Strategic Games (II) and Mixed Strategies

Econ 702 Game Theory Recitations 3

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1 Strategic Games II

1.1 Solution Concepts

- Dominance
  - **Def** a_i'' strictly (weakly) dominates a_i' if
  - **Def** A strategy is strictly (weakly) dominant (dominated) if
  - Relationship with Nash equlibrium
  - Iterated Elimination of Dominated Strategies
- Maxmin
  - zero-sum game:
    - preference: $s \preceq_1 s' \Leftrightarrow s' \preceq_2 s$
    - utility: $\exists u, u_1 = u, u_2 = -u$.
  - the maxmin and minmax:
    - **Def**: $\underline{v} = max_{s_1 \in S_1} \min_{s_2 \in S_2} u(s_1, s_2)$, $\overline{v} =$
    - $\underline{v} \leq \overline{v}$
  - value of the game:
  - relation with NE

1.2 Applications

- Cournot Model
- Bertrand Game
- Median Voter Theorem
- Auctions: the rules determines (1) who wins (2) at what price
  - Second Price:
    - biddiing your value is a weakly dominant strategy.
    - all bidders to bid their value is a NE. (but not the only NE: see Theorem 8)
  - First price
    - bidding more than or exactly your value is weakly dominanted

    - the NE: $v_1 \geq b_1 = \max\{b_i : i \neq 1\} \geq v_2$
  - First Price vs Second Price
    - all NE in first price is efficient
    - only the weakly dominant equalibrium in the second price is efficient.
    - there is a NE in first price produce the same outcome as the weakly dominant equilibirum in the second price.

2 Mixed Strategies

- mixed stratgy: a probability distribution over the player's actions.
- redefine other concepts with mixed strategies:
  - vNM preference
  - best response
  - NE
  - dominance
  - zero-sum game
- **Method for finding Mixed strategy NE**

	B	S
B	2,1	0,0
S	0,0	1,2

- The Nash Theorem: Every strategic game with vNM preferences in which each player has finitely many actions has a Mixed strategy Nash equilibrium.
- Application: Expert Diagnosis