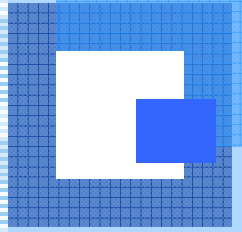


# *Chapter 10*

## *Pricing and Output Decisions: Monopolistic Competition and Oligopoly*

*Managerial Economics: Economic  
Tools for Today's Decision Makers, 4/e  
By Paul Keat and Philip Young*



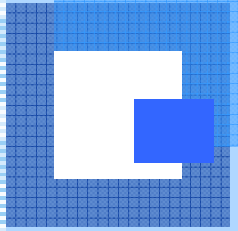
# Pricing and Output Decisions: Monopolistic Competition and Oligopoly

- Introduction
- Monopolistic Competition
- Oligopoly
- Pricing in Oligopoly: Rivalry and Mutual Interdependence
- Competing in Imperfectly Competitive Markets
- Game Theory and the Pricing Behavior of Oligopolies
- Strategy



# Introduction

- Imperfect Competition
  - Some market power but not absolute market power.
  - Have the ability to set prices within certain constraints
  - Mutual Interdependence
    - Interaction among competitors when making decisions
  - Comparison of Market Structures: Table 10.1



# Introduction

	<b>Perfect Competition</b>	<b>Monopoly</b>	<b>Monopolistic Competition</b>	<b>Oligopoly</b>
<b>Market Power?</b>	<b>No</b>	<b>Yes, subject to government regulation</b>	<b>Yes</b>	<b>Yes</b>
<b>Mutual interdependence among competing firms?</b>	<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>
<b>Non-price competition?</b>	<b>No</b>	<b>Optional</b>	<b>Yes</b>	<b>Yes</b>
<b>Easy market entry or exit ?</b>	<b>Yes</b>	<b>No</b>	<b>Yes, relatively easy</b>	<b>No, relatively difficult</b>



# Monopolistic Competition

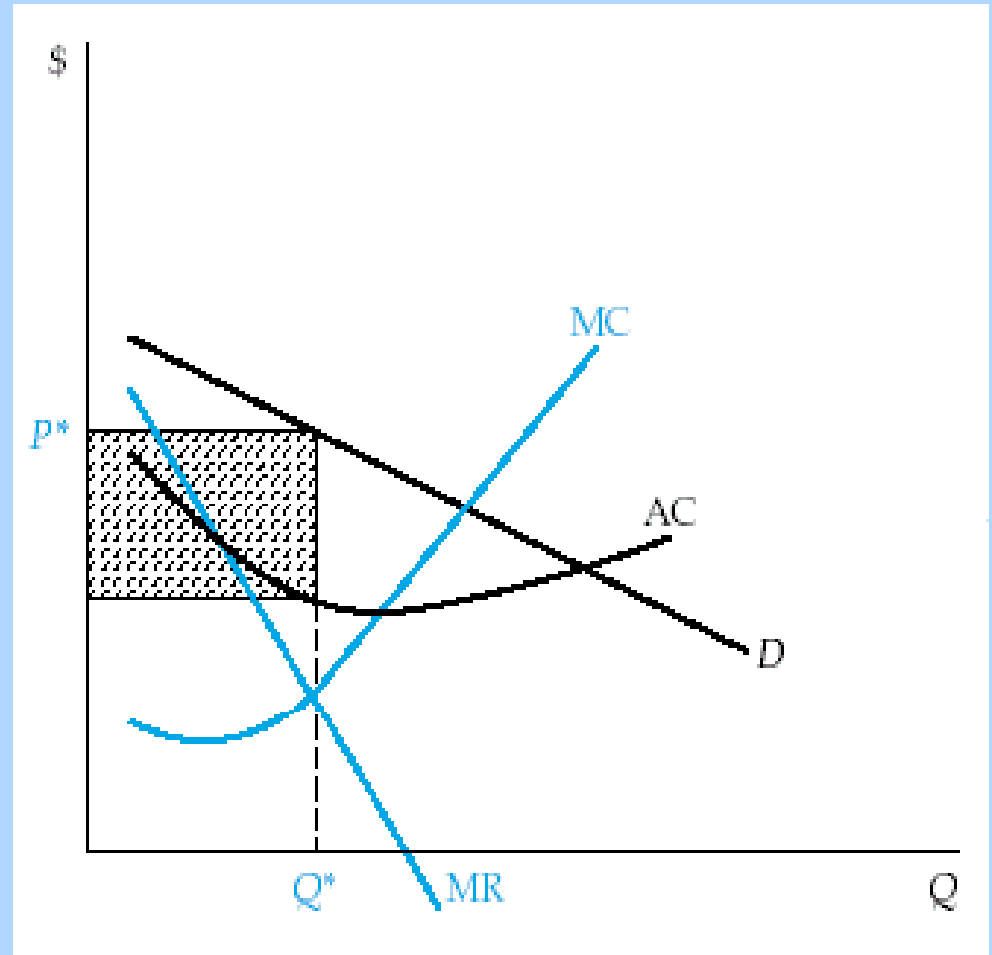
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- Characteristics
  - Many firms
  - Relatively easy entry
  - Product differentiation
    - Downward sloping demand for product



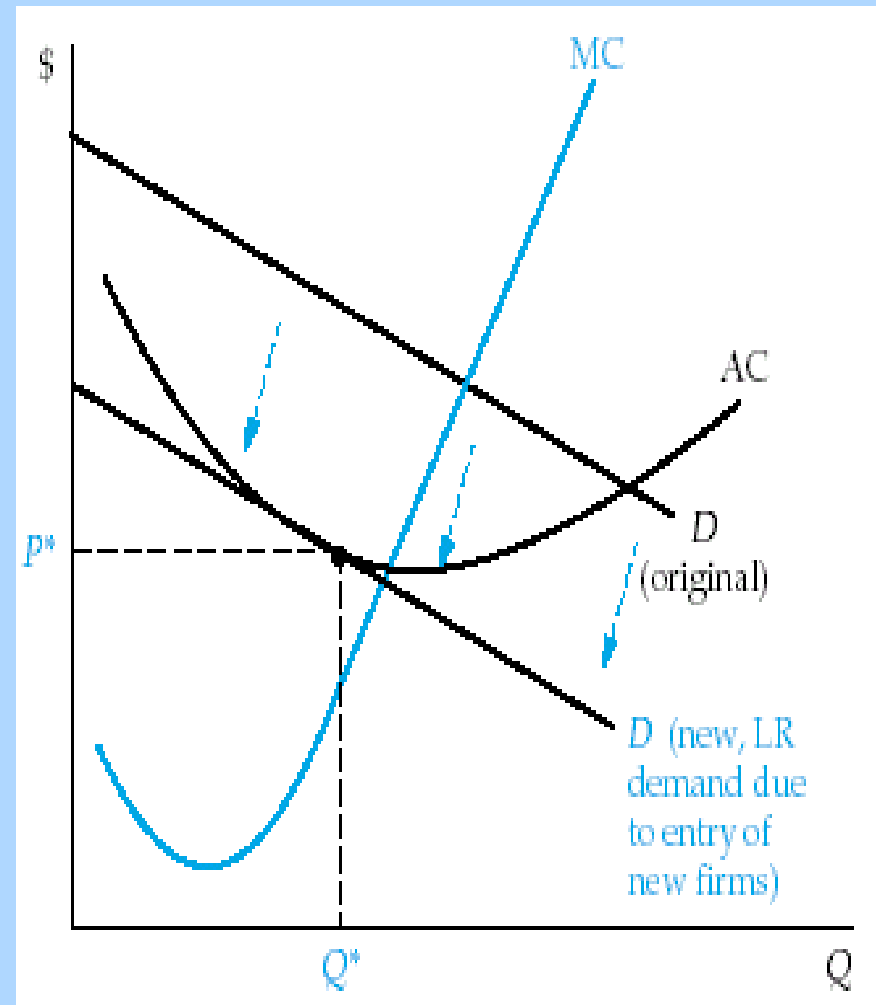
# Monopolistic Competition

- Profit Maximization
  - Use the  $MR=MC$  rule
- What will happen in the long run? Why?



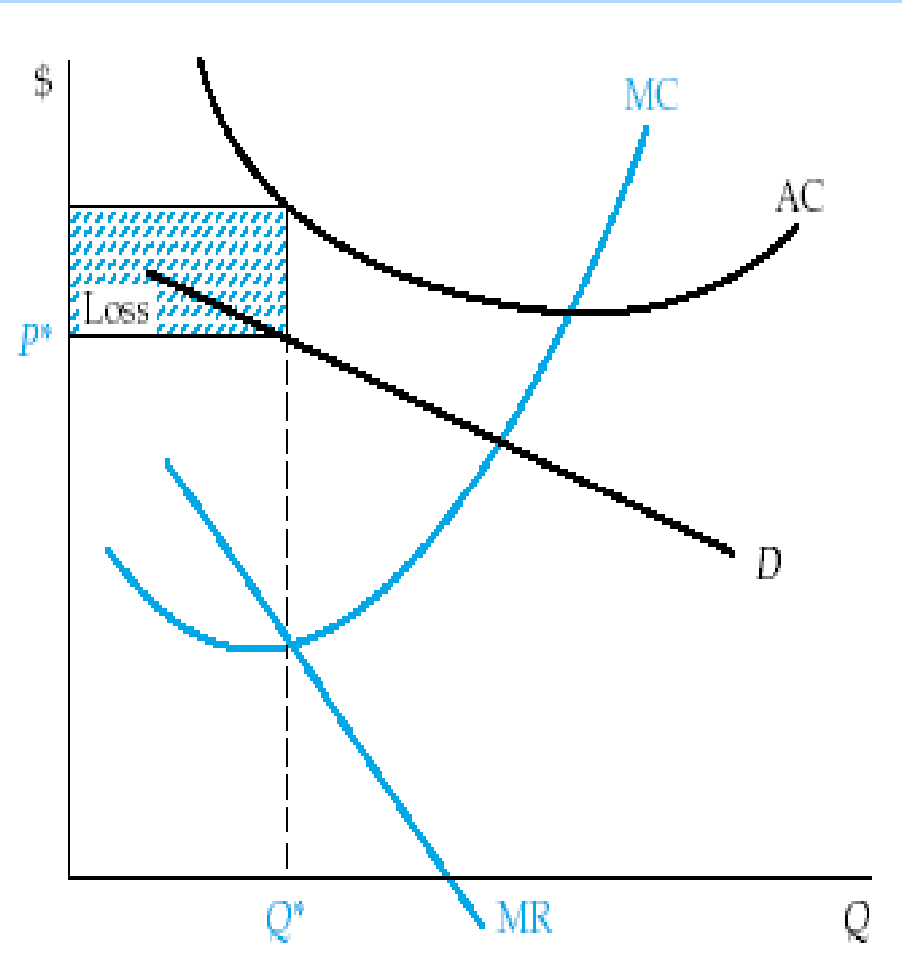
# Monopolistic Competition

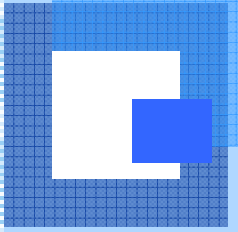
- In the long run, above normal profits invite entry. Why?
- Entry of additional firms causes the demand curve for each existing firm to shift to the left.
- In the long run, monopolistically competitive firms earn normal profits.



# Monopolistic Competition

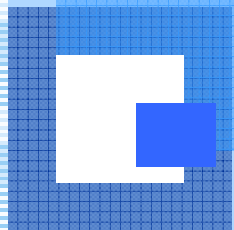
- Describe the firm's profitability.
  - Economic Loss
- What will happen in the long run?
  - Firms will exit
  - Demand curve shift to the right.





# Oligopoly

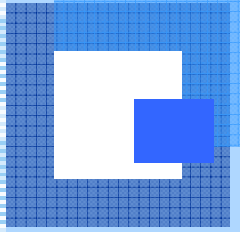
- Oligopoly markets are characterized by markets dominated by a small number of large firms.
- Measures of Market Concentration
  - Market Share of the top firms in the industry.
  - Herfindahl-Hirschman index (HH)
    - $HH = \sum_{i=1}^n S_i^2$   
where n is the number of firms in the industry and  $S_i$  is the firm's market share



# Oligopoly

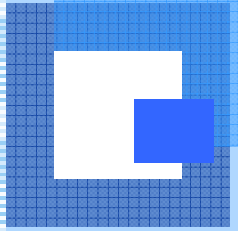
## Market Concentration

NAICS CODE	INDUSTRY GROUP AND INDUSTRY	COMPANIES	VALUE OF SHIPMENTS (\$ MILLIONS)	PERCENT OF VALUE OF SHIPMENTS			HH INDEX
				4 LARGEST	8 LARGEST	20 LARGEST	
311	Food manufacturing	21,958	421,737	14.3	22.0	34.8	91.0
3113	Sugar and confectionary product mfg.	1,556	24,114	41.9	56.4	75.0	580.3
31131	Sugar mfg.	49	7,399	64.4	84.0	95.9	1452.2
311311	Sugarcane mills	34	1,457	56.6	71.4	94.3	1158.7
311312	Cane sugar refining	12	3,209	98.7	99.9	100.0	D
311313	Beet sugar refining	8	2,732	85.0	100.0	N	1997.6
312	Beverage and tobacco product mfg.	2,237	96,971	45.1	59.1	72.7	777.2
3121	Beverage mfg.	2,169	60,896	40.9	52.1	66.0	531.5
31211	Soft drink and ice mfg.	1,008	32,587	45.5	53.6	68.8	743.3
312111	Soft drink mfg.	388	31,376	47.2	55.6	70.9	800.4
312112	Bottled water mfg.	109	785	51.7	64.4	80.3	986.6
312113	Ice mfg.	514	424	24.4	31.3	43.1	302.3



# Oligopoly

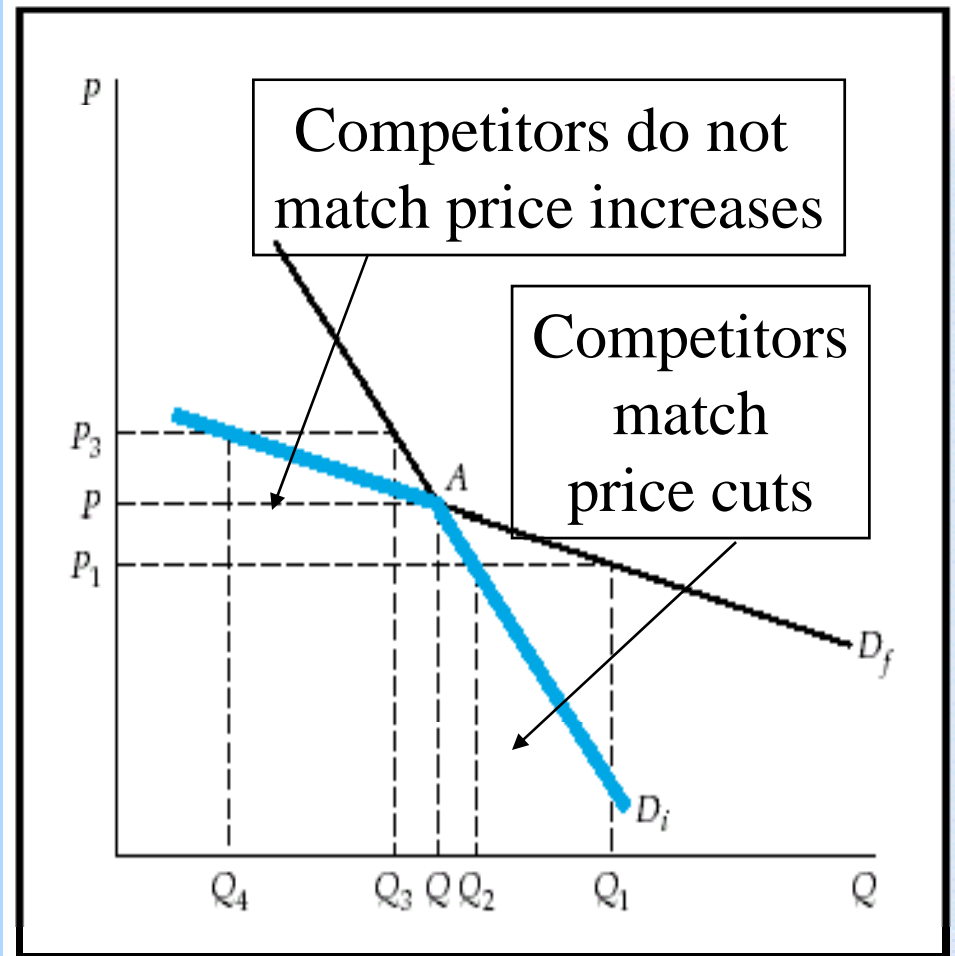
- Pricing under rivalry and mutual interdependence
  - Each firm sets its price while explicitly considering the reaction by other firms.
  - Different models used to describe behavior
  - Kinked Demand Curve Model
    - 1930s by Paul Sweezy
    - Behavioral Assumption: A competitor will follow a price decrease but will not follow a price increase.



# Oligopoly

## Kinked Demand Curve Model

- Original price and quantity at point A.
- If reduce price and competitors match the price cut then move along more inelastic demand segment.
- If increase price and competitors do not follow then move along the more elastic segment.
- Accounting for the behavior of the other firms causes the demand curve to be kinked.

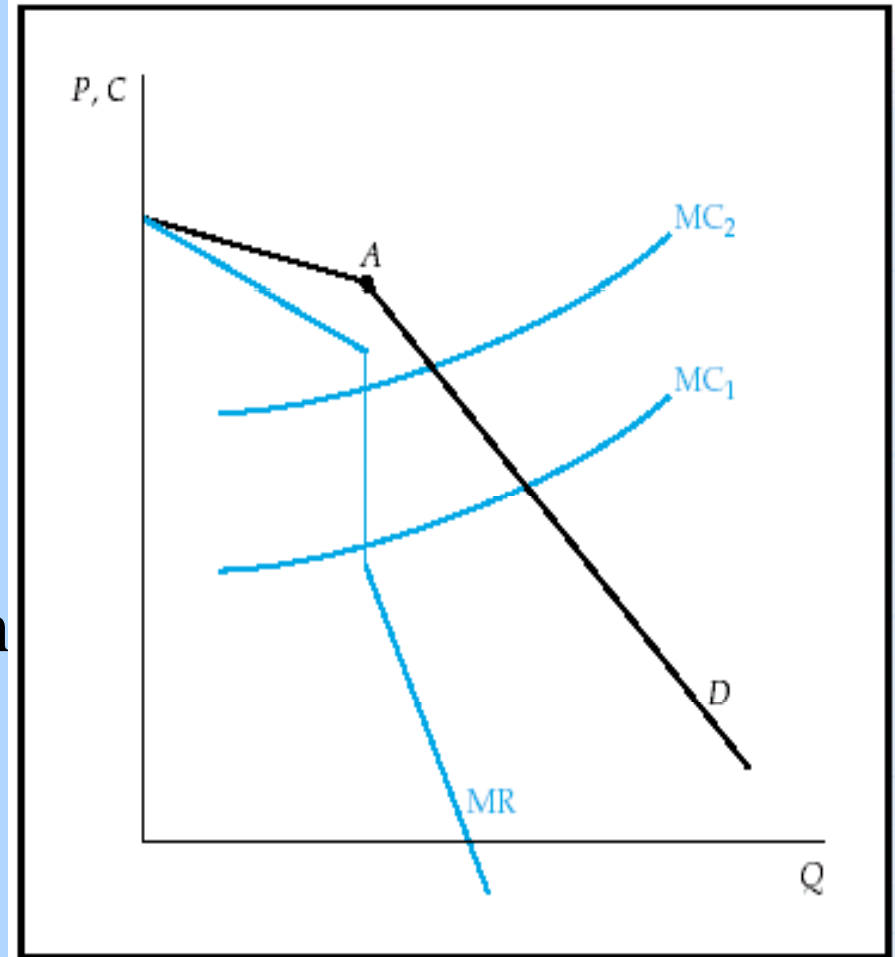


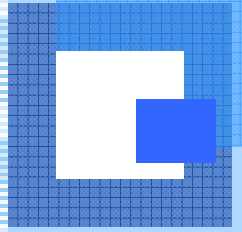


# Oligopoly

## Kinked Demand Curve Model

- In order to maximize profits, use the  $MR=MC$  rule.
- The MR curve for the kinked demand curve is discontinuous at the kink.
- This leads the firm to charge the same price even if costs change.
- Price rigidities
- Little empirical support





# Oligopoly

## Price Leadership Model

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- Another model of firm behavior.
- One firm in the industry (typically the largest firm) is the price leader and, as such, takes the lead in changing prices.
- The price leader assumes that firms will follow a price increase. It assumes that firms may follow a reduction in price, but will not go lower in order not to trigger a price war.



# Oligopoly

## Non-price Competition

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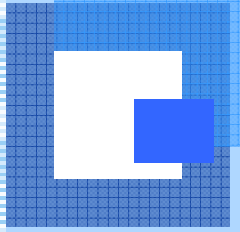
- Definition
  - Any effort made by firms other than a change in the price of the product in question in order to change the demand for their product.
  - Efforts intended to affect the non-price determinants of demand



# Oligopoly

## Non-price Competition

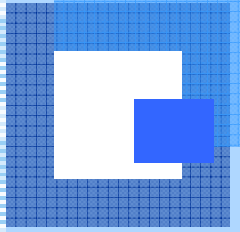
- Non-price Determinants of Demand
  - Any factor that causes the demand curve to shift
    - Tastes and preferences
    - Income
    - Prices of substitutes and complements
    - Number of buyers
    - Future expectations of buyers about the product price



# Oligopoly

## Non-price Competition

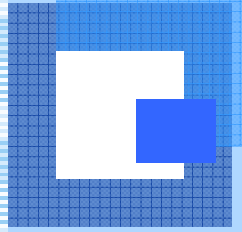
- Non-price variables
  - Any factor that managers can control, influence, or explicitly consider in making decisions affecting the demand for their goods and services
    - Advertising
    - Promotion
    - Location and distribution channels
    - Market segmentation
    - Loyalty programs
    - Product extensions and new product development
    - Special customer services product “lock-in” or “tie-in”
    - Pre-emptive new product announcements



# Oligopoly

## Non-price Competition

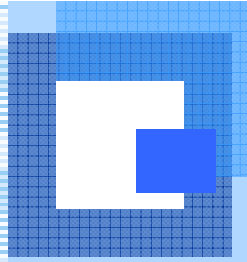
- Just as the  $MR=MC$  rule was used to determine the optimal price, the optimal level of a non-price factor is found by “equalizing at the margin”
- For example, the optimal amount of advertising expenditure is found by equating the MR from additional advertising expenditure and the MC associated with that expenditure.



# Oligopoly

## Game Theory and Pricing Behavior

- Game theory can be used to explain and predict behavior when there is mutual interdependence.
- Game theory is concerned with “how individuals make decisions when they are aware that their actions affect each other and when each individual takes this into account.” (Bierman and Fernandez, 1998)
- Prisoner’s Dilemma
  - Two-person
  - Non-zero-sum
  - Non-cooperative
  - Has a dominant strategy

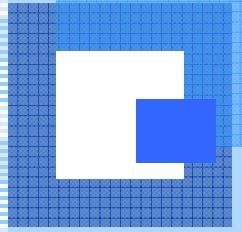


# Oligopoly

## Game Theory and Pricing Behavior

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- Zero-sum game
  - One player's gain is the other player's loss
  - Gains and losses sum to zero.
- Non-zero-sum game
  - Both player's may gain or lose.
  - Gains and losses do not sum to zero.

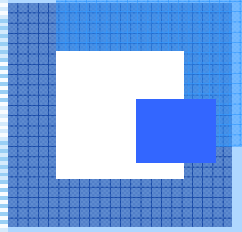


# Oligopoly

## Game Theory and Pricing Behavior

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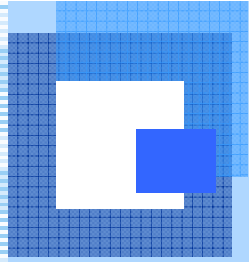
- Non-cooperative game
  - Players do not share information with each other.
- Cooperative game
  - Players may share information and coordinate actions.
- Dominant Strategy
  - There is one set of actions (strategy) that is best for a player, no matter what the other player does.



# Oligopoly

## Game Theory and Pricing Behavior

- Prisoner's dilemma
  - Two individuals commit a serious crime together and are apprehended by police
  - They know there is insufficient evidence to convict them of the serious crime.
  - There is enough evidence to convict them of loitering which carries a lesser prison sentence.
  - Each prisoner is interrogated separately with no communication between them.

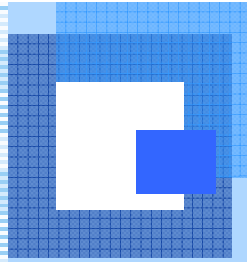


# Oligopoly

## Game Theory and Pricing Behavior

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- Prisoner's dilemma, continued:
  - Police tell them that if one of them confesses he will receive a suspended sentence while the other will receive the maximum sentence.
  - If both talk then they will each receive a moderate sentence.
  - What will each suspect do?

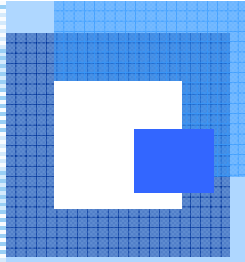


# Oligopoly

## Game Theory and Pricing Behavior

- Prisoner's dilemma, continued:
  - Payoff Matrix

		SUSPECT I	
		Confess	Not Confess
SUSPECT II	Confess	5 years / 5 years	14 years / 1 year suspended
	Not Confess	14 years / 1 year suspended	18 months / 18 months

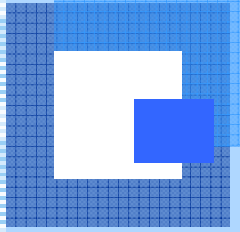


# Oligopoly

## Game Theory and Pricing Behavior

- Confessing is a dominant strategy for each player.
- This is the best strategy no matter what the other player chooses
- Equilibrium
  - Each player have no incentive to unilaterally change their strategy.

		SUSPECT I	
		Confess	Not Confess
SUSPECT II	Confess	5 years / 5 years	14 years / 1 year suspended
	Not Confess	14 years / 1 year suspended	18 months / 18 months



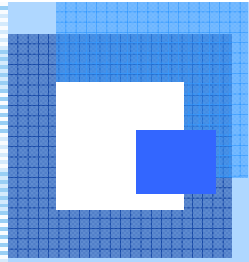
# Oligopoly

## Game Theory and Pricing Behavior

- Consider the game between two firms, A and B, described below.
- What is the equilibrium?

		COMPANY A	
		High Price	Low Price
COMPANY B	High Price	400 400	600* 100
	Low Price	600 100	200 200

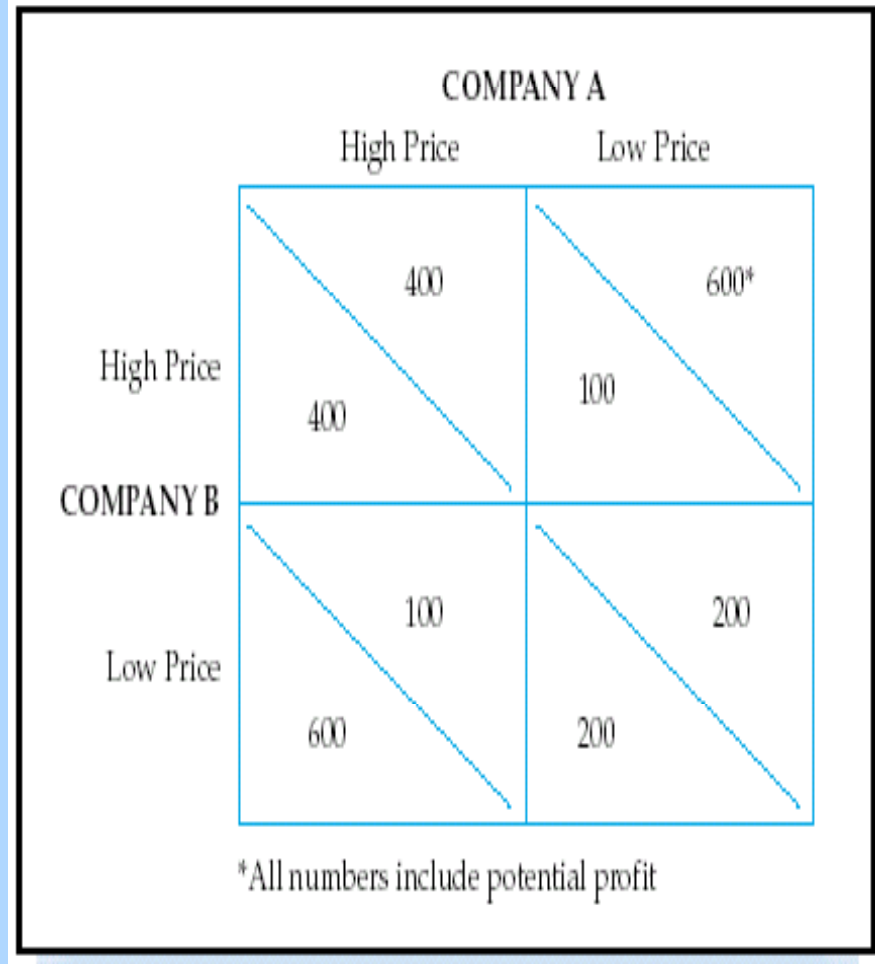
\*All numbers include potential profit

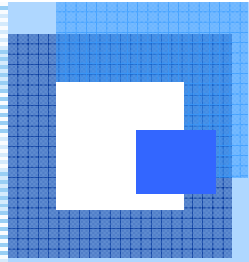


# Oligopoly

## Game Theory and Pricing Behavior

- (Low/Low) is a stable equilibrium. No incentive for either firm to deviate.
- Better off at (High/High) but it is not stable. Each firm has an incentive to deviate.





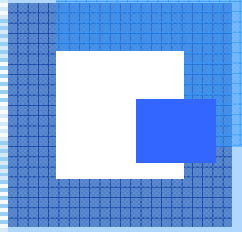
# Oligopoly

## Game Theory and Pricing Behavior

- Efficiency implies that there is no other strategy pair that would make one player better off and no player worse off.
- (Low/Low) is not efficient.
- (High/High) is efficient.
- (High/High) would be an equilibrium if the firms were allowed to cooperate.

		COMPANY A	
		High Price	Low Price
COMPANY B	High Price	400 400	600* 100
	Low Price	100 600	200 200

\*All numbers include potential profit



# Oligopoly

## Game Theory and Pricing Behavior

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- Repeated Game
  - The game is played over and over.
- In a repeated game, equilibria that are not stable may become stable due to the threat of retaliation.



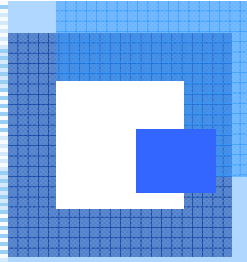
# Oligopoly

## Game Theory and Pricing Behavior

- Suppose this game is repeated indefinitely.
- Suppose both firms charge the high price.
- How can this strategy become stable in the repeated game?
- What if the game were only repeated for a set number of periods?

		COMPANY A	
		High Price	Low Price
COMPANY B	High Price	400 400	600* 100
	Low Price	100 600	200 200

\*All numbers include potential profit

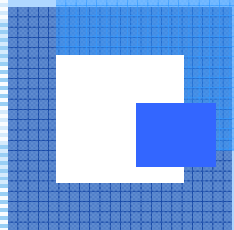


# Oligopoly

## Game Theory and Pricing Behavior

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- Simultaneous games are games in which players make their strategy choices at the same time.
- Sequential games are games in which players make their decisions sequentially.
- In sequential games, the first mover may have an advantage.

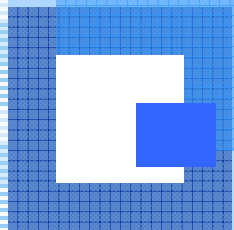


# Oligopoly

## Game Theory and Pricing Behavior

- Consider the following payoff matrix in which firms choose their capacity, either high or low.

		COMPANY C	
		High Q	Low Q
Company D	High Q	(D) 50/50 (C)	(D) 200/75 (C)
	Low Q	(D) 200/75 (C)	(D) 100/100 (C)

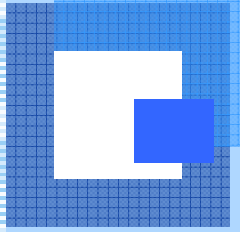


# Oligopoly

## Game Theory and Pricing Behavior

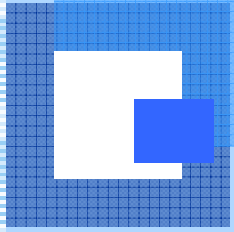
		COMPANY C	
		High Q	Low Q
Company D	High Q	(D) 50/50 (C)	(D) 200/75 (C)
	Low Q	(D) 200/75 (C)	(D) 100/100 (C)

- Is this a zero-sum game?
- Is there a dominant strategy for either firm in the simultaneous move game?
- Suppose firm C has the ability to move first. Is there an equilibrium in this sequential game?



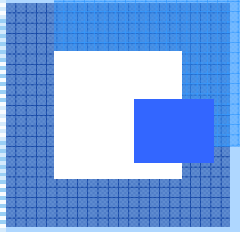
# Strategy

- Strategy is important when firms are price makers and are faced with price and non-price competition as well as threats from new entrants into the market.
- More important for firms in imperfectly competitive markets than those in perfectly competitive markets or monopoly markets.



# Strategy

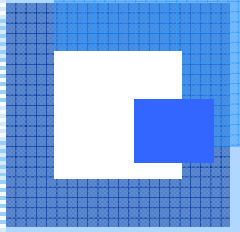
- Strategy is defined as “the means by which an organization uses its scarce resources to relate to the competitive environment in a manner that is expected to achieve superior business performance over the long run.”
- Managerial Economics is “the use of economic analysis to make business decisions involving the best use of an organization’s scarce resources.” (see Chapter 1)
- Important linkages between managerial economics and strategy.



# Strategy

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- Linkages are divided into three sections:
  - Industrial Organization
  - Ideas of Michael Porter
  - Strategy and Game Theory

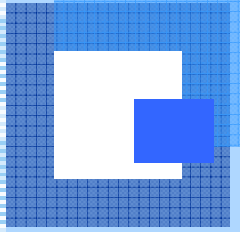


# Strategy

## Industrial Organization

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- Industrial organization studies the way that firms and markets are organized and how this organization affects the economy from the viewpoint of social welfare.
- How does industry concentration affect the behavior of firms competing in the industry?

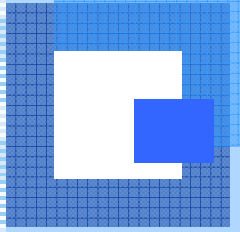


# Strategy

## Industrial Organization

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- Structure-Conduct-Performance (S-C-P) Paradigm
  - Structure affects conduct which affects performance
  - Structure
    - Demand and supply conditions in the industry.
  - Conduct
    - Pricing and non-price strategies
  - Performance
    - Welfare and efficiency results



# Strategy

## Industrial Organization

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- The “New” Theory of Industrial Organization
  - There is no necessary connection between industry structure and performance that uniquely leads to maximum social welfare.
  - Weak evidence of relationship between concentration and profit levels.
  - Theory of Contestable Markets
    - What matters is the threat of potential competition.

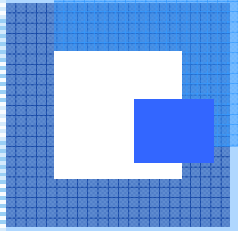


# Strategy

## Ideas of Michael Porter

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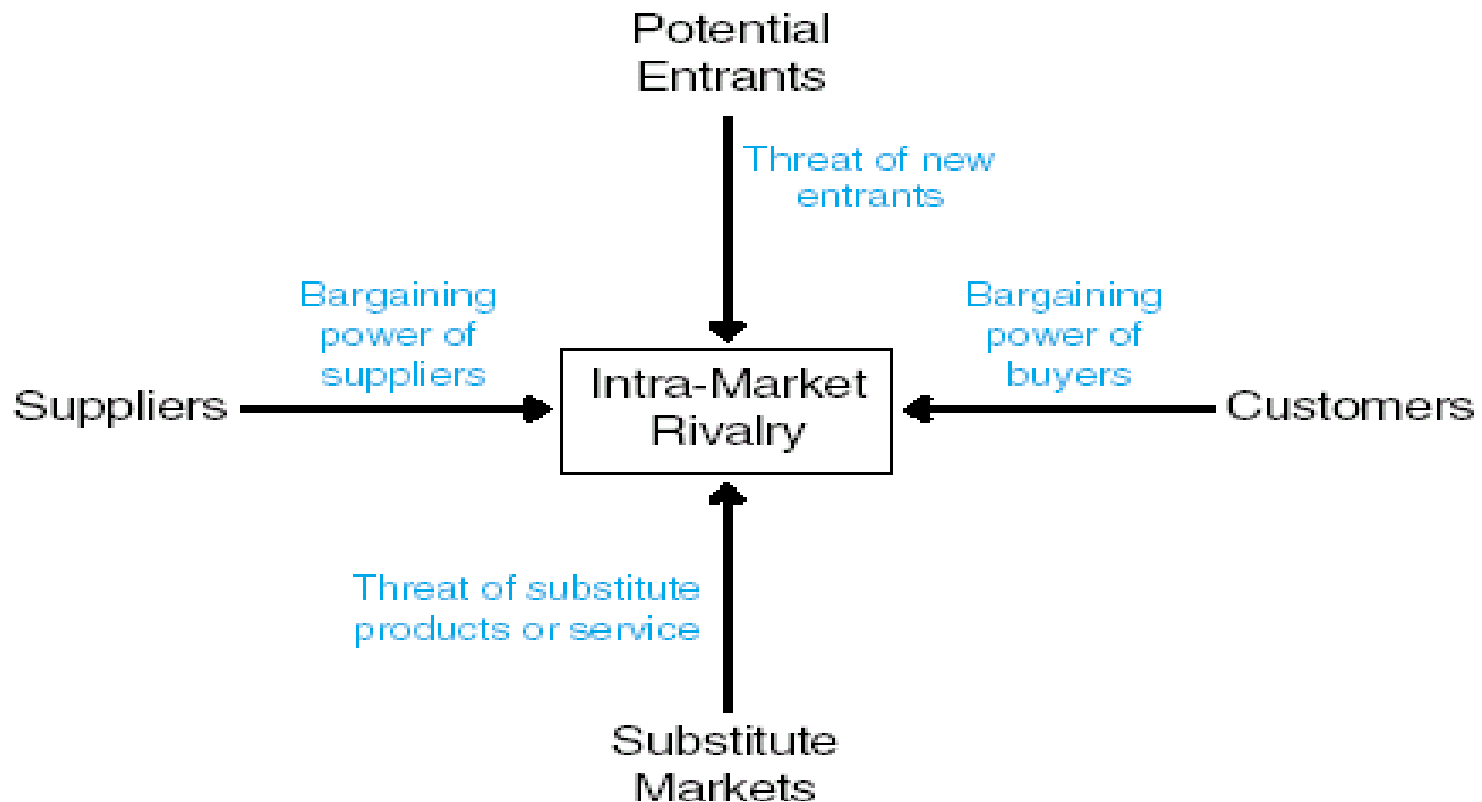
- Economics professor from the Harvard Business School.
- “Five Forces” model illustrates the factors that affect the profitability of a firm.



# Strategy

## Ideas of Michael Porter

### The Porter Competitive Framework

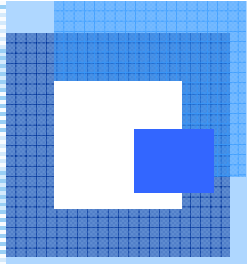




# Strategy and Game Theory

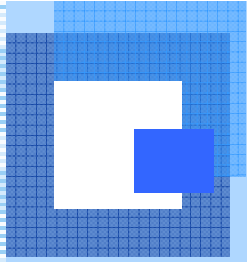
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- Examine the use of game theory applied to two aspects of strategy
  - Commitment
  - Incentives



# Strategy and Game Theory

- Commitment
  - Firms may earn higher payoffs if they are able to commit to play a particular strategy.
  - In order for commitment to be effective it must be credible.
  - Credibility can be accomplished in a variety of ways:
    - Burn bridges behind you
    - Establish and use a reputation
    - Write contracts



# Strategy and Game Theory

- Incentives
  - Methods used to change the payoff matrix of the game.
  - Examples
    - Incentives for customers to remain loyal to a particular firm
      - Frequent Flyer programs
    - Incentives for customers to reveal information
      - Insurance Menu Plans