

ECON 5103 Unit 10 Video 2

Game Theory, Part II

Types of Games

Players and risk

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Types of Games:

Cooperative and Non-Cooperative:

Cooperative (also called collusive): Players are allowed to jointly make choices.

Example: Cartel

Non-Cooperative: Players are not allowed to jointly make choices

Example: Price fixing is illegal in the U.S. in most cases

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Repeating and Non-Repeating

Repeating: A player must make the same type of choice more than once.

Example: Each week, Biff's Dry Cleaner must decide whether to pay to put coupons in the SuperSaver mailer.

Non-Repeating: A player makes a type of choice only one time.

Example: Biff's Dry Cleaner must decide whether to support or oppose the construction of medians along the road on which it is located.

Sequential and Non-Sequential

Sequential: A player must make a set of choices in a specified order in relation to choices made by another player

Example: Chess is a sequential game. So is Tic-Tac-Toe.

Non-Sequential: A player makes a choice simultaneously with another player.

Example: A sealed bidding process is non-sequential.

Example: Bobby Fischer plays a 7-game chess match with Boris Spassky.

This event is a non-cooperative, repeating, sequential game.

To retain a semblance of simplicity, most examples of games that we will use will be this type:

Non-repeating and non-sequential

Sometimes we will assume that cooperation is legal, and sometimes we will assume that cooperation is illegal.

Players and **risk**. Three possible attitudes that a player can have regarding risk.

1. Risk averse
2. Risk loving
3. Risk neutral

Let us look at these attitudes regarding risk assuming that the firm owner is the player.

1. Risk averse

The player avoids choices that are risky.

The most extreme case of risk averse is a "**maximin**" player--a player who always chooses the option that has the least amount of downside risk. (Choosing the option whose worst possible outcome is the least bad.)

Maximin example. A firm owner must choose one of these options

Option 1: Has a 1% probability of a \$100 profit and a 99% probability of a \$1000 profit.

Option 2: Has a 40% probability of a \$200 profit and a 60% probability of a \$300 profit

The extremely risk averse owner--the maximin owner--will avoid option 1 because its worst case scenario, \$100 profit, is lower than the worst case scenario of option 2, \$200 profit. The maximin owner chooses option 2.

1. Risk loving

The player is attracted to choices that are risky.

The most extreme case of risk averse is a "**maximax**" player--a player who always chooses the option that has the highest possible benefit.

Maximax example. A firm owner must choose one of these options

Option 1: Has a 99% probability of a \$100 profit and a 1% probability of a \$1000 profit.

Option 2: Has a 40% probability of a \$200 profit and a 60% probability of a \$300 profit

The extremely risk loving owner--the **maximax** owner--will choose option 1 because its best case scenario, \$1000 profit, is higher than the best case scenario of option 2, \$300 profit. The maximax owner chooses option 1.

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1. Risk neutral

The player does not care about the risk of a choice--only about the average gain ('expected gain') from the choice.

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Risk neutral example. A firm owner must choose one of these options

Option 1: Has a 99% probability of a \$100 profit and a 1% probability of a \$1000 profit.

$$[\text{Average profit} = .99(\$100) + .01(\$1000) = \$109]$$

Option 2: Has a 40% probability of a \$200 profit and a 60% probability of a \$300 profit

$$[\text{Average profit} = .40(\$200) + .60(\$300) = \$260]$$

The risk neutral owner--the will choose option 2 because its average profit, \$260, is higher than the average profit of option 1, \$109