

CHAPTER 17

# Oligopoly

PRINCIPLES OF  
**Economics**  
N. Gregory Mankiw

Premium PowerPoint Slides  
by Ron Cronovich

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**In this chapter,  
look for the answers to these questions:**

- § What outcomes are possible under oligopoly?
- § Why is it difficult for oligopoly firms to cooperate?
- § How are antitrust laws used to foster competition?

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## Measuring Market Concentration

§ **Concentration ratio:**

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§ This chapter focuses on oligopoly,  
a market structure with high concentration ratios.

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### Concentration Ratios in Selected U.S. Industries

Industry	Concentration ratio
Video game consoles	100%
Tennis balls	100%
Credit cards	99%
Batteries	94%
Soft drinks	93%
Web search engines	92%
Breakfast cereal	92%
Cigarettes	89%
Greeting cards	88%
Beer	85%
Cell phone service	82%
Autos	79%

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### Oligopoly

§ **Oligopoly:**

§ Strategic behavior in oligopoly:  
A firm's decisions about  $P$  or  $Q$  can affect other firms and cause them to react. The firm will consider these reactions when making decisions.

§ **Game theory:**

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### EXAMPLE: Cell Phone Duopoly in Smalltown

$P$	$Q$
\$0	140
5	130
10	120
15	110
20	100
25	90
30	80
35	70
40	60
45	50

- § Smalltown has 140 residents
- § The "good": cell phone service with unlimited anytime minutes and free phone
- § Smalltown's demand schedule
- § Two firms: T-Mobile, Verizon  
**duopoly:**
- § Each firm's costs:  $FC = \$0$ ,  $MC = \$10$

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**EXAMPLE: Cell Phone Duopoly in Smalltown**

P	Q	Revenue	Cost	Profit
\$0	140	\$0	\$1,400	-1,400
5	130	650	1,300	-650
10	120	1,200	1,200	0
15	110	1,650	1,100	550
20	100	2,000	1,000	1,000
25	90	2,250	900	1,350
30	80	2,400	800	1,600
35	70	2,450	700	1,750
40	60	2,400	600	1,800
45	50	2,250	500	1,750

Competitive outcome:

Monopoly outcome:

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**EXAMPLE: Cell Phone Duopoly in Smalltown**

§ One possible duopoly outcome: collusion

§ **Collusion:**

§ T-Mobile and Verizon could agree to each produce half of the monopoly output:

§ For each firm:

§ **Cartel:**

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**ACTIVE LEARNING 1**

**Collusion vs. self-interest**

P	Q
\$0	140
5	130
10	120
15	110
20	100
25	90
30	80
35	70
40	60
45	50

Duopoly outcome with collusion:

Each firm agrees to produce  $Q = 30$ , earns profit = \$900.

If T-Mobile reneges on the agreement and produces  $Q = 40$ , what happens to the market price? T-Mobile's profits?

Is it in T-Mobile's interest to renege on the agreement?

If both firms renege and produce  $Q = 40$ , determine each firm's profits.

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ACTIVE LEARNING 1

Answers

P	Q
\$0	140
5	130
10	120
15	110
20	100
25	90
30	80
35	70
40	60
45	50

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**Collusion vs. Self-Interest**

§ Both firms would be better off if both stick to the cartel agreement.

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§ Lesson:  
It is difficult for oligopoly firms to

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ACTIVE LEARNING 2

The oligopoly equilibrium

P	Q
\$0	140
5	130
10	120
15	110
20	100
25	90
30	80
35	70
40	60
45	50

If each firm produces  $Q = 40$ ,  
market quantity = 80  
 $P = \$30$   
each firm's profit = \$800

Is it in T-Mobile's interest to increase its output further, to  $Q = 50$ ?

Is it in Verizon's interest to increase its output to  $Q = 50$ ?

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ACTIVE LEARNING 2

Answers

P	Q
\$0	140
5	130
10	120
15	110
20	100
25	90
30	80
35	70
40	60
45	50

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### The Equilibrium for an Oligopoly

§ **Nash equilibrium:** a situation in which

§ Our duopoly example has a Nash equilibrium in which each firm produces  $Q =$

§ Given that Verizon produces  $Q =$   
T-Mobile's best move is to produce  $Q =$

§ Given that T-Mobile produces  $Q =$   
Verizon's best move is to produce  $Q =$

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### A Comparison of Market Outcomes

When firms in an oligopoly individually choose production to maximize profit,

§ oligopoly  $Q$  is \_\_\_\_\_ monopoly  $Q$   
but \_\_\_\_\_ competitive  $Q$ .

§ oligopoly  $P$  is \_\_\_\_\_ competitive  $P$   
but \_\_\_\_\_ monopoly  $P$ .

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### The Output & Price Effects

§ Increasing output has two effects on a firm's profits:

§ **Output effect:**

§ **Price effect:**

§ If output effect > price effect,

§ If price effect > output effect,

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### The Size of the Oligopoly

§ As the number of firms in the market increases,

§ the price effect

§ the oligopoly looks more and more like

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§ the market quantity

*Another benefit of international trade:*

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### Game Theory

§ Game theory helps us understand oligopoly and other situations where "players" interact and behave strategically.

§ **Dominant strategy:**

§ **Prisoners' dilemma:**

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### Prisoners' Dilemma Example

- § The police have caught Bonnie and Clyde, two suspected bank robbers, but only have enough evidence to imprison each for 1 year.
- § The police question each in separate rooms, offer each the following deal:
  - § If you confess and implicate your partner, you go free.
  - § If you do not confess but your partner implicates you, you get 20 years in prison.
  - § If you both confess, each gets 8 years in prison.

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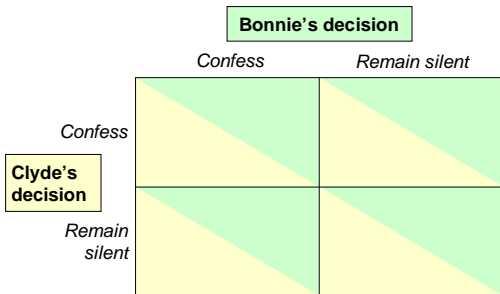
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### Prisoners' Dilemma Example



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### Prisoners' Dilemma Example

- § Outcome:
- § Both would have been better off if
- § But even if Bonnie and Clyde had agreed before being caught to remain silent,

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### Oligopolies as a Prisoners' Dilemma

§ When oligopolies form a cartel in hopes of reaching the monopoly outcome, they become players in a prisoners' dilemma.

§ Our earlier example:

- § T-Mobile and Verizon are duopolists in Smalltown.
- § The cartel outcome maximizes profits: Each firm agrees to serve  $Q = 30$  customers.

§ Here is the "payoff matrix" for this example...

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### T-Mobile & Verizon in the Prisoners' Dilemma

Each firm's dominant strategy:

		<b>T-Mobile</b>	
		$Q = 30$	$Q = 40$
<b>Verizon</b>	$Q = 30$	T-Mobile's profit = \$900 Verizon's profit = \$900	T-Mobile's profit = \$1000 Verizon's profit = \$750
	$Q = 40$	T-Mobile's profit = \$750 Verizon's profit = \$1000	T-Mobile's profit = \$800 Verizon's profit = \$800

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### ACTIVE LEARNING 3 The "fare wars" game

The players: American Airlines and United Airlines

The choice: cut fares by 50% or leave fares alone

- § If both airlines cut fares, each airline's profit = \$400 million
- § If neither airline cuts fares, each airline's profit = \$600 million
- § If only one airline cuts its fares, its profit = \$800 million the other airline's profits = \$200 million

Draw the payoff matrix, find the Nash equilibrium.

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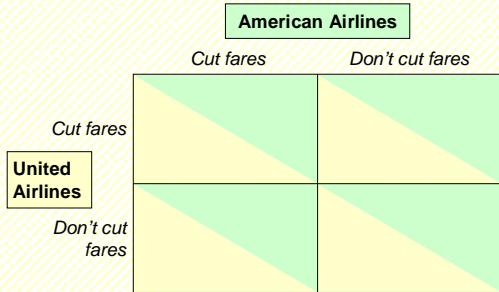
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ACTIVE LEARNING 3  
Answers




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Other Examples of the Prisoners' Dilemma

Ad Wars

Two firms spend millions on TV ads to steal business from each other. Each firm's ad cancels out the effects of the other, and both firms' profits fall by the cost of the ads.

Organization of Petroleum Exporting Countries

Member countries try to act like a cartel, agree to limit oil production to boost prices & profits. But agreements sometimes break down when individual countries renege.

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Other Examples of the Prisoners' Dilemma

Arms race between military superpowers

Each country would be better off if both disarm, but each has a dominant strategy of arming.

Common resources

All would be better off if everyone conserved common resources, but each person's dominant strategy is overusing the resources.

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### Prisoners' Dilemma and Society's Welfare

§ The noncooperative oligopoly equilibrium

§ Bad for oligopoly firms:

§ Good for society:

§ In other prisoners' dilemmas, the inability to cooperate may

§ e.g., arms race, overuse of common resources

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### Another Example: Negative Campaign Ads

§ Election with two candidates, "R" and "D."

§ If R runs a negative ad attacking D, 3000 fewer people will vote for D: 1000 of these people vote for R, the rest abstain.

§ If D runs a negative ad attacking R, R loses 3000 votes, D gains 1000, 2000 abstain.

§ R and D agree to refrain from running attack ads. Will each one stick to the agreement?

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### Another Example: Negative Campaign Ads

Each candidate's dominant strategy:

		R's decision	
		Do not run attack ads (cooperate)	Run attack ads (defect)
D's decision	Do not run attack ads (cooperate)	no votes lost or gained	R gains 1000 votes D loses 3000 votes
	Run attack ads (defect)	R loses 3000 votes D gains 1000 votes	R loses 2000 votes D loses 2000 votes

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### Another Example: Negative Campaign Ads

- § Nash eq'm:
- § Effects on election outcome:  
Each side's ads
  
- § Effects on society:

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### Why People Sometimes Cooperate

- § When the game is repeated many times, cooperation may be possible.
- § These strategies may lead to cooperation:

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### Public Policy Toward Oligopolies

- § Recall one of the Ten Principles from Chap.1:  
***Governments can sometimes improve market outcomes.***
- § In oligopolies, production is too low and prices are too high, relative to the social optimum.
- § Role for policymakers:

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## Restraint of Trade and Antitrust Laws

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§ Clayton Antitrust Act (1914):  
Strengthened rights of individuals damaged by  
anticompetitive arrangements between firms

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## Controversies Over Antitrust Policy

- § Most people agree that price-fixing agreements among competitors should be illegal.
- § Some economists are concerned that policymakers go too far when using antitrust laws to stifle business practices that are not necessarily harmful, and may have legitimate objectives.
- § We consider three such practices...

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## 1. Resale Price Maintenance (“Fair Trade”)

- § Occurs when
  
- § Is often opposed because it appears to reduce competition at the retail level.
- § Yet, any market power the manufacturer has is at the wholesale level; manufacturers do not gain from restricting competition at the retail level.
- § The practice has a legitimate objective:

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## 2. Predatory Pricing

§ Occurs when

§ Illegal under antitrust laws, but hard for the courts to determine when a price cut is predatory and when it is competitive & beneficial to consumers.

§ Many economists doubt that predatory pricing is a rational strategy:

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## 3. Tying

§ Occurs when

§ Critics argue that tying gives firms more market power by connecting weak products to strong ones.

§ Others counter that tying cannot change market power: Buyers are not willing to pay more for two goods together than for the goods separately.

§ Firms may use tying

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## CONCLUSION

§ Oligopolies can end up looking like monopolies or like competitive markets, depending on

§ The prisoners' dilemma shows how difficult it is for firms to maintain cooperation, even when doing so is in their best interest.

§ Policymakers use the antitrust laws to regulate oligopolists' behavior. The proper scope of these laws is the subject of ongoing controversy.

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