

MANAGERIAL ECONOMICS

Economic Tools for Today's Decision Makers

SEVENTH EDITION



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Chapter 11

Game Theory and Asymmetric Information

Outline

- Game theory
 - Game theory and management decisions
 - Strategy and game theory
- Asymmetric information
 - Reputation
 - Standardization
 - Market signaling

Learning Objectives

- Define game theory and explain how it helps better understand mutually interdependent management decisions
- Explain the game called Prisoners' Dilemma and its application to business
- Explain the difference between cooperative and non-cooperative games
- Show how bargaining tactics and focal points affect business decisions

Learning Objectives

- Explain 'asymmetric information' and its affect on markets
- Describe the concepts of 'adverse selection' and 'moral hazard'
- Explain how 'market signaling' can help agents make better economic decisions when asymmetric information exists

Game Theory

Economic optimization has two shortcomings when applied to actual business situations

- assumes factors such as reaction of competitors or tastes and preferences of consumers remain constant
- managers sometimes make decisions when other parties have more information about market conditions

Game Theory

Game theory is used by economists to examine strategic interaction of markets, and is especially useful in analyzing oligopoly markets.

- A **game** involves players making strategic decisions
- **Players** are the decision-making units
- A **strategy** is an option available to a player
- **Payoffs** are the outcomes

Game Theory

- Fundamental aspects of game theory
 - players are interdependent
 - uncertainty: other players' actions are not entirely predictable
- Types of games
 - zero-sum or non-zero-sum
 - cooperative or non-cooperative
 - two-person or n-person

Game Theory

- A **payoff matrix** is a table that describes the outcome for each player and for each set of strategic choices.
- A **dominant strategy (DS)** is a strategy that produces the optimal outcome *regardless* of what the other players do.
- A **dominant strategy equilibrium (DSE)** occurs if each player in a game chooses its dominant strategy.
- A **Nash equilibrium** occurs if every player's strategy is optimal given its competitors' strategies.

Games in Economics

Example: The nightclub game

Profit Payoffs		Gray's Choices	
		DJ	Live Band
White's Choices	DJ	500	100
	Live Band	800	400

Decision: Live band or DJ?

Games in Economics

Prisoners' Dilemma

- two-person, non-zero-sum, non-cooperative
- always has a dominant strategy
- equilibrium is stable
- confessing is the dominant strategy for each player, no matter what other player chooses
- each player has no incentive to unilaterally change his 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

Games in Economics

- **Repeated Game:** game is played repeatedly over a period of time
- In a perpetual repeated game, equilibria that are not stable may become stable due to the threat of retaliation.
- However, if number of periods is fixed, players will have incentive to 'cheat' in the last period due to lack of threat of retaliation, which will then allow them to cheat in all periods.

Games in Economics

- **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

Bargaining

- A **cooperative game** is a game in which the players can negotiate explicit binding contracts.
- A **zero sum game** is a game where the sum of payouts is constant.
- A **variable sum game** is a game where the sum of payouts for each set of strategies varies.

Bargaining

Game Tactics

- **A non-cooperative game** is a game in which formal negotiation and entering into a legally binding contract is not possible.
- **Tacit bargaining** is bargaining that is not openly expressed but is implied by actions.
- **Focal points** are points chosen due to their prominence (i.e. make the “obvious” choice-the one that is favorable to you).

Bargaining

More Game Tactics

- A **threat** is undertaking an action that harms yourself if your rival does something you do not want your rival to do. You make yourself worse off
- A **promise** is a commitment to a second party in a bargain

Bargaining

Another Game Tactic

- The use of **limited war**
 - The feature of war that makes it limited is that the bounds are qualitative, not quantitative, in nature.
 - Example in oligopoly behavior--should the firm restrict competition to non-price dimensions and avoid price competition?

Bargaining

- General Framework of Game Play
 - P.A.R.T.S.
 - Players
 - Added value
 - Rules
 - Tactics
 - Scope

Asymmetric Information

Asymmetric information: market situation in which one party in a transaction has more information than the other party. Leads to many problems in markets:

- too much or too little production
- difficult contracting
- possible fraud
- market may disappear

Asymmetric Information

Problems with Asymmetric Information

- 1. Adverse selection:** prior to transaction, one party may know more about the value of a good than the other
 - Possible ways to reduce adverse selection: imposition of a government edict requiring all to purchase insurance, or screening by insurance companies.

Asymmetric Information

- 2. Moral hazard:** transaction changes the incentives of a party because it cannot be monitored after the transaction.
- 3. Principal-agent problem:** occurs when the principal (usually the owner of the firm) cannot monitor the actions of the agent.
 - The principal-agent problem can be reduced by the appropriate choice of a managerial compensation package

Asymmetric Information

Market responses:

- obtaining information from third parties
- relying on reputation of the seller
- standardization of products
- market signaling: demonstrated success in one activity provides information about success/quality in another

Asymmetric Information

- Example – Adverse selection
 - ‘lemons’ (bad used cars): seller knows the vehicle well, but buyer does not

Asymmetric Information

- Example: education as a signal
 - attending college demonstrates certain traits
 - employers see this as a screening device

Asymmetric Information

- Example: warranties
 - more costly on low quality goods than high quality goods
 - consumers see them as a screening device

Summary

- Oligopolistic interaction can be modeled using game theory.
- The outcome, or payout, depends not only on an individual player's strategy but also on strategy of the rival player.
- Bargaining is negotiating over the terms of an agreement.
- Bargaining can be explicit and enforceable, or it can be tacit and formally unenforceable.

Summary

- An informational asymmetry exists when one side knows more than the other in a transaction.
- Education acts as a separating (or signaling) device in hiring workers.
- Adverse selection and moral hazard arise due to information asymmetries.
- The principal-agent problem occurs when the principal cannot monitor the actions of the agent.