CHAPTER 2 OUTLINE

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“Game-Theoretic Applications in Supply Chain Analysis.”

Section 1. Introduction to Game Theory

a) Game Theory and Management Science
   • Use of Game Theory in Management Science research
b) Purpose of this chapter
   • Types of games currently used in Supply Chain analysis
   • Differences between this chapter and other Game Theory surveys
c) Game setup
   • Definitions (pure strategies, Normal form, Pareto optimality, etc)

Section 2. Non-cooperative static games

a) Nash equilibrium concept
   • Best reply mappings
   • Motivation and definition of Nash equilibrium concept
   • Criticism and refinements
b) Existence of equilibrium
   • Examples of non-existence
   • Nash theorem (also for symmetric games)
   • Fixed point theorems (Brouwer, Kakutani)
c) Uniqueness of equilibrium
   • Contraction mappings
   • Univalent mappings
   • Other methods and examples in the literature
d) Comparative statics, parametric continuity and monotonicity
   • Difficulties with comparative statics in games
   • Implicit function theorem method
   • Monotonic structures in supermodular games
   • Examples in the literature.

Section 3. Supermodular games

• Definitions
• Characterizations of supermodular games
• Examples in the literature

Section 4. Cooperative static games

a) Concept of the core
b) Shapley value
c) Examples of cooperative games in Supply Chain analysis
Section 5. Dynamic games

a) Subgame perfection
b) Stackelberg equilibrium concept
c) Multi-period games
   • Stochastic dynamic games
   • Myopic solutions
d) Differential games and optimal control theory
e) Examples in the literature

Section 6. Other games and potential applications of Game Theory

a) Games of incomplete and asymmetric information
b) Bargaining and auctions
c) Bayesian games and learning
d) Opportunities for other application of Game Theory