enforcement authority.

Also, European Council Regulation 139 – control of mergers.

## Article 101

- Prohibits **agreements** between two or more independent firms that restrict competition.
- Covers both horizontal agreements (between competitors) and vertical agreements (between buyers and sellers).
- Similar to U.S. policy prohibiting "contracts in restraint of trade"

# Article 101 (cont'd)

Specifically prohibited are agreements that

- fix prices
- limit production
- divide markets
- "apply dissimilar conditions to equivalent transactions."
- "make the conclusion of contracts subject to ... supplementary conditions."

# Leniency policy on cartels

- Policy encourages companies to hand over inside evidence of cartels to the European Commission.
- <u>company in any cartel to cooperate</u> with authorities will not have to pay a fine. Second and third companies pay reduced fines.
- Most cartels found by the European Commission have been detected through this leniency policy.

# COMPETITION POLICY IN THE EUROPEAN UNION

#### Page 2

# Article 102

- Prohibits a firm from abusing a dominant position.
- Similar to U.S. policy against "monopolizing any part of trade"

## Article 102 (cont'd)

Specifically prohibited are actions such as

- charging unfair prices
- limiting production
- "applying dissimilar conditions to equivalent transactions."
- "making the conclusion of contracts subject to ... supplementary conditions."

#### European Council Regulation 139

- Mergers that impede competition are illegal under Regulation 139.
- All mergers above a certain size must be reported to the European Commission, which must examine them.

• \_\_\_\_\_ mergers are the main focus of policy.

#### European Council Regulation 139 (cont'd)

Mergers may be either

- approved without conditions,
- approved with conditions, such as divesting part of the business or licensing certain technology, or
- prohibited.

## EC horizontal merger guidelines

European Commission's "Horizontal Merger Guidelines" (2004) covers many of same issues as U.S. 2010 "Guidelines," including

- market definition, market shares, and HHI.
- "non-coordinated effects" and "coordinated effects."
- barriers to entry and failing firms.
- efficiencies (cost savings) from merger if they benefit consumers.

#### EC non-horizontal merger guidelines

- European Commission's "Non-Horizontal Merger Guidelines" (2008) similar to U.S. "Vertical Merger Guidelines" document.
- Admits that "non-horizontal mergers are generally less likely to significantly impede effective competition than horizontal mergers."

# COMPETITION POLICY IN THE EUROPEAN UNION

Page 3

#### Enforcement of the law: the European Commission

- Investigates whether firms violate E.U. rules.
- Can
  - Prohibit certain conduct.
  - Require remedial action.
  - Impose fines.
- Decisions can be appealed to European General Court, and then to European Court of Justice.

#### Commissioner for Competition

- European Commission includes 28 Commissioners, one from each E.U. country.
- Responsibilities of each Commissioner are assigned by the E.U. President (currently Ursula von der Leyen).
- Commissioner for Competition is currently Margrethe Vestager.
  - Citizen of Denmark.



#### Directorate-General for Competition

- DG Competition develops and carries out the Commission's policies on competition.
- Works under guidance of Commissioner for Competition.
- Includes legal and economic experts.

#### Enforcement of the law: member states

- By the 1990s, the DG Competition was overwhelmed by its workload.
- European Union Council Regulation 1 (2003) allowed and encouraged competition authorities and courts in member states to enforce articles 101 and 102.

## Similarities to U.S. antitrust policy

- Both E.U. law and U.S. law prohibit collusion, monopolization, and mergers that lessen competition.
- Stated purpose of law is to protect \_\_\_\_\_\_ and consumers, not firms.
- E.U. has a formal leniency program for firms that admit to participation in a cartel (price-fixing).
- Regulation 139 requires prior notification of mergers.

#### Differences from U.S. antitrust policy

- Until 20 years ago, competition policy was less vigorously enforced in E.U. than in U.S.
- E.U. policy goals of fairness and European integration were sometimes more important than promoting competition.
- So E.U. competition policy sometimes protected firms as well as consumers.

# COMPETITION POLICY IN THE EUROPEAN UNION

Page 4

#### Differences from U.S. antitrust policy (cont'd)

- New differences have appeared recently, especially on abuse of dominant position (monopolization).
- In evaluating whether a firm's actions are competitive or anticompetitive
  - E.U. policy focuses on their "object" (or intent).
  - U.S. policy focuses on their economic effects.
- In some recent cases, E.U. authorities decided that firms' actions were anticompetitive, while U.S. authorities decided they were not.

- Competition policy in the E.U. is governed by Articles 101 and 102, and Regulation 139.
- They prohibit \_\_\_\_\_\_ that restrict competition, \_\_\_\_\_\_ of dominant market position, and \_\_\_\_\_\_ that impede competition—same concerns as U.S. antitrust policy.
- Enforcement is responsibility of the European Commission and the DG for Competition.
- Enforcement was formerly less vigorous in the E.U. than in the U.S., but now sometimes more vigorous.

# COMPETITION POLICY IN CHINA

Page 1

#### COMPETITION POLICY IN CHINA

- What is the AML?
- What does it prohibit?
- How is it enforced?

# Anti-Monopoly Law (AML) of the People's Republic of China

- Drafting of law began in 1993, consulting authorities in the E.U. and the U.S.
- First draft presented in 1997.
- Final draft adopted at 29th Meeting of Standing Committee of Tenth National People's Congress on August 30, 2007.
- AML effective August 1, 2008.
- AML does not say what agencies are responsible for enforcement.

## Enforcement of AML

- At first, enforcement was divided among 3 agencies:
   NDRC = National Development and Reform
  - Commission • SAIC = State Administration for Industry and Commerce
  - MOFCOM = Ministry of Commerce
- In 2018, enforcement was centralized in the Anti-Monopoly Bureau of the State Administration for Market Regulation (SAMR) (国家市场管理总局).
- SAMR also has responsibility for intellectual property, food and product safety, etc.

## Scope of AML

Chapter I "General Provisions"

Article 2: "This Law is applicable to monopolistic conducts in economic activities within the territory of the People's Republic of China; and it is applicable to monopolistic conducts outside the territory of the People's Republic of China, which serve to eliminate or restrict competition on the domestic market of China."

## What the AML allows

Chapter I "General Provisions"

Article 5: Businesses may become large "through fair competition and voluntary association."

Similar to U.S. court decisions: "... the law does not make mere size an offense..."

## What the AML prohibits

Chapter I "General Provisions"

Article 3: "For the purposes of this Law, monopolistic conducts include:

- monopoly agreements reached between undertakings;
- 2) abuse of dominant market position by undertakings; and
- 3) concentration of undertakings that lead, or may lead to elimination or restriction of competition."

## COMPETITION POLICY IN CHINA

Page 2

# AML prohibits "monopoly agreements"

Chapter II "Monopoly Agreements"

Article 13: Prohibits horizontal agreements between competing firms. Article 14: Prohibits vertical restraints, including

resale price maintenance.

Article 46: A firm that voluntarily reports a monopoly agreement may be given reduced punishment.

# AML prohibits "abuse of dominant position"

Chapter III "Abuse of Dominant Market Position"

- Article 17: Prohibits
- predatory pricing,
- refusal to deal,
- exclusive dealing,
- tying,
- price discrimination.
- ... "without justifiable reason."

## AML regulates mergers

Chapter IV "Concentration of Undertakings"

Articles 20-27: Requires prior notification of mergers and review by authorities, if merged company would have large market share.

Article 28: Authorities may prohibit a merger.

Article 29: Authorities may impose conditions on a merger.

## Enforcement of the AML

Enforcement authorities may

- order businesses or trade associations to change practices,
- confiscate "unlawful gains,"
- impose fines,
- order divestiture of assets.

If a business volunteers information about a "monopoly agreement," the authorities may grant

#### Role of courts in China

A firm may appeal the decision of the SAMR to the courts.

• In practice appeals are unusual, because courts usually defer to enforcement authorities.

Also, firms may sue other firms in court for violating AML. However,

- Only actual damages can be recovered, not treble (\_\_\_\_\_) damages as in U.S.
- · Decisions are made by judges only, no juries.

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A firm may appeal the decision of the SAMR to the courts.

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Also, firms may sue other firms in court for violating AML. However,

- Only actual damages can be recovered, not treble (<u>times 3</u>) damages as in U.S.
- Decisions are made by judges only, no juries.

# COMPETITION POLICY IN CHINA

#### Page 3

# Similarities to U.S. antitrust policy

- Both China's AML and U.S. law prohibit collusion, monopolization, and mergers.
- Stated purpose of AML is "protecting fair market competition, enhancing economic efficiency, safeguarding the interests of consumers" (Article 1).
- AML allows leniency for firms that admit to participation in a cartel (price-fixing).
- AML requires prior notification of mergers.

# Differences from U.S. antitrust policy

- AML is clearer and more detailed than U.S. laws.
- However, purpose of AML also includes broader goals: "promoting the healthy development of socialist market economy" (Article 1).
- AML also restricts *government agencies* from limiting competition (Chapter V).

# Differences from U.S. antitrust policy (cont'd)

- Cases proceed more quickly than in U.S.
- Cases are rarely settled. That is, parties rarely reach agreement before final decision.
- No criminal prosecutions for antitrust violations.
- Fewer appeals: courts tend to defer to enforcement authorities.

- Competition policy in China is governed by the Anti-Monopoly Law (\_\_\_\_\_), effective 2008.
- The AML prohibits "monopoly agreements," "abuse of dominant market position," and mergers that may "eliminate competition"—same concerns as U.S. antitrust policy.
- Enforcement is responsibility of the Anti-Monopoly Bureau of the State Administration for Market Regulation (SAMR).

# PART 4

# Economic Regulation

Page 1

#### BRIEF HISTORY OF REGULATION IN U.S.

- What Supreme Court cases laid the foundation for regulation?
- What have been the trends in regulation?
- How does regulation work?

# What U.S. Constitution says about regulation

- "Congress shall have the power ... to regulate Commerce ... among the several states" (Article 1 Section 8).
- "The powers not delegated to the United States by the Constitution, nor prohibited by it to the States, are reserved to the States respectively, or to the people" (10th Amendment).
- " ... nor shall any State deprive any person of life, liberty, or property, without due process of law" (14th Amendment, Section 1).

# Munn v. Illinois (1877)

- Grain elevator operator challenged state regulation of grain-elevator rates, appealing to due-process clause of 14th Amendment.
- Supreme Court decided against operator.
- "when private property is affected with a public interest, it ceases to be *juris privati* only" and becomes fair game for state or federal regulation.

Munn v. Illinois, 94 U.S. 113 (1877).

# Questions unanswered by Munn v. Illinois decision

- What industries are "affected with a public interest"? Public utilities only?
- In fact, many states had already regulated natural gas, electricity, water, transportation, banks, and insurance.
- Also, can states set any prices they want in industries they regulate?
- Unclear in Munn v. Illinois.

#### Smyth v. Ames (1898)

- Nebraska passed law in 1893 limiting railroad freight rates.
- Challenged by 4 railroads, again appealing to due-process clause of 14th Amendment.
- Railroads claimed law forced them to operate at a loss.
- U.S. Supreme Court agreed.

#### Smyth v. Ames (1898): the decision

- "...the basis for all calculations as to the reasonableness of rates ... must be the fair value of the property being used ...
- "What the company is entitled to ask is a fair return upon the value of that which it employs for the public convenience."
- "On the other hand, what the public is entitled to demand is that no more be extracted from it .. than the services rendered by it are reasonably worth."

Smyth v. Ames, 169 U.S. 466 (1898).

#### Page 2

# Questions answered by Smyth v. Ames decision

• Regulated prices must permit a

#### on investment.

• Seems to imply prices must be set equal to long-run cost.

#### Nebbia v. New York (1934)

- Grocer challenged regulation of milk prices by New York's Milk Control Board.
- Argued that milk industry was competitive, not a public utility.
- Supreme Court agreed that milk was not a public utility, but said regulation could extend beyond public utilities.

Nebbia v. New York, 291 U.S 502 (1934).

## Questions answered by Nebbia v. New York decision

- According to Nebbia v. New York, "there is no closed class or category of business affected with a public interest ..."
- Rather, "a state is free to adopt whatever economic policy may reasonably be deemed to promote public welfare, and to enforce that policy by legislation adopted to its purpose."

# Interstate Commerce Act (1887)

- Response to turbulence in railroads-alternating periods of stability and price wars.
- Railroads demanded price stability.
- Consumers, especially farmers, demanded end to price discrimination.
- Interstate Commerce Commission (ICC) created.

# Wave of federal regulation in 1930s

- Securities Exchange Act (\_\_\_\_) established SEC to regulate stock sales and stock exchanges.
- Communications Act (\_\_\_\_) established FCC to regulate radio and telephone service.
- Motor Carrier Act (\_\_\_\_\_) charged ICC with regulating trucking.

# Wave of federal regulation in 1930s (cont'd)

- Public Utility Act (\_\_\_\_) established Federal Power Commission to regulate interstate transmission of natural gas and electricity.
- Civil Aeronautics Act (\_\_\_\_) established Civil Aeronautics Board to regulate airlines.

#### Page 3

# Slow growth of regulation in 1940s through the 1960s

- FPC begins regulating natural gas prices at wellhead in \_\_\_\_\_.
- FCC begins regulating cable television in
- Oil prices regulated beginning in \_\_\_\_\_.

#### Deregulation in 1970s

- SEC abolishes fixed broker fees in \_\_\_\_\_.
- Airline Deregulation Act of \_\_\_\_\_\_\_ deregulates airlines and abolishes CAB.
- Staggers Act of \_\_\_\_\_ partially deregulates railroads.
- Motor Carrier Act of \_\_\_\_\_ deregulates trucking.

## More deregulation in 1980s

- Bus Regulatory Reform Act of \_\_\_\_\_\_\_\_ deregulates intercity passenger buses.
- Gradual deregulation of long-distance landline telephone service by FCC after 1984 antitrust judgment.
- Oil prices deregulated in \_\_\_\_\_
- Natural gas prices deregulated in \_\_\_\_\_.

# More deregulation in 1990s

- Energy Policy Act of \_\_\_\_\_ encouraged competition in wholesale market for electric power.
- Interstate Banking and Branching Efficiency Act of \_\_\_\_\_\_ eliminated restrictions on interstate branch banking.
- ICC Termination Act of \_\_\_\_\_ abolished Interstate Commerce Commission.

## Recent trends

- Telecommunications Act of \_\_\_\_\_ contained elements of regulation and deregulation.
- Federal Energy Regulatory Commission, in a series of orders, took steps to build competitive wholesale electricity markets.
- Gramm-Leach-Bliley Act of repealed restrictions on mixing banking with insurance and securities.

# How does regulation begin?

#### Legislation

- creates new agency or extends power of existing agency.
- sets powers of agency.
- specifies policy objectives.

Page 4

#### Who regulates? How much power do they have? · Some regulatory functions are performed by • Agencies' latitude depends on law. agencies, whose heads serve at the pleasure of the · some have considerable discretion. president (or governor). • others have precise mandates and formulas · Some regulatory functions are performed by written into law. independent commissions. · Federal commissioners are appointed for fixed term, cannot be removed. regulated markets are biased toward · State commissioners are sometimes appointed, preserving the status quo. sometimes elected.

# How does regulation proceed?

- Two approaches to regulation.
  - Case-by-case
  - Rulemaking
- Affected parties can always appeal to U.S. Court of Appeals.

• Nevertheless, change is slow and costly, so

- and established right of government to regulate any industry, subject to fair return on investment ).
- A wave of legislation in s brought railroads, trucking, finance, radio, telephones, airlines, etc. under federal regulation.
- Trend toward deregulation began in \_ s, continues today.

# THEORIES OF REGULATION

#### Page 1

## THEORIES OF REGULATION

- What theories attempt to explain regulation?
- What is the difference between normative and positive theories?

#### Two kinds of theory

- Normative theory = shows how regulation work.
- Positive theory = predicts how regulation \_\_\_\_\_\_work.

# Normative theory: regulation should respond to market failures

- *Natural monopoly* causes goods to be at too high a price (greater than marginal cost).
- *External costs* cause goods that hurt others to be \_\_\_\_\_.
- *Imperfect information* causes unobservable quality to be \_\_\_\_\_.

# Normative theory: regulation should maximize social welfare

Maximizes consumer surplus + producer surplus, eliminating .

- Lowers prices to marginal cost in monopoly industries.
- Restricts output of goods that generate external costs.
- Solves information problems.

## Positive theories of regulation

Simple theories

- Normative analysis as positive theory, also called
- Capture theory.

Economic theories

- Stigler-Peltzman model of politicians' behavior.
- Becker model of competing influence groups.

# Public interest theory

Assumes regulation does what it should do.

Problems: contrary evidence.

- Studies show little downward effect of regulation on price or profit (at least before 1960).

# THEORIES OF REGULATION

#### Page 2

#### Capture theory

- Says regulatory agencies "captured" by industries they are supposed to regulate.
- Regulation serves producers only.

#### Capture theory: Problems

- Does not explain how producers can capture an agency under democratic government.
- Cannot explain regulatory bias toward protecting small producers. Example: oil refining.
- Cannot explain cross-subsidization.
- Cannot explain regulation that reduces profit and is opposed by industry. Examples: Environment, occupational safety, product safety.
- Cannot explain deregulation.

- Normative theory shows how regulation
   work to increase social welfare.
- Positive theories predicts how regulation
   work:
  - Public interest theory predicts regulation works as it should.
  - Capture theory predicts regulation serves only the ,
  - Neither explains actual regulation well.

#### ECONOMIC THEORIES OF REGULATION

Page 1

#### ECONOMIC THEORIES OF REGULATION

- What are economic theories of regulation?
- What can they explain?

# What are "economic" theories of regulation?

- Positive theories that try to explain how regulation
- Intended to match the real world better than public-interest or capture theories of regulation.

#### Economic theories discussed here

- Stigler-Peltzman model
  - Politicians supply regulation, which is demanded by consumers and producers, to maximize support.
- Becker model
  - Consumers and producers compete to influence regulators.

# Stigler-Peltzman model

- Why regulation? The State, unlike private firms, can offer the power of coercion.
- Regulation can redistribute \_\_\_\_\_ by
  - raising or lowering prices.
  - restricting entry.
  - forcing production and sale below cost.
- Politicians are motivated to supply regulation because want to

# Stigler-Peltzman model: demand for regulation

- Groups are more willing to pay for regulation (with votes and other political resources) if they are
  - likely to \_\_\_\_\_ from regulation.
  - \_\_\_\_\_. This tends to favor small groups with strongly-felt preferences.

George Stigler, "The theory of economic regulation," *Bell Journal of Economics and Management Science 2* (Spring 1971): 3-21. Sam Peltzman, "Toward a more general theory of regulation," *Journal of Law and Economics 19* (August 1976): 211-40.



- Suppose Group A has a million members who each stand to gain \$1, while Group B has a thousand members who each stand to gain \$1000.
- If the groups are opposed,
  - Group \_\_\_\_\_ will win out because each member stands to gain a lot;
  - Group \_\_\_\_\_ will likely be undermined by free-rider problems ("let George do it!").

#### ECONOMIC THEORIES OF REGULATION

#### Page 2



- Since 1949, federal program limits number of farmers that can sell peanuts and severely restricts imports. Essentially a quota.
- One estimate for 1982-87 says annual gain to farmers was \$255 million with loss to consumers of \$289 million.
- Why did this regulation succeed?
- For 23,046 farmers, avg gain=\$\_
- For 235 million consumers, avg loss=\$\_\_\_\_



- Since 1978, federal government has subsidized mixing ethanol (made from corn) with gasoline.
- Costs exceed benefits by \$3 billion per year.
- But beneficiaries (energy companies, corn farmers) are few, while losers (taxpayers, consumers) are widely dispersed.

Robert Hahn and Caroline Cecot, "The Benefits and Costs of Ethanol: An Analysis Of the Government's Analysis," *Journal of Regulatory Economics*, Vol. 35 (June 2009): pp. 275-295.









- Natural monopolies and competitive industries, not \_\_\_\_\_\_.
- Why?
### ECONOMIC THEORIES OF REGULATION

Page 3





### Stigler-Peltzman model: conclusions

- Politicians are motivated to supply regulation because want to
- To maximize support, politicians typically choose a price \_\_\_\_\_\_ competitive and monopoly prices.
- Politicians are most likely to target industries that are natural monopolies or competitive, not industries in between.



Gary S. Becker, "A Theory of Competition Among Pressure Groups for Political Influence," *Quarterly Journal of Economics* 98 (August 1983): 371-400.





### ECONOMIC THEORIES OF REGULATION

#### Page 4

### Becker model: inefficiency of political process

- Some wealth is always lost in transfer (deadweight loss and costs of regulation).
- All groups suffer from free-riding, but some groups more than others.

### Becker model: equilibrium is not Pareto-optimal

- Same regulatory outcome could be obtained and resources saved if all groups exerted less pressure.
- Similar to "Prisoner's dilemma."
- Similar to Cournot model of oligopoly.
- But deadweight loss does affect regulation.

### Becker model: the role of deadweight loss

- Suppose Group A benefits from regulation and Group B suffers.
- If deadweight loss is increased by regulation, then Group B suffers \_\_\_\_\_\_ than Group A benefits.
- The greater the deadweight loss from regulation, the \_\_\_\_\_ pressure Group B is willing to exert against it.
- Example: price floor in competitive market.

### Becker model: the role of deadweight loss (cont'd)

- If deadweight loss is reduced by regulation, then Group B suffers \_\_\_\_\_ than Group A benefits.
- The more deadweight loss is reduced, the pressure Group B is will exert against it.
- Example: price ceiling on natural monopoly.

### Becker model: implications

- Regulatory policies that improve social welfare are \_\_\_\_\_\_ likely to be adopted than policies that reduce social welfare.
- Assumes interest groups are equally efficient at applying pressure.
- So the public-interest model may not be too far off.

### Becker model: conclusions

- Regulation is an outcome of a game between competing interest groups.
- Policies that reduce deadweight loss are more likely to be adopted.
- But competitive markets might still be regulated.

### ECONOMIC THEORIES OF REGULATION

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Do economic theories explain changes in regulation in the real world?

- According to economic theories of regulation, changes in regulation occur in response to
  - changes in cost or demand for products
  - changes in relative influence of interest groups.
- This may explain deregulation of railroads and branch banking.
- It does not explain deregulation of trucking.

### Conclusions

- Economic theories model regulation using the concepts of optimization and equilibrium.
- The Stigler-Peltzman model views politicians as \_\_\_\_\_\_political support by trading off the interests of consumers and producers.
- The Becker model views regulation as the \_\_\_\_\_\_ outcome of a game between competing interest groups.

### NATURAL MONOPOLY

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### NATURAL MONOPOLY

- •What is a natural monopoly?
- •What are economies of scale?
- •What are economies of scope?

### Definition of natural monopoly

- An industry is a natural monopoly if a given level of total output can be produced more cheaply by one firm than by several firms.
- Natural monopoly has \_\_\_\_\_\_ to do with natural resources!









### NATURAL MONOPOLY





### Allocative efficiency versus productive efficiency

- If an industry is a natural monopoly, competition is not a stable outcome.
- Dilemma:
  - Production by several firms leads to competition and lower
  - But production by only one firm may lead to lower \_\_\_\_\_ of production.



### Temporary natural monopoly

- Natural monopoly may disappear if MES decreases or demand increases sufficiently.
- This industry is a natural monopoly at "old demand" but <u>not</u> at "new demand."



### Examples of temporary natural monopoly

- Long-distance telephone service.
  - Demand grew rapidly in mid-20<sup>th</sup> century.
- Long-distance freight transportation.
  - Railroads (19th century) have high MES.
  - Trucking (1920s and 1930s) have lower MES.

## Conclusions Natural monopoly means total industry output can be produced most cheaply by \_\_\_\_\_\_ firm. Falling average cost (economies scale) imply

- natural monopoly at \_\_\_\_\_ output levels
  Natural monopoly can also occur over certain
- ranges if average cost levels out or is U-shaped.
- Natural monopoly makes competition unstable and perhaps \_\_\_\_\_\_.

### PRICING WITH ECONOMIES OF SCALE

### Page 1

### PRICING WITH ECONOMIES OF SCALE

•What pricing problem arises with economies of scale?











### PRICING WITH ECONOMIES OF SCALE

Page 2



### MULTIPART TARIFFS





### Multipart tariffs: definition

- · Fees, blocks and other complications, so that "price" has more than one component.
- Synonyms:
  - · nonlinear pricing.
  - 2<sup>nd</sup> degree price discrimination.
- Note: in the world of regulation, a *tariff* means a pricing policy or pricing schedule.



- Suppose there are economies of scale.
  - · MC pricing would cause regulated firm to lose money.
  - · AC pricing would cause deadweight loss.
- Multipart tariffs can capture some consumer surplus reducing efficiency.
- The marginal unit is still sold at a price equal to cost.

### Why multipart tariffs are useful (cont'd)

- Unlike third-degree (market-segmenting) price discrimination, all customers get the same price schedule.
- Although marginal price = marginal cost, average price (=spending/q) marginal cost.
- Customers choose how much to buy, and thus what average price to pay.











### MULTIPART TARIFFS

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### Threat of arbitrage

- Like all price discrimination, multipart tariffs may be undercut if consumers can sell to each other.
- Example: one consumer pays the entry fee and buys for everyone.
- Consequence: electric power tariffs often specify that power may not be resold.

### 

### NATURAL MONOPOLY

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### MULTIPRODUCT FIRMS

•How can we write the total cost function of a firm that produces multiple outputs?

•What are economies of scope?

### The multiproduct firm

- Most real-world firms produce multiple products.
- Examples: \_\_\_\_\_\_
- Such firms typically have *joint costs*—costs associated with several outputs.
- Examples: \_\_\_\_\_

### Total cost function for multiproduct firm

- The total cost function of the multiproduct firm depends on all of its outputs.
- Example: Let  $q_D$  = number of dinners served and  $q_L$  = number of lunches served.
- Then let  $c(q_D, q_L) = total cost function for a restaurant that serves both lunch and dinner.$

### Economies of scope

- Joint costs create economies of scope.
- Definition: An industry has economies of scope if combinations of *different* outputs can be produced more cheaply together by one firm than separately by more than one firm:

 $c(\boldsymbol{q}_D,\boldsymbol{q}_L) \qquad \quad c(\boldsymbol{q}_D,\boldsymbol{0}) + c(\boldsymbol{0},\boldsymbol{q}_L).$ 

### Economies of scope: example

• Producing 50 dinners alone costs c(50,0) =\_\_\_\_\_.

Total cost		Lunches		
		0	100	200
	0	\$0	\$250	\$500
Dinners	50	\$400	\$500	\$700
	100	\$800	\$900	\$1000

### Economies of scope: example (cont'd)

• Producing 200 lunches alone costs c(0,200) = \$\_\_\_\_\_.

Total cost		Lunches		
		0	100	200
	0	\$0	\$250	\$500
Dinners	50	\$400	\$500	\$700
	100	\$800	\$900	\$1000

### NATURAL MONOPOLY

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### Economies of scope: example (cont'd)

• Producing 50 dinners AND 200 lunches together costs only c(50,200) = \$\_\_\_\_\_.

Total cost		Lunches		
		0	100	200
	0	\$0	\$250	\$500
Dinners	50	\$400	\$500	\$700
	100	\$800	\$900	\$1000

Conclus	sions		
If a firm produces seve cost function depends of quantities.	ral outputs, its total on of the		
"Economies of" means a combination of different outputs can be produced most cheaply by one firm.			

### RAMSEY PRICING

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### RAMSEY PRICING

- Suppose MC<AC and multipart tariffs are not feasible.
- How should prices be set?

### Assume economies of scale and scope

- Suppose a regulated monopolist produces several products, or sells the same product in several markets.
- Ideally, all prices should be set equal to
- But suppose that, due to economies of scale and scope, MC pricing \_\_\_\_\_ cover total costs.

# The pricing problem Also assume that multipart tariffs are impossible for some reason. Obviously, some product(s) or customer(s) must be priced \_\_\_\_\_ marginal cost.

• Which one(s)? How much?







### RAMSEY PRICING Page 2





### Example 1: regulated telephone prices

- For much of the 20<sup>th</sup> century, telephone prices were regulated.
- Business demand for phone service probably \_\_\_\_\_\_ elastic than residential demand.
- Business customers typically paid a \_\_\_\_\_ monthly price than residential customers.

### Example 2: regulated railroad freight rates

- For much of the 20<sup>th</sup> century, railroad freight rates were regulated under the principle of "value of service" pricing.
- More valuable goods (liquor, electronic equipment, etc.) paid higher rates than less valuable goods (gravel, sand, potatoes, etc.).
- Demand for shipping by first group was probably \_\_\_\_\_ elastic.



### RAMSEY PRICING Page 3

Comparison: Ramsey pricing versus marketsegmenting monopoly price discrimination

• An unregulated monopolist uses pricing rule  $MC_i$   $P_i - MC_i$  1

$$P_i = \frac{Mc_i}{1 + \frac{1}{\varepsilon_i}} \quad or \quad \frac{r_i - Mc_i}{P_i} = \frac{1}{\varepsilon_i}$$

- Equivalent to Ramsey rule with *a* = \_\_\_\_.
- But monopolist sets prices to maximize profit, not just break even!

### But Ramsey pricing is vulnerable to "cream skimming"

- If one product or market is priced far above MC, it may be possible for an entrant to enter only that \_\_\_\_\_ market.
- This takes away profitable business from the regulated monopolist and undercuts its ability to break even.

### Example of illegal cream-skimming

- U.S. Postal Service charges same 1st-class rate for delivery across town or across country. But delivery across town costs much less.
- Markup is thus very high for local delivery.
- Occasionally, firms try to enter local market alone, skimming the cream.
- However, this is illegal and vigorously prosecuted by Postal Service because threatens its ability to break even.

### Example of legal cream-skimming

- In late 1970s, AT&T's long distance telephone rates were marked up much higher above MC than local telephone service.
- (Not actually Ramsey pricing, because elasticity of demand for long-distance service was in fact than for local service.)
- But MCI, Sprint, and other companies entered the long-distance market alone, skimming the cream and forcing regulators to realign rates.

### Conclusions

- Suppose prices must be raised marginal cost to ensure regulated firm breaks even.
- To minimize deadweight loss, markup should be \_\_\_\_\_\_ proportional to price elasticity of demand (Ramsey rule).
- However, Ramsey prices can be vulnerable to \_\_\_\_\_\_ attacks.

### TRADITIONAL RATE-OF-RETURN REGULATION

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### TRADITIONAL RATE-OF-RETURN REGULATION

•How are utilities traditionally regulated?

### The rate case

- Traditionally, utility rates are set in *rate cases*, quasi-judicial proceedings before state or federal regulatory commissions.
- Utility usually asks for rate increases so that it can get more revenue, to balance increased costs.

### The utility's revenue

- Most utilities sell a number of different products or services.
- Suppose a utility has n products, i=1,...,n.
- Let  $q_i$  = quantity sold of product i.
- Let  $p_i = price$  of product i.
- The utility's revenue is given by

Revenue =  $\sum_{i=1}^{n}$ 

### Rate level and rate structure

• Argument focuses on this equation:

$$\sum_{i=1}^{n} p_i q_i = \text{expenses} + (s \times RB)$$

- First, the right side is evaluated based on data from a recent "test period."
- This establishes the utility's revenue requirement.
- Then,  $\,p_i\,$  are set to balance the equation.

### Expenses versus rate base

- *Expenses* include labor, materials, depreciation, and taxes.
- Rate base (RB) is utility's investment in
- Here, s denotes the allowed or "fair" *rate of return*.
- Hence called "rate of return (ROR) regulation."

### Setting the allowed rate of return

- This issue usually occupies most of a rate case.
- The utility argues for a \_\_\_\_\_ rate.
- The commission staff or the consumer advocate argues for a \_\_\_\_\_ rate.

### TRADITIONAL RATE-OF-RETURN REGULATION

### Page 2

### Computing value of rate base

- Most common method is to use \_\_\_\_\_, minus depreciation.
- Other methods include
  - Reproduction cost (cost of building same designs today).
  - Replacement cost (cost of building equivalent capacity today).

### Another way to compute value of rate base?

- Could add up the market value of the company's outstanding stocks and bonds.
- But the value of any company's stock depends on expected future profits.
- So these depend on the rates to be set by the regulatory commission!

### Averch-Johnson effect

- Suppose the allowed rate of return (s) is set *above* the competitive rate of return (r).
- Effectively, the commission is  $\frac{1}{(1-1)^{1/2}}$  plant and equipment
  - (physical capital).
- In theory, one should expect the utility to respond by \_\_\_\_\_ physical capital.

H. Averch and Leland Johnson, "Behavior of the Firm Under Regulatory Constraint," *American Economic Review*, December 1962.







#### TRADITIONAL RATE-OF-RETURN REGULATION

### Conclusions

- Traditionally, utility rates (prices) are set to cover expenses and produce a "fair" rate of return on the "\_\_\_\_\_" (physical capital).
- If the allowed rate of return is set too high, the utility might in theory use too much capital (the \_\_\_\_\_\_ effect).

### INCENTIVE REGULATION

Page 1

### INCENTIVE REGULATION

•How can a regulator encourage utilities to be more efficient?

### Perverse incentives in traditional ROR regulation

- Suppose a utility is extremely vigilant in increasing efficiency and decreasing expenses.
- Then its actual ROR might rise above the previously allowed rate of return (s).
- But then at the next rate case, its prices would be adjusted \_\_\_\_\_!



### Creating incentives for technical efficiency

- How can utility be encouraged to keep expenses low?
- Commission could review expenses.
- Or commission could set rates so as to encourage efficiency.





### INCENTIVE REGULATION

### Page 2

### Deliberate policies to encourage efficiency

- Regulatory lag is an inadvertent policy that may encourage efficiency.
- Deliberate policies include
  - Performance standards.
  - Earnings sharing.
  - Price caps.

### Performance standards: a supplement to ROR regulation

Many electric power and gas companies are given incentive bonuses based on specific measures of performance, such as

- heat rates (a measure of fuel efficiency)
- customer response time
- base load utilization (a measure of capacity utilization)









### INCENTIVE REGULATION

### Page 3

### The X-factor

- Hardest part is setting X factor.
- Difficult to forecast productivity growth.
- Typical practice is to use past rate of productivity growth, then add "stretch factor" for anticipated increase from switching from ROR regulation to price caps.

### Pricing under price cap regulation

- Typically, rate increase applies to an average of all prices p<sub>1</sub>,...,p<sub>n</sub>.
- Utility given substantial flexibility on individual prices p<sub>i</sub>.
- Price caps are \_\_\_\_\_. Utility may still reduce rates if desired.

### Price caps in practice

- Used to regulate AT&T's long-distance telephone service.
- Increasingly popular in state telephone regulation as well. Largely replaced earnings sharing, which was popular in the early 1990s.
- However, now telephone rates are no longer regulated at all.

### Conclusions

- Regulatory lag encourages utilities to reduce expenses, but risks misaligning prices in the long run.
- Performance standards, earnings sharing, and \_\_\_\_\_\_ can encourage the utility to keep expenses low.

#### Page 1

### COMMON COSTS AND JOINT COSTS

•In setting utility rates, how should costs of inputs shared by several products be allocated?

### Allocating costs

- Most utilities produce many kinds of output.
- Often inputs are shared by several kinds of output.
- Examples:
  - Same generators are used to produce power during day and during night.
  - Same track carries passenger and freight traffic on railroads.

### "Fully distributed costs"

- How should the costs of shared inputs be allocated in setting prices?
- Typical regulatory practice distributed shared costs \_\_\_\_\_\_ to output (e.g., kilowatt-hours) or \_\_\_\_\_\_ to other inputs (e.g., car-miles for railroads).
- Like average-cost pricing, sometimes this practice makes sense, sometimes it does not.

### Ideal pricing: P = MC

- "Fully distributed costs" makes sense if it produces \_\_\_\_\_\_ cost pricing.
- This is likely to occur if the shared inputs are used to their capacity and inputs are proportional to outputs.
- This is *not* likely to occur if there is excess capacity of some kind, for then MC < fully distributed costs.

Cost item	Lunch	Dinner	Shared
Food and labor, per customer	\$4	\$10	
Electric power, per customer			\$1
Furniture, equipment per customer of capacity			\$3

### Fully-distributed costs for the restaurant example

- Suppose there are 50 lunch customers and 100 dinner customers.
- Total shared costs are \$1 × (50+100) for electricity, plus \$3 × max(50,100) for furniture, equipment
- Shared costs per customer = 450 / (50+100) =

.

=

#### Page 2



- So the price of lunch would be set at  $P_L = \$4 + \$3 = \_$ .
- The price of dinner would be set at  $P_D = \$10 + \$3 =$ \_\_\_\_\_.



These are Kahn's definitions. See Alfred E. Kahn, *The Economics of Regulation:* Principles and Institutions, Volume 1, New York: Wiley, 1970, p.78.

### (1) Common costs: definition

- Costs of inputs that can be used to produce *either* of several outputs.
- Amount needed of a common input depends on \_\_\_\_\_\_ of the different outputs.

This is Kahn's definition. See Alfred E. Kahn, *The Economics of Regulation:* Principles and Institutions, Volume 1, New York: Wiley, 1970, p.78.

### (1) Common costs: examples

- Telecommunications
  - Outputs: local calls, long-distance calls.
  - Common input: \_\_\_\_\_
- Railroads
  - Outputs: passenger traffic, freight traffic.
  - Common input: \_\_\_\_\_



### (2) Joint costs: examples

- · Trucking or railroads
  - Outputs: Freight hauled one direction, freight hauled back the other direction.
  - Joint input: \_\_\_\_\_
- Intercity busses
  - Outputs: passenger service, package service.
  - Joint input: \_\_\_\_\_

#### Page 3



### (2) Joint costs: still more examples from unregulated markets

- Airlines
  - Outputs: tickets during peak periods like Thanksgiving, tickets during other periods.
  - Joint inputs: \_

### Restaurant example again

Cost item	Lunch	Dinner	Shared
Food and labor, per customer	\$4	\$10	
Electric power, per customer			\$1
Furniture, equipment per customer of capacity			\$3

### Cost function for the restaurant

- Let  $q_L =$  number of lunch customers.
- Let  $q_D$  = number of dinner customers.
- Total cost is  $c(q_L,q_D)$ 
  - $= 4q_{L} + 10q_{D} + 1q_{L} + 1q_{D} + 3 \max(q_{L},q_{D})$ =

### Marginal costs for the restaurant

- $c(q_L,q_D) = 5q_L + 11q_D + 3 max(q_L,q_D)$ .
- Assume there are more dinner customers than lunch customers, so that  $q_L < q_D$ , and  $max(q_L,q_D) = q_D$ .
- MC of lunch  $= \frac{\partial c}{\partial q_L} =$
- MC of dinner  $= \frac{\partial c}{\partial q_D} =$

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for restaurant example		
	Fully- distributed costs	Marginal costs
Price of lunch	\$7	\$5
Lunch revenue (50 diners)	\$350	\$250
Price of dinner	\$13	\$14
Dinner revenue (100 diners)	\$1300	\$1400
Total revenue		



• To understand joint costs, consider another unregulated example: hotels.





"Fully distributed costs" are \_\_\_\_\_ used for pricing outputs with *joint* inputs in unregulated markets.

- If hotels used "fully distributed costs," then their rates would be \_\_\_\_\_\_ year round!
- If theatres used "fully distributed costs" then a ticket would cost the \_\_\_\_\_\_ in the evening as for a matinee performance!
- If airlines used "fully distributed costs," then a ticket would cost the \_\_\_\_\_\_ in peak travel periods as in off-peak periods!

### What determines capacity?

- In unregulated private markets, joint costs of capacity are not "fully distributed" across outputs.
- Instead, some outputs drawing on the same capacity are priced much higher than others.
- The amount of capacity available plays a key role in pricing.
- But what determines the equilibrium amount of capacity in these markets?

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### PEAK-LOAD PRICING IN THEORY

#### Page 1

### PEAK-LOAD PRICING IN THEORY

•What is "peak-load pricing"?•Why does it improve social welfare?

### The pricing problem

- In competitive markets, the market mechanism sets prices equal to
  - Firms that set price any other way lose money
- The regulated firm has little incentive because it is guaranteed to break even.
  - Regulators must set prices equal to to maximize welfare.

### Pricing with joint cost

- Suppose demand varies over time periods, but the same capacity is used by all time periods.
- Examples:
  - generating capacity in electric power
  - switches and trunks in telecommunications.
- How should peak and off-peak period prices be set to maximize welfare?



### Assumptions about demand (cont'd)

- No cross-elasticities: That is, crosselasticities of demand between peak and off-peak are \_\_\_\_\_\_.

### Measurement conventions

- Quantities are usage.
  - For example, kilowatt-hours for electricity.
- Capacity is measured as *maximum usage* producible in *n* hours.
  - For example, if n = 12 hours and a generator can produce 10,000 kilowatts, capacity = 120,000 kilowatt-hours.

### PEAK-LOAD PRICING IN THEORY















### PEAK-LOAD PRICING IN THEORY











### PEAK-LOAD PRICING IN PRACTICE: ELECTRIC POWER

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### PEAK-LOAD PRICING IN PRACTICE: ELECTRIC POWER

•How close are electricity rates to ideal peak-load pricing?

### Electric power supply in practice

- Electric power generating companies typically have a variety of plants using different fuels.
- Companies use plants with lowest SMC first, then move up as needed.
- Usually, the plants with the lowest SMC have the highest MCC.









### PEAK-LOAD PRICING IN PRACTICE: ELECTRIC POWER







Metertype	Peak-load pricing capability
Usage-only meter: records total usage for the month.	Seasonal (summer/winter).
Usage plus "demand" register: records total usage plus maximum usage.	"Demand charge".
Time-of-use meter: records usage by period (day/night).	Daily peak/off peak.
Critical-peak meter: records usage by period, plus optional temporary period.	Daily peak/off peak plus temporary "critical-peak" prices set by utility.
Interval meter: records usage each hour.	Each hour can potentially have different price.

### Objections to better peak-load pricing

- 1) Advanced meters are still \_\_\_\_\_
- 2) Demand response is \_\_\_\_\_: customers cannot adjust power consumption to prices that fluctuate hourly.
- 3) Real-time and critical-peak pricing create \_\_\_\_\_\_ for consumers.

Their monthly bills could vary a lot without changes in usage.

### Proposed solutions

- 1) Wait for costs to fall. Technology is getting rapidly cheaper.
- Give customers programmable controls that turn appliances on and off automatically in response to price changes.
- Allow customers to prepay for their expected usage at a fixed rate, but price any deviations at marginal cost.



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### MARKETS FOR WHOLESALE ELECTRIC POWER

•How is wholesale electric power traded?

### Interconnections

- Utilities are connected to customers and to each other by a grid.
- Grid originally constructed for long-term bilateral wholesale power purchases.
- Now being used to buy and sell more frequently.



### Who regulates wholesale electricity?

- Federal Energy Regulatory Commission (FERC) regulates transmission and wholesale sales of electricity in interstate commerce.
- Does \_\_\_\_\_ regulate retail power sales or siting of transmission lines (state responsibilities) or siting of generators (state or NRC responsibility).

### Wholesale power markets

- 1992 Energy Policy Act allowed FERC to order utilities to "wheel" (transmit) power across their lines.
- FERC has used this mandate to encourage wholesale power markets.
- But transmission lines are natural \_\_\_\_\_\_. Also, if a utility owned transmission lines, it could block its rivals.

### Wholesale power markets

- 1992 Energy Policy Act allowed FERC to order utilities to "wheel" (transmit) power across their lines.
- FERC has used this mandate to encourage wholesale power markets.
- But transmission lines are natural <u>monopolies</u>. Also, if a utility owned transmission lines, it could block its rivals.

#### Page 2



### Non-utility power producers

- Power producers can join RTOs or ISOs even if they have retail customers.
- These producers sell \_\_\_\_\_ power only, to utilities, through the RTO or ISO.
- Exempted from price regulation under 1992 Energy Policy Act.

### Design of wholesale power markets

- In *centralized markets*, RTO is broker, similar to mythical "Walrasian auctioneer" in free markets.
- All offers to buy (bids) or sell (offers) must pass through RTO, which sets price.
- In *decentralized markets*, buyers and sellers can deal with each other directly or through private brokers.

### Centralized markets: the "day-ahead" market

- Power producers and power users submit hourly bids and asks in advance to RTO.
- RTO software constructs demand and supply curves and computes hourly equilibrium prices.
- Equilibrium prices and accepted bids and offers for each hour are announced one day ahead.

### Dispatch and settlement in the "day-ahead" market

- RTO then orders producers when to start and stop their generators.
- Producers who comply are paid price (*not* their offer price). Producers who do not comply face penalties.
- Buyers also pay \_\_\_\_\_ price (*not* their bid price).

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### Example: dispatch and settlement

- RTO would accept the first and third offer, but the third producer would be ordered to supply only
  - Both producers would be paid
- RTO would accept both bids.
  - Both would pay \_\_\_\_\_

### Efficiency in "day-ahead" market

- Key point: if producers' offers = their true marginal costs, then RTO's procedure minimizes total production costs.
- But do producers have an incentive to ask their true marginal cost?
- \_\_\_\_\_, unless they have market power.

Incentives to bid true MC when everyone is paid the equilibrium price

- Suppose your MC is \$30 and you expect the equilibrium price to be \$30-\$40.
- What happens if you bid \$30?
- If equilibrium price > \$30, then you will get to sell at a price > your MC and make money.
- If equilibrium price < \$30, then you lose the auction, but you don't sell power at a loss.

Incentives to bid true MC when everyone is paid the equilibrium price (cont'd)

- By contrast, suppose you ask more than your MC, say \$35.
- You will have \_\_\_\_\_ impact on price you are paid if you win.
- But you chance of winning when P > your MC, and thus missing out!
- No gains from asking *more* than your MC.

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Incentives to bid true MC when everyone is paid the equilibrium price (cont'd)

- Suppose you ask less than your MC, say \$25.
- You will have \_\_\_\_\_ impact on price you are paid.
- But you chance of winning when P < your MC, and thus losing money!
- No gains from asking *less* than your MC.

### "Pay as bid"

- Observers sometimes note that most offers are well below the equilibrium price.
- They suggest that buyers could save money if sellers were only paid their offer prices ("pay as bid"), not the equilibrium price.
- But then sellers would no longer have an incentive to ask their true marginal cost.
- Sellers would ask higher prices and the average price of power would probably \_\_\_\_\_\_.

### Centralized markets: the "real-time" market

- Actual power demand (or supply) may deviate slightly from quantity expected a day ahead.
- RTO also conducts a "real-time" market in five-minute increments throughout the day.
- Deviations from day-ahead quantities are paid for at "real-time" prices, which may differ from "day-ahead" prices.







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### Real-life complications: locational prices

- Transmission lines have finite capacity.
- If transmission lines going into a location reach capacity, then supply cannot be increased ("security-constrained").
- Price at that location may rise above price elsewhere.

### Centralized markets: summary

- QUANTITIES are determined by using least-cost ("economic") generators first, unless transmission lines are congested.
  - "Security-constrained economic dispatch."
- PRICES are determined by marginal bids and offers, but may differ by location if transmission lines are congested.
  - "Locational marginal pricing" (LMP).

### Conclusions

- FERC has encouraged centralized markets for power.
- In centralized markets, RTOs receive bids and offers, compute demand and supply curves, set \_\_\_\_\_, and order producers to start and stop generating power.
- Prices of power change hourly and differ by location if transmission lines are \_\_\_\_\_.
### THE CALIFORNIA ENERGY CRISIS OF 2000-01



### California's intentions

- Competition would be established at both and level.
- Retail providers would purchase wholesale power, purchase distribution from existing utilities, and sell directly to retail customers, it was hoped.
- Wholesale market-based prices for power would replace traditional ROR (cost-based) regulation.

### Plan for deregulation

- California ISO would control power grid.
- Power Exchange (PX) would manage buying and selling.

# But longstanding supply problems were ignored

- Little investment in power generation in prior decade.
- Reason: uncertainty. Investors knew deregulation was coming but were not sure of consequences.
- Transmission lines from northern California to southern California had limited capacity.

### Policy mistakes

- Competition permitted but existing utilities were made "default providers" of electric power, subject to price cap.
- Existing utilities prohibited from signing long-term contracts to purchase power. For "transparency," they were required to purchase power only in day-ahead market.

### THE CALIFORNIA ENERGY CRISIS OF 2000-01

### Page 2

### More supply problems in 2000

- Drought in Pacific Northwest reduced the supply of hydropower.
- Other plants required downtime for maintenance.
- Prices of natural gas and emissions permits rose unexpectedly.

### Rising wholesale prices in 2000

- Spot prices for wholesale power rose sharply from under \$50 per mWh in April to over \_\_\_\_\_ per mWh in December.
- Customers remained with existing utilities because of the retail price cap.
- Existing utilities began to suffer huge losses.

### Disaster in 2001

- Rolling blackouts.
- One utility (PG&E) declared bankruptcy. Others were close to bankruptcy.
- State was forced to pay the (by now) huge difference between \_\_\_\_\_\_ wholesale prices and \_\_\_\_\_\_ retail prices.
- Caps on retail rates were raised sharply to save utilities—but this angered consumers.

### Lessons #1: risk

- Spot prices for wholesale power are extremely volatile and **utilities cannot absorb**
- So, either retail rates must adjust quickly to fluctuating wholesale spot prices, *or*
- Utilities must be permitted to purchase power in forward markets, *or*
- Utilities must be permitted to be vertically integrated with generators.

### Lesson #2: demand response

- Efficient usage requires that retail prices respond to temporary wholesale price spikes.
- Retail customers are the usage decisionmakers. They must receive **accurate price signals** about when to conserve electricity.
- · Otherwise, demand will be essentially

# Lesson #3: price caps

- **Price caps** on regulated utilities can **undermine retail competition**.
- If price caps on regulated utilities, the default providers, are set lower than cost, competitors will \_\_\_\_\_\_ the market.

### THE CALIFORNIA ENERGY CRISIS OF 2000-01

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### MARKET POWER IN WHOLESALE ELECTRIC POWER MARKETS









- Reducing the total quantity supplied by a small amount could cause price to rise substantially—e.g. from, say, \$80 per mWh to \$200 per mWh.
- Producers with more than one generator have incentive to take a generator off-line during peaks.



### MARKET POWER IN WHOLESALE ELECTRIC POWER MARKETS

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Markup formula: numerical examples					
Demand elasticity (ε)	Market share (S <sub>i</sub> )	Price-cost margin			
-0.5	0.02				
-0.1	0.02				
-0.05	0.02				

# Market power • These examples show that even a small producer, with only 2% market share, can exert substantial market power when demand is extremely \_\_\_\_\_.

# What can be done to mitigate market power?

 $\frac{P - MC}{P} = \frac{S_i}{|\varepsilon|}$ 

- 1. Enlarge the market, reducing  $S_i$ .
- 2. Increase the demand elasticity.
- 3. Restructure power contracts to reduce gains from power over price.

### 1. How to enlarge the market

- Encourage \_\_\_\_\_ power producers to connect to the system.
- Make sure plenty of \_\_\_\_\_\_\_ lines are built within and between regions. Utilities might not do this on their own.

- 2. How to make demand more elastic
- Make retail prices respond to peaks in wholesale prices.
- With accurate price signals, retail demand elasticity is probably about -0.2 to -0.3, not -0.05.

3. How to restructure contracts to reduce gains from power over price

- Require large producers to sell most of their power through \_\_\_\_\_\_-term contracts. Then they will not profit much from a temporary rise in wholesale spot prices.
- Do \_\_\_\_\_\_ encourage divestiture of generation facilities. A utility that is both a buyer and a seller has little incentive to raise wholesale price.

### MARKET POWER IN WHOLESALE ELECTRIC POWER MARKETS

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Questionable "solutions" sometimes advocated

- Price caps.
  - Problem: if set too low, can cause competitive supply to \_\_\_\_\_
- "Pay-as-bid" pricing instead of everyone receiving the same equilibrium price.
  - Problem: offer prices will surely

# 3 Conclusions Wholesale spot prices are \_\_\_\_\_ because during peak periods, a slight shift in demand or supply causes prices to change drastically. This can give producers \_\_\_\_\_\_ during peaks. Market power can be mitigated by \_\_\_\_\_\_ the market, making demand more \_\_\_\_\_\_, and requiring large producers to sign \_\_\_\_\_\_ contracts.

### EFFECTS OF PRICE REGULATION IN COMPETITIVE MARKETS

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What happens to a competitive market when a price floor is imposed?Does free entry improve the outcome?



- Suppose a market is competitive with perfectly elastic long-run supply at minimum AC.
- Suppose regulation is imposed, imposing a price floor (P<sub>F</sub>) above minimum AC.
- What happens to quantity and consumer surplus?









### EFFECTS OF PRICE REGULATION IN COMPETITIVE MARKETS

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- Some firms may be more efficient than others.
- But with the price floor, \_\_\_\_\_\_ firms enjoy rents (above-normal profit) so \_\_\_\_\_\_ can continue operation.
- Even if regulator were to eliminate some firm, no guarantee that regulator will choose least-efficient firm.

### Conclusions

- A price floor \_\_\_\_\_ consumer surplus, transferring some of this to producers.
- But if AC is U-shaped or downwardsloping, producer costs are likely to \_\_\_\_\_\_ if no firms leave, especially if new firms enter. Rents may be dissipated.
- Entry restrictions can preserve some of the rents, if \_\_\_\_\_\_-cost firms are forced to exit.

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### INDIRECT EFFECTS OF REGULATION

How do minimum prices affect product quality and productive efficiency?
How do maximum prices affect welfare?
How does regulation affect innovation?

# Indirect effects of price regulation

Aside from its effects on price and cost, regulation may have indirect effects on

- 1) product quality
- 2) production efficiency
- 3) cross-subsidization of products
- 4) capital formation
- 5) innovation.

### 1) Effect of price regulation on quality

- If price regulation prohibits firms from competing on price, they will compete in other respects.
- They may try to attract customers by producing a higher-quality product.
- But this still creates deadweight loss, because consumers would really prefer a lower-quality product at a lower cost.

# Why do people buy low-quality products?

- Deception: People want high quality products but are deceived into buying products of low quality.
- Deliberate choice: People do not want to pay more for higher quality.











# Summary: effect of price regulation on quality

- A price floor may drive out low-quality goods and increase quantity of high-quality goods.
- But this is \_\_\_\_\_ necessarily a good thing.
- Some people would prefer the low-quality good if it were available at its average cost.
- The price floor creates deadweight loss in \_\_\_\_\_ markets.

# 2) Effect of price regulation on productive efficiency

- Rents in regulated industries may prompt workers to demand higher wages, above the competitive level, especially if unionized.
- This may cause firms to substitute \_\_\_\_\_\_ for labor.
- Firm behaves as if opportunity cost of labor is \_\_\_\_\_\_ than it really is.
- Employment is inefficiently \_\_\_\_\_.







- Deregulation would decrease wages and increase employment.
- · Deregulation would also cause
  - Entry or expansion of \_\_\_\_\_\_ efficient firms.
  - Exit or contraction of \_\_\_\_\_\_ efficient firms.
- Example: Deregulation of branch banking decreased cost and decreased loan losses.

Jith Jayaratne and Philip E. Strahan, "Entry Restrictions, Industry Evolution, and Dynamic Efficiency: Evidence from Commercial Banking," *Journal of Law and Economics* 46 (April 1998): 239-274.





# 4) Effect of price regulation on capital formation

- If prices are set below cost, capital formation (investment) is likely to be reduced.
- If firm uses internal financing (retained earnings) it will have \_\_\_\_\_\_\_(accounting) profit for reinvestment.
- If firm uses external financing (borrowing) it will likely face \_\_\_\_\_\_ cost of capital because investors fear bankruptcy.

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# 5) Effect of price regulation on innovation

- It is unclear whether price regulation encourages or discourages research and development (R&D), compared to competitive markets.
- Arguments can be given on both sides.

## Price regulation might encourage innovation

- If R&D is conducted by big firms and financed internally out of profit, then *minimum* prices would \_\_\_\_\_\_ profit and R&D.
- Also, if regulation encourages nonprice competition, it might incidentally R&D.

## Then again, price regulation might discourage innovation

- If R&D is conducted mostly by new entrants, entry restrictions will R&D.
- Rate-of-return regulation (but not price caps) \_\_\_\_\_\_ firms from adopting cost-saving innovations, at least until after the next rate case.
- Some data suggest that regulation does slow productivity growth.

### Competition and innovation

- But it is also unclear whether *competitive* markets generate the optimal amount of R&D.
- If R&D is a *nonexcludible public good*, then its benefits are enjoyed by competitive firms that do not produce it.
- Little incentive for competitive firms to invest in R&D if they can "\_\_\_\_" on others.

### Conclusions

- Regulation may \_\_\_\_\_ productive efficiency, by allowing high-cost firms to survive.
- 3) Cross-subsidization causes deadweight loss in \_\_\_\_\_ markets.
- 4) Regulation probably reduces capital formation.
- 5) Effects on innovation are unclear.

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### MEASURING THE EFFECTS OF REGULATION

• How can we measure the effects of regulation in the real world?

# Why measure effects of regulation and deregulation?

- To check whether theory is correct.
  - Example: Does elimination of price floor really increase quantity sold?
- To quantify benefits of deregulation.
  - Example: What are the welfare gains from eliminating cross-subsidization?

### Challenges of measurement

- Changes in regulation often accompanied by other changes (in income, technology, etc.) that might also affect market price, quantity, number of firms, etc.
- To measure regulation's effect, must find a way to hold other factors constant.
- Unlike chemists or physicists, economists cannot do \_\_\_\_\_.

### Approaches to measurement

- 1) Intertemporal approach.
- 2) Market comparison approach.
- 3) Difference-in-differences approach.
- 4) Counterfactual approach.

### 1) Intertemporal approach

- Compares observed outcomes before and after regulation (or deregulation).
- "Time-series" data.
- Must control for business cycle, economic growth, and other changes over time that might affect market outcomes.







### Example of intertemporal approach: NYSE (cont'd)

- In 1970s, U.S. Securities and Exchange Commission gradually deregulated rates for large-volume trades.
- Securities Act Amendments of 1975 prohibited all minimum rates.
- Data show that average rates \_\_\_\_\_\_ sharply at first, gradually thereafter.
- Rates for low-volume trades \_\_\_\_\_\_ slightly.

### 2) Market comparison approach

- Compares regulated markets with unregulated markets in the same time period.
- "Cross-sectional" data.
- Must control for differences in demand and supply that might affect market outcomes.
- In U.S., we can often compare states with different regulations.

# Example of market comparison approach: eyeglasses

- In 1960s, many states banned advertising for eyeglasses and eye examinations.
- How does advertising affect market price?
  - Might \_\_\_\_\_ price if it helps firms differentiate their product from their rivals'.
  - Might \_\_\_\_\_ price if it helps consumers compare prices. Reduces each firm's market power.

Lee Benham, "The Effect of Advertising on the Price of Eyeglasses," *Journal of Law and Economics*, 15 (October 1972), pp. 337-52.



- Data from a 1963 survey show that average price paid for eyeglasses was about 20% \_\_\_\_\_\_\_\_\_\_in states that did not restrict advertising, compared with states that did.
- Are these the same eyeglasses? Might other factors beside regulation affect price?
- Author controlled for other factors (including income, family size, etc.) using analysis and still found

price difference.

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# 3) Difference-in-differences approach

- · Compares two markets over time:
  - market that becomes regulated (or deregulated)
  - another market with no change.
- Differences across markets and changes in market conditions over time are thus held constant.

Difference-in-differences approach: numerical example					
Market	Initial price	Later price	Difference	Difference-in- differences.	
Deregulated market	\$5	\$6			
Control market	\$3	\$8			
Conclusion: deregulation price by \$					



Jeffrey Milyo and Joel Waldfogel, "The Effect of Price Advertising on Prices: Evidence in the Wake of 44 Liquormart," American Economic Review, 89 (December 1999), pp. 1081-96.

# Example of difference-in-differences approach: 44 Liquormart (cont'd)

- But nearby state of Massachusetts never had such law.
- So authors compared change in liquor prices in Massachusetts with change in prices in Rhode Island from June 1995 to June 1997.
- Found that liquor prices in Rhode Island \_\_\_\_\_\_ compared with Massachusetts.

### 4) Counterfactual approach

- Suppose regulation has always existed everywhere.
- Cannot use other approaches.
- Can try to extrapolate how the market would behave in absence of regulation.
- Try to predict market outcomes that would occur, *counter* to the current *fact* of regulation.

### Counterfactual approach (cont'd)

- Typical strategy is to estimate demand and marginal cost (=supply) curves.
- Intersection is \_\_\_\_\_ outcome.
- · Assumes that deregulation
  - leads to pure competition, not oligopoly.
  - would not change cost curves. (But in fact often deregulation increases efficiency and lowers cost curves.)



























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### Rents from entry restrictions

- Suppose interest rate = 5%.
- In Indianapolis in 1980, price of medallion was about \$450. Implies expected annual rent was 5% x \$450 = \_\_\_\_\_.
- In New York City in 1998, price of medallion was \$230,000. Implies expected annual rent was 5% x \$230,000 = \_\_\_\_\_.

### Conclusions

- The effect of regulation (or any policy change) can be measured using the intertemporal, market comparison, difference-in-differences, or counterfactual approaches.
- The \_\_\_\_\_ must control for changes in other variables affecting market outcomes.
- The \_\_\_\_\_\_ approach leans heavily on assumptions about how markets work.

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### Interstate Commerce Act of 1887

- Interstate Commerce Act of 1887 created Interstate Commerce Commission (ICC) to ensure that
  - · rates were "reasonable and just."
  - · higher rates not charged for short hauls than for long hauls.
  - · no discrimination among customers.

### Interstate Commerce Commission (ICC)

- Little power at first.
- Hepburn Act of 1906 allowed ICC to set maximum rates.
- Transportation Act of 1920 allowed ICC to set minimum rates and control entry and exit from routes.
  - · ICC authorized to guarantee adequate return on investment.



### Explanations for railroad regulation

- Demand for regulation by railroads ( theory).
- · Railroads wanted to establish a cartel, but were unable to do so without government help.
- Empirical evidence: substantial in railroad stock prices when Act passed.

Robin A. Prager, "Using Stock Price Data to Measure the Effects of Regulation: the Interstate Commerce Act and the Railroad Industry," RAND Journal of Economics, Vol. 20 (Summer 1989), pp. 280-290.

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### Competition from motor carriers

- In 1920s, railroads faced increasing competition from
  - trucks in freight.
- buses in passenger traffic.
- Railroads pushed for state regulation.
- Stopped by Supreme Court decision in 1925 voiding state authority over interstate trucking or busing.

### Motor Carrier Act of 1935

- Motor Carrier Act passed, partly because of lobbying by railroads.
- Brought interstate trucks and buses under ICC control.
- ICC given control of rates, entry, and exit.

# Explanations for trucking regulation

- \_\_\_\_\_ natural monopoly argument here. Small firms as efficient as big firms.
- Instead, demand for regulation of trucks by
  - ICC unable to raise railroad rates without controlling close competitors in trucking.
  - Railroads were a small well-organized group with much to gain.

# Similarities in regulation of railroads and trucking

- Rate changes had to be approved by ICC.
- \_\_\_\_\_ into a market required a "certificate of convenience" from ICC.
- required ICC approval.
- One difference: groups of trucking firms allowed to set own rates through "rate bureaus" from antitrust laws.\*

\* Reed-Bulwinkle Act of 1948.

# Rate regulation of railroads in practice

- "Value-of-service pricing."
  - \_\_\_\_\_ rates for high-value goods.
  - Example: higher rates for manufactured goods than raw materials and agricultural products.
- "Equalizing discrimination."
  - \_\_\_\_\_ rates (per mile) for short-haul and long-haul, regardless of cost.
  - A form of cross-subsidization.

# Rate regulation of trucking in practice

- Same rates regardless of density of traffic.
  A form of cross-subsidization.
- But trucking rates *could* vary by size of shipment (unlike railroads).
  - Larger shipments usually have lower marginal cost.
- Regulation's main effect was to keep trucking rates \_\_\_\_\_.

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# Entry and exit regulation of railroads in practice

- \_\_\_\_\_ was the key issue.
- Cross-subsidization meant that some routes were priced \_\_\_\_\_ cost.
- ICC did \_\_\_\_\_ allow railroads to abandon unprofitable routes.

# Entry and exit regulation of trucking in practice

- \_\_\_\_\_ was the key issue.
- Rates were set to ensure high profits.
- Firms applying to serve a new route had to show that demand could not be met by existing suppliers.
- Applications usually \_\_\_\_\_
- In practice, only way to enter was to purchase license from existing firm.

### Railroads press for deregulation

- Interstate Highways constructed in 1950s, giving greater advantage to trucks.
- Unregulated trucking sector expanded.
  - Owner-operators carrying exempt commodities.
  - Customers (manufacturers and wholesalers) shipping their own goods.
- Bankruptcy of Penn-Central, a large northeast railroad, in early 1970s.
- Other railroads in financial trouble, too.

### Railroad Revitalization & Regulatory Reform Act of 1976

- Set "zone of reasonableness" in which railroads could change rates unless they enjoyed market dominance.
  - But ICC interpreted "market dominance" broadly, thereby retaining control over rates.
- Gave railroads more freedom to abandon unprofitable routes.

### Changes in ICC policy on trucking in late 1970s

- 1975: ICC prohibited rate bureaus from blocking independent rate filings.
- Late 1970s: ICC permitted easier entry, lower rates. Also expanded deregulated zones around cities and airports.

### Staggers Rail Act of 1980

- Limited ICC jurisdiction to routes where railroads enjoyed "market dominance."
  - ICC interpreted "market dominance" narrowly this time, so railroads given substantial freedom to set own rates.
- Gave railroads freedom of entry and exit.

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### Motor Carrier Act of 1980

- Supported by Senator Ted Kennedy, President Jimmy Carter, and the National Association of Manufacturers (important trucking customers).
- Opposed by trucking industry, however.
- Codified many of the changes already made by ICC.

### Recent developments

- Only a few states deregulated *intrastate* trucking in 1980s.
- Trucking Industry and Regulatory Reform Act of 1994 eliminated all rate regulation at *federal or state level* for interstate trucking firms that provided intrastate services.
- Interstate Commerce Commission abolished in 1995.

### Conclusions

- The ICC was created in \_\_\_\_\_, largely to stop railroad price wars and equalize rates.
- As trucking began to compete with railroads, the ICC was given control over trucking rates in
- Rail rates cross-subsidized unprofitable routes. Trucking rates maximized profits.
- Trucking and railroads were deregulated at the federal level about \_\_\_\_\_.

### EFFECTS OF DEREGULATING RAILROADS AND TRUCKING

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### EFFECTS OF DEREGULATING RAILROADS AND TRUCKING

- What happened to rates, profits, entry, and exit after deregulation?
- Why did traffic shift between railroads and trucking?

### Effects on railroad rates

- Average rates (per ton-mile) \_\_\_\_\_ about 12% from 1981 through 1985.
- However, this was mostly due to change in composition of traffic.
- Shift from high-rate manufactures to low-rate bulk items (including agr. products).
- Some rates increased, some decreased.

### Effects on trucking rates

- Average rates (per ton-mile) \_\_\_\_\_\_ about 5% from 1978 to 1985.
- Again this was partly due to changes in composition of traffic.
- Shift from low-rate bulk items (including agr. products) to high-rate manufactures.
- Most shippers reported their particular rates had \_\_\_\_\_\_ dramatically.

# Estimated gains to customers (shippers) from rate changes

- Gains to trucking customers from deregulation were probably several billion dollars per year.
- Some rail customers gained, but more lost. Net loss was several billion dollars per year.
- Some of these gains and losses are transfers, so they do not equal \_\_\_\_\_ changes.

# Other effects of deregulation on railroads

- After Staggers Act, railroads abandoned many unprofitable routes.
- Spending on maintenance \_\_\_\_\_\_ sharply.
- Profits \_\_\_\_\_.

# Effects of deregulation on trucking entry and exit

- Massive entry of new carriers.
- Simultaneous massive exit: thousands of bankruptcies per year.
- Value of ICC trucking license dropped from about \$350,000 to near \_\_\_\_\_.
- Size distribution of firms did not change.

### EFFECTS OF DEREGULATING RAILROADS AND TRUCKING

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# Effects of deregulation on trucking efficiency and quality

- Fall in average costs, with fewer firms at the high end.
- Trucking firms permitted to cut rates on backhauls (similar to peak-load pricing).
- Shippers reported improved quality of service. Complaints to ICC declined.



# Effects of trucking deregulation on productivity growth and profits

- Productivity \_\_\_\_\_\_ after first year of deregulation.
- Stock prices fell with deregulation, so clearly expected profits \_\_\_\_\_.

# Effect of trucking deregulation on truckers' wages

- Before deregulation, Teamsters' Union enjoyed wages \_\_\_\_\_\_ higher than wages of nonunion workers with similar skills doing similar work.
- Deregulation permitted rapid entry of nonunion trucking firms.
- After deregulation, Teamsters' wage premium dropped to about \_\_\_\_\_.

# Why the composition of traffic changed

- Before deregulation, many goods were shipped on the wrong mode because regulated \_\_\_\_\_\_ did not reflect \_\_\_\_\_\_
- Example: Rates for agr. commodities shipped by truck were deregulated in 1950s, but rail rates remained high.
- After deregulation, agr. commodities shifted to rail, and manufactures shifted to truck.

# Conclusions Deregulation caused some rates to rise slightly and many rates to drop sharply, especially in \_\_\_\_\_\_. Profitability increased slightly in \_\_\_\_\_\_ and dropped sharply in \_\_\_\_\_\_. Efficiency increased as railroads dropped routes and truckers offered discounts on backhauls. Bulk traffic shifted to \_\_\_\_\_\_ and high-value traffic shifted to \_\_\_\_\_\_.

### **REGULATION OF AIRLINES**

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### **REGULATION OF AIRLINES**

- When were airlines regulated?
- What effect did regulation have on rates, routes, and quality of service?
- When were airlines deregulated?

### Airlines before regulation

- · Commercial airlines began hauling mail for Postal Service in late , and passengers in early \_\_\_\_\_.
- In \_\_\_\_\_, ICC given authority to allocate mail routes.

### Civil Aeronautics Act

- Civil Aeronautics Act of set up Civil Aeronautics Authority (later Civil Aeronautics Board, CAB).
- CAB given authority to award routes, regulate fares, and ensure safety.
- Safety regulation transferred to Federal Aviation Administration (FAA) in

### Powers of the Civil Aeronautics Board (CAB)

- CAB could regulate fares.
- CAB could prevent an airline from entering or abandoning a route.
- Also, by implication, CAB could control how an airline carried passengers from point to point (e.g., stops and plane changes).

### Rate regulation of airlines in practice

- Overall rates set to protect profits.
- Cross-subsidization:
  - Rates set cost for short-haul routes
  - Rates set cost for long-haul routes.

### Entry and exit regulation of airlines in practice

- In 1938, 16 "trunk" airlines were "grandfathered" and given certificates.
- From 1938 to 1978, CAB allowed entry of new trunk airlines.
- Denied applications from 1950-74.

### **REGULATION OF AIRLINES**

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# Entry and exit regulation of airlines in practice (cont'd)

- Airlines applying to serve a particular route had to demonstrate that they would not harm
- In early 1970s, concerned about excess capacity and falling profits, CAB set a complete route moratorium, not permitting **ANY** airline to enter **ANY** new route.

### Nonprice competition

- With prices controlled, airlines engaged in competition for passengers.
  - More nonstop flights: reduced travel time.
  - More frequent departures and less crowded planes: load factor only about 50%.
  - More flight attendants.
  - Better food.
- As a result, airline profits from high fares were largely \_\_\_\_\_

### Unregulated sector

- Purely *intrastate* airlines were \_\_\_\_\_\_subject to CAB regulation.
- In 1970s, fares on intrastate routes in California and Texas were roughly \_\_\_\_\_ as large as fares on interstate routes of similar length.

### Calls for deregulation

- 1975 Senate hearings held by Ted Kennedy explored regulatory reform.
- John Robson appointed CAB chairman in 1975. Reduced entry restrictions, announced support for full deregulation.
- Alfred Kahn (economist) appointed CAB chairman in 1977. Further reduced entry restrictions and fare regulation.

### Gradual deregulation by CAB

- 1976: Charter airlines granted access to regular routes, provided they required advance purchase and minimum stay.
- 1977: American Airlines requested and received similar "Super Saver" fares for NY-LA and NY-SF routes.
- 1978: CAB proposed automatic approval for fare changes (+10% or -70%).

### Airline Deregulation Act of 1978

- Phased out airline regulation.
  - Route regulation to end Dec 31, 1981.
  - Fare regulation to end Jan 1, 1983.
  - CAB to be abolished Jan 1, 1985.
- But CAB under Kahn accelerated deregulation ahead of schedule.

### **REGULATION OF AIRLINES**

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### EFFECTS OF DEREGULATING AIRLINES

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### EFFECTS OF DEREGULATING AIRLINES

What happened to fares and passenger volume after deregulation?
How did the emergence of "hub-and-spoke" route systems affect service?
What antitrust problems have emerged?

# Effect on fares • End of cross-subsidization. • Fares fell for long-haul routes. • Fares rose for short-haul routes. • Greater use of discounts (price \_\_\_\_\_) • Big increase in number of tourist travelers on discount fares.

### Effect on quality of service

- Increased "\_\_\_\_\_" (that is, more crowded planes) especially on long-haul flights.
- Some \_\_\_\_\_ in travel time between smaller cities because fewer nonstop flights.
- No change in safety.
- But volume of passengers increased substantially, suggesting the price-quality package became more attractive overall to consumers.







### EFFECTS OF DEREGULATING AIRLINES

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### Effect on productive efficiency

- New "hub-and-spoke" route systems replaced "point-to-point" systems.
- Allowed \_\_\_\_\_ load factors and more frequent departures, but \_\_\_\_\_ total flight times between smaller cities.
- Unit costs fell more rapidly after deregulation than before.







### Profits and wages

- Big \_\_\_\_\_ in profits, forcing mergers and bankruptcies.
- Labor unions forced to make wage and accept two-tiered wage agreements (lower wages for new hires).
- Effects similar to trucking deregulation.

### Trends in concentration

- HHI \_\_\_\_\_ on long-haul routes, but not short-haul routes.
- HHI \_\_\_\_\_\_ sharply in 1985-1987, when 20 airlines merged.
- HHI especially high at hubs, where one airline usually has very large market share.
- Fares also \_\_\_\_\_\_ at hubs.

### EFFECTS OF DEREGULATING AIRLINES

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### Opportunities for fare collusion

- Computer reservation systems used by travel agents and Airline Tariff Publishing Company (ATPCO) facilitate coordination of fares.
  - Consent decree in early 1990s restricted use of ATPCO for coordination.
- Marketing alliances attenuate competition.

### Other possible antitrust problems

- Access to landing slots and gates is difficult for entrants at some airports.
- Frequent-flier programs seem designed to capture passengers.
  - Give advantage to airline flying more routes.
- Numerous instances of apparent predatory pricing.

### Conclusions

- Fares \_\_\_\_\_ on long-haul flights and total volume of passengers \_\_\_\_\_.
- New antitrust issues emerged including high concentration at hubs, price coordination, and apparent \_\_\_\_\_ pricing.