

EE481: Industrial Economics

Game Theory (Dynamic Game)

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Dynamic vs. Static

- Static Game = One-shot game. No player can observe the others' decisions.
- Dynamic Game = ...
 - Repeated Game
 -
 -
 - Sequential Game

Finitely Repeated Games

- Actions are taken and payoffs are received over and over again.
- Increase a possibility to enforce an agreement (firms compete in more than 1 period).

Example: Price-fixing Game

		Firm 2	
		Cooperate	Defect
Firm 1	Cooperate		
	Defect		

Payoff (Firm 1, Firm 2)

- Suppose this game is played repeatedly for 20 periods.
- What now would be each player's strategy?

Finitely Repeated Games

- Finite number of repetitions
 - ...
- Suppose firm1 and firm2 successfully cooperate until period 19, what would happen in period 20 (last period)?
 - ...
- If both would defect in the last period, what benefit there would be to cooperate in the next-to-last period?
 - ...
- Use the same rational back to the first period.
 - ...
 - Cooperate would never be chosen!

Infinitely Repeated Games ($T = \infty$)

- In the real world, we see that firms sometimes cooperate, sometimes defect.
 - Needs to find a better model to explain the situation.
- Infinitely repeated game
 - ...
- Infinitely repeated game allows us to predict that firms would cooperate.

Infinitely Repeated Games (Strategies)

Grim Strategy

- ① Start by choosing “cooperate”.
- ② ..

Tit-for-Tat

- ① Start by choosing “cooperate”.
- ② ..

Infinitely Repeated Games (In Practice)

Grim Strategy and Tit-for-Tat in Practice

- Could work in practice, although firms don't compete infinitely (there is an end at some point)
- This is because
 - 1 There is uncertainty about when the game would end
 - 2 _____. So, would not be able to work out that if they compete for a finite number of periods, it is rational to just cheat from the first period.
- But if there are too many firms, Grim Strategy and Tit-for-Tat would be _____ to enforce.

Infinitely Repeated Games (In Practice)

When do firms defect??

- Rotemberg and Saloner (1986) - during boom.
- Green and Porter (1984) - during recession.

Sequential Games

- Sequential games =

The **extensive form** representation of a sequential game identifies:

- 1 Identity of each player
- 2 ..
- 3 Choices and actions available to each player
- 4 Information (history of the game)
- 5 Payoffs (all possible outcomes)

A Simple Sequential Game

Non-Credible Threats (Empty Threats)

- A non-credible threat is a threat that would never happen if the firm is rational.

Describing NE

- In a sequential game, NE is not strong enough to rule out unreasonable equilibria.
- Let's write down all the NE in this game.

Backward Induction and SPNE

- We can use “backward induction” to find only reasonable equilibrium (equilibria) of the game.
- The equilibrium found would be called a Subgame Perfect Nash Equilibrium (SPNE). For SPNE, the solution to every subgame is a Nash Equilibrium.

Describing SPNE

Entry Deterrence Example

Reference and Further Reading I



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