Economic Analysis of Technological Processes

Lecture 6

Game Theory (28)- Game Applications (29)- Information Technology (35)- Asymmetric Information (37)

Lecture 6: Game theory

general analysis of strategic interaction

parlour games, political negotiation, and economic beaviour

The Payoff Matrix of a Game

two-person games & finite number of strategies

dominant strategy

independent

A payoff matrix of a game.

		Player B	
		Left	Right
Player A	Top	1, 2	0, 1
	Bottom	2, 1	1, 0

Lecture 6: Game theory

Nash Equilibrium-dependent

generalization of the Cournot equilibrium

2 equilibria

A Nash equilibrium.

		Player B	
		Left	Right
Player A	Top	2, 1	0, 0
	Bottom	0, 0	1, 2

Lecture 6: Game theory

pure strategy

no Nash equilibrium

mixed strategy-random choices

Nash equilibrium in mixed strategies always exists

		Player B	
		Left	Right
Player A	Top	0, 0	0, –1
	Bottom	1, 0	–1, 3

Lecture 6: Game theory

The Prisoner's Dilemma

Nash equilibrium does not necessarily lead to Pareto efficient outcomes

Confess or deny

(deny, deny) is Pareto efficient- but no way to coordinate

Cartel

		Player B: Confess	Player B: Deny
Player A	Confess	–3, –3	0, –6
	Deny	–6, 0	–1, –1

Lecture 6: Game theory

one–shot game or to be repeated

Repeated

to establish a reputation for cooperation

fixed number of times
each player will defect on every round

or an *indefinite*

tit-for-tat

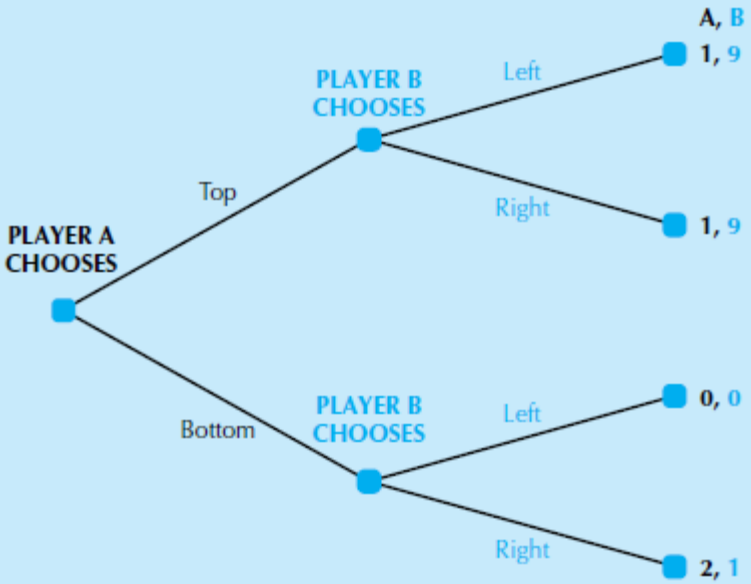
Lecture 6: Game theory

two Nash equilibria: (top, left) and (bottom, right)

extensive form

threat is credible?

		Player B	
		Left	Right
Player A	Top	1, 9	1, 9
	Bottom	0, 0	2, 1



Lecture 6: Game applications

cooperation, competition, coexistence, and commitment

Best response curves

$$c^* = b_c(r^*)$$
$$r^* = b_r(c^*)$$

The Cournot equilibrium

each firm is choosing its profit-maximizing output, given the choice of the other firm

		Column	
		Left	Right
Row	Top	2, 1	0, 0
	Bottom	0, 0	1, 2

Lecture 6: Game applications

Mixed Strategies

Combination	Probability	Payoff to Row
Top, Left	rc	2
Bottom, Left	$(1-r)c$	0
Top, Right	$r(1-c)$	0
Bottom, Right	$(1-r)(1-c)$	1

Games of Coordination

battle of the sexes: movies

focal point

Prisoner's Dilemma

no easy way: contracts

Assurance Games: to move first, by opening itself to inspection

		U.S.S.R.	
		Refrain	Build
U.S.	Refrain	4, 4	1, 3
	Build	3, 1	2, 2

Lecture 5: Monopoly behaviour

some degree of monopoly power

more complicated pricing and marketing strategies

Price Discrimination

sell different units of output at different prices

First-degree: different prices from person to person

= perfect price discrimination

Second-degree : prices differ across the units of the good, but not across people= bulk discount

Third-degree: to different people for different prices e.g. Senior tickets

Lecture 6: Game applications

Chicken

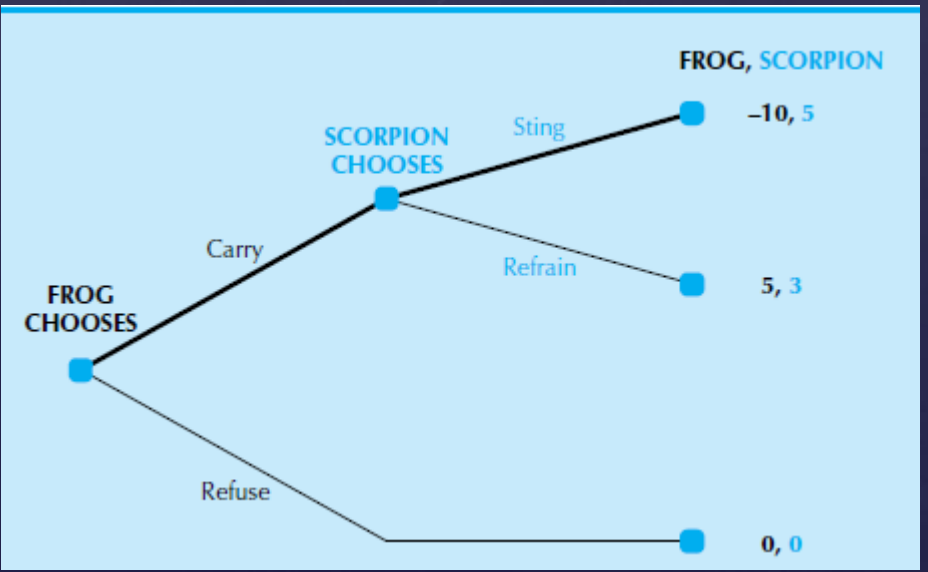
automobile game

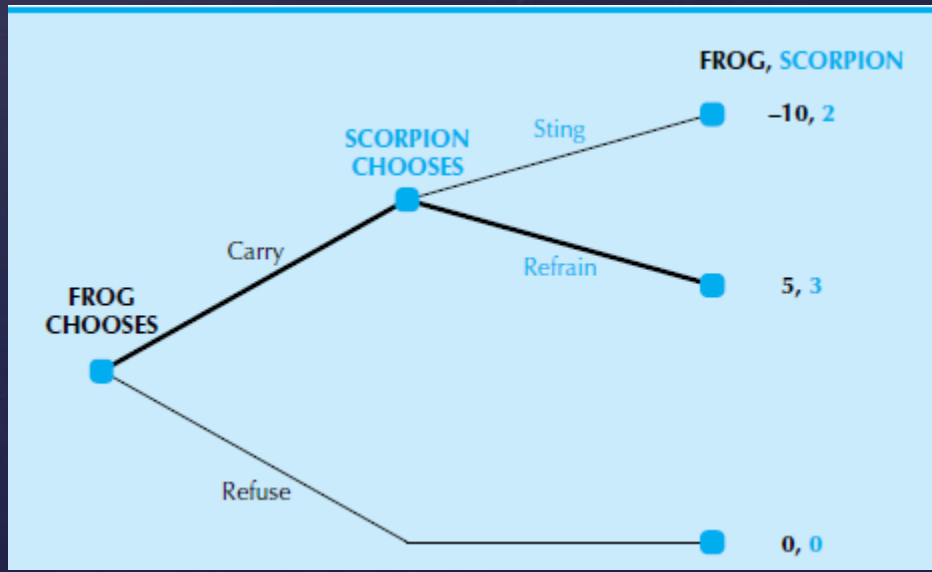
two pure strategy Nash equilibria

Games of Competition

zero-sum games

Games of Commitment: sequential moves





Lecture 6: Game applications

Savings and Social Security contracts

Bargaining

Alice and Bob, have $1 to divide between them

		Younger Generation	
		Support	Refrain
Older Generation	Save	3, –1	1, 0
	Squander	2, –1	–2, –2