

Extensive Form Games

Econ 702 Game Theory Recitation 4

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1 Extensive Games with Perfect Information

1.1 Definition

- A set of players N
- A set of **terminal histories**
- A **player function** P
- Preferences over the set of terminal histories

1.2 Nash equilibrium

- Action: $A(h) = \{a : (h, a) \text{ is a history}\}$
- Strategy (the plan of action): for each h such that $P(h) = i$, s_i assigns an action in $A(h)$, i.e., $s_i(h) \in A(h)$.
- **Outcome** induced by strategy profile $O(s)$
- **Nash equilibrium**: The strategy profile s^* in an extensive game with perfect information is a NE if

$$u_i(O(s^*)) \geq u_i(O(r_i, s_i^*))$$

for every strategy r_i of player i .

- Strategic form of an extensive game

1.3 Subgame Perfect Equilibrium

- Subgame $\Gamma(h)$ of the game Γ following the history h .
- $O_h(s)$: the terminal history consisting of h followed by the outcome generated in the subgame following h by the strategy profile induced by s in the subgame.
- **Subgame perfect equilibrium**
- How to find the subgame perfect equilibrium: **backwards induction**

2 Examples

See Chapter 6 in Osborne, 2003.

- Ultimatum Game
- Holdup Game
- Stackelberg's Duopoly Model
- Vote Buying
- Game of Chessc (see chapter 1 in Maschler, Zamir, and Solan, 2013)

3 References

- Maschler, M., Zamir, S., & Solan, E. (2013). *Game theory*. Cambridge University Press.
- Osborne, M. J. (2003, August 7). *An Introduction to Game Theory* (1 edition). New York: Oxford University Press.