

2.1: Game Theory Tools for Understanding Mutual Interaction

Game theory is the study of how interdependent decision makers make choices. What game theory offers IO: A “lens” through which to interpret and analyze oligopolistic behavior. When describing a game:

- Rules of play must be explicit
- Various “solution concepts” used to “solve” a game.
- Matrix (Normal) form is one way to describe it
- Decision Tree (Extensive) form is another

Matrix form is useful for “solving” simultaneous decision games. Key concepts:

- Strategy sets
- Payoffs
- Information structure

Extensive form is useful for “solving sequential play games. Key concepts:

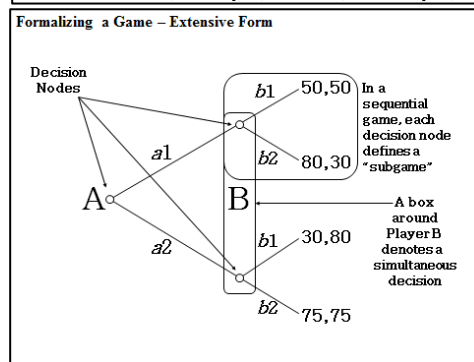
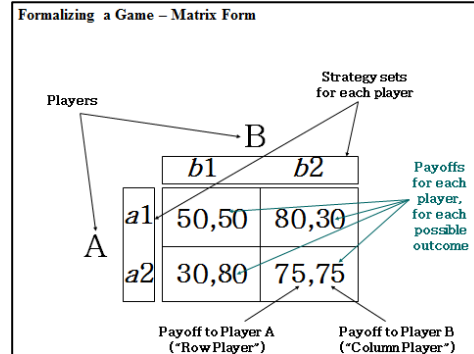
- Decision nodes
- Subgames
- Backward induction

Solution concepts:

- Dominance reasoning
 - Secure strategies (“maxi-min”)
 - Nash equilibrium
- Focal point equilibrium

Focal point equilibria: Do they occur in real life?

The “prisoners’ dilemma”: Is it useful for analyzing competitive situations?



- Solution Concepts**
- Dominant Strategy**
Is a given strategy “best” for a player no matter what the other player does?
 - Secure Strategy**
What’s the worst that could happen?
 - Nash Equilibrium**
Reciprocal best responses ...
 - Focal Point Equilibrium**
Is our objective function too simplistic?

- Sample Games / Concepts**
- For each game, identify all Nash equilibria (NE), if any exist.
 - If any of the games have multiple NE, does Schelling “focal point equilibrium” concept seem to apply to any of the games?
 - Do any of the games fit the description of a classic prisoners’ dilemma?
- | | | | | | | | | | |
|---|-----|------|------|----|-------|-------|----|-------|-------|
| | (1) | | (2) | | (3) | | | | |
| | B | | B | | B | | | | |
| | b1 | b2 | b1 | b2 | b1 | b2 | | | |
| A | a1 | 7,4 | 9,3 | a1 | 42,28 | 70,30 | a1 | 10,40 | 22,20 |
| | a2 | 6,11 | 8,10 | a2 | 30,70 | 18,12 | a2 | 8,24 | 28,28 |

Relevant exercises: Problem Set 2, exercise 1.