Module 2: "Static games of complete information"

Lecture 14: "Revision of Static Games with complete information"

The Lecture Contains:

- Normal Form Game(NFG) & Extensive Form Game(EFG)
- Static Games in EFG Representation
- Dynamic Games in NFG representation
- How to solve a game?
- How to find NE for a game with infinite action set
- Economic Applications of static Games
- Mixed Strategies Revision

Previous Next

Normal Form Game(NFG) & Extensive Form Game(EFG)

- Game can be represented in 2 main ways
  - NFG [use of payoff matrix]
  - EFG [use of game tree]
- NFG usually represents static / simultaneous move games
- EFG usually represents dynamic / sequential move games
- However a static game can also be represented in EFG representation and a dynamic game can also be represented in NFG representation

Previous Next

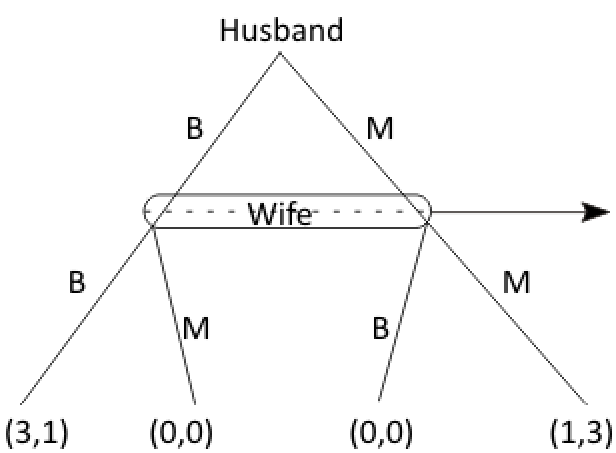
Static Games in EFG Representation

Example:

Battle of Sexes Game

		H	
		B	M
W	B	(3,1)	(0,0)
	M	(0,0)	(1,3)

EFG representation



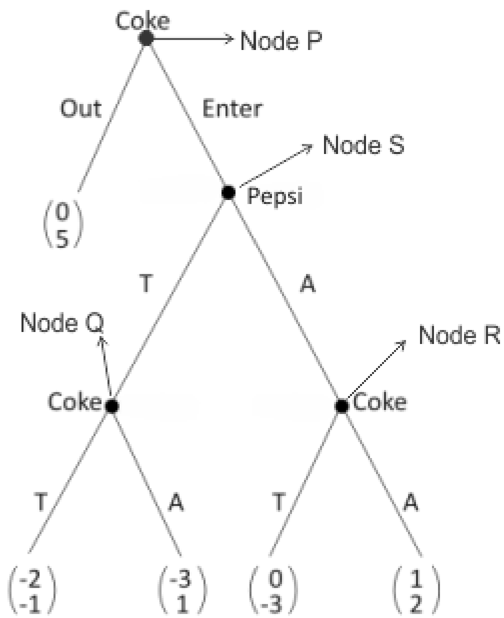
Note: Wife has an information set as game is played simultaneously

- i.e. wife does not know whether husband has played B or M

Previous Next

Dynamic Games in NFG representation -Example

- Distinction between action and strategy
  - They are not the same in dynamic game
- Strategy is a complete plan of action
  - Completely describes the action that will be taken in every contingent situation



Pepsi - 2 actions as well as strategies (has only 1 contingent situation at Node S)
-Accommodate(A) & tough(T)
Coke-eight strategies
-ETT, ETA, EAT, EAA, OTT, OTA, OAT, OAA

XYZ

X- refers to what coke does at node P
Y- refers to what coke does at node Q
Z- refers to what coke does at node R

	T	A
ETT	-2,-1	0,-3
ETA	-2,-1	1,2
EAT	-3,1	0,-3
EAA	-3,1	1,2
OTT	0,5	0,5
OTA	0,5	0,5
OAT	0,5	0,5
OAA	0,5	0,5

NFG representation of Pepsi-Coke Game

Previous Next

How to solve a game?

- IEDS
  - Basis: Extended notion of rationality
  - Drawbacks: Cannot predict anything if none of the players has any dominated strategies to start with.
- NE
  - A broader concept & greater predictability
  - None of the player would have any unilateral incentive to deviate at NE
  - Everybody is playing his/her best response against the rivals

Previous Next

How to find NE for a game with infinite action set

- **Example revisited**
- Players 1 and 2 are simultaneously bargaining over Re 1
- Each proposing an offer s_i $[0 \leq s_i \leq 1 \; i = 1{,}2]$
- if $s_1 + s_2 > 0,$ each gets zero

  if $s_1 + s_2 \leq 1,$ player 1 gets s_1

  player 2 gets s_2
- What is the pure strategy NE?
- Use of BRF
- $R^1(s_2) = 1 - s_2$ if $0 \leq s_2 < 1$

  $[0{,}1]$ $s_2 = 1$ [Indifferent as it gets zero payoff in all cases]

  Similarly,

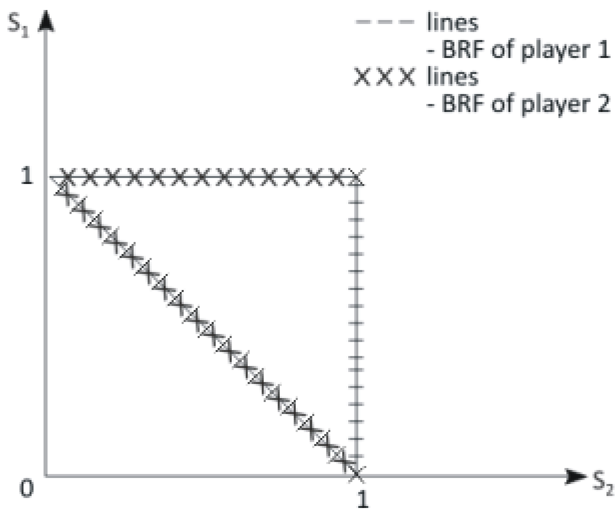
  $R^2(s_1) = 1 - s_1$ $0 \leq s_1 < 1$

  $[0{,}1]$ $s_1 = 1$

Previous Next

How to find NE for a game with infinite action set [contd.]

- Sketch the BRFs



- Nash Equilibria
  - all on the downward sloping line
    - rupee is divided
  - (1, 1)
    - rupee is not divided; nobody gets anything

Previous Next

Module 2: "Static games of complete information"

Lecture 14: "Revision of Static Games with complete information"

Economic Applications of static Games

- Cournot Model of Quantity Competition
  - Use of best response functions to find NE.
- Cartel
  - Not sustainable in short run
- Bertrand Model of Price Competition
  - Bertrand Paradox

Mixed Strategies Revision

Battle of Sexes Example

		W: B	W: M
H	B	2,1	0,0
	M	0,0	1,2

- Let (q, 1-q)- mixed strategy of W

  (p, 1-p)- mixed strategy of H
  Given the strategy (q, 1-q) of W :-
  H's expected payoff from playing B

  = q.2 + 0(1-q) =2q

  H's expected payoff from playing M= 1-q

- BRF of H:

  $p^H(q) = 1 \text{ if } q > \frac{1}{3}$

  $0 \text{ if } q < \frac{1}{3}$

  $[0,1] \text{ if } q = \frac{1}{3}$

  Similarly

- BRF of W:

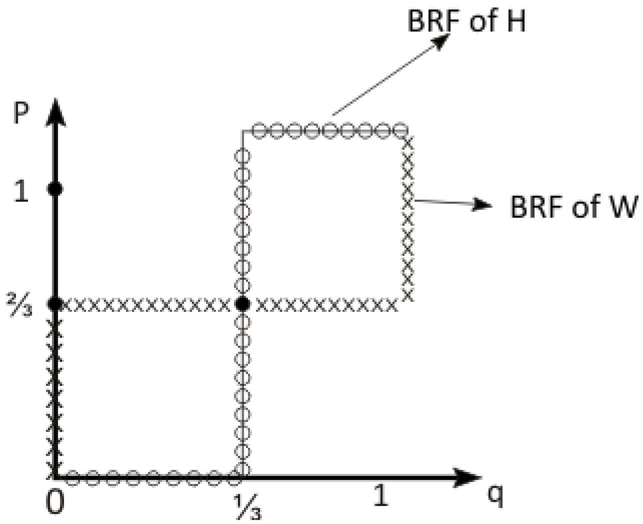
  $q^W(p) = 1 \text{ if } p > \frac{2}{3}$

  $0 \text{ if } p < \frac{2}{3}$

  $[0,1] \text{ if } p = \frac{2}{3}$

Previous Next

Mixed strategies: Revision [Contd .]



- Three Nash Equilibria
- At

$$\left.\begin{array}{l} q = 0, p = 0 \\ q = 1, p = 1 \end{array}\right\} \text{Two pure strategy Nash Equilibria}$$

$$\left. q = \frac{1}{3}, p = \frac{2}{3} \right\} \text{One mixed strategy Nash Equilibria}$$

Previous Next