Intermediate Microeconomics

Exercises: Oligopoly

Agribusiness Teaching Center

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Best Response

Assume that there are two firms, each producing with a constant $MC = 2$. *Assume that the demand function for the product is defined as follows:* $p = 100 - 0.5\,(q_1 + q_2)$.

If firm 2 sets a quantity of $q_2 = 100$, *what's the best response quantity for firm 1.*

Best Response

Assume the market demand function defined as

$$p = 100 - 0.5\,(q_1 + q_2),$$

and assume further a constant

$$MC = 0.$$

Find the best response functions.

Equilibrium

Assume two firms competing in a market and that these firms have the following reaction functions:

$$q_1 = 50 - \frac{q_2}{2}$$
$$q_2 = 50 - \frac{q_1}{2}$$

1. *For what quantity produced by firm 2 would firm 1 prefer to shut down and produce nothing?*
2. *What quantity would firm 1 produce if firm 2 never existed?*
3. *Verify that* $q_1 = 33,(3)$ *and* $q_2 = 33,(3)$ *is a Nash equilibrium.*

Cournot

Consider two oligopolists producing an identical product with identical cost functions $C = q^2$ *who face a demand curve* $p = 1 - (q_1 + q_2)$

1. *What is the Cournot equilibrium in this market?*
2. *If firm 1 can choose its output first, what will the outcome be?*
3. *Suppose the two firms choose price instead of quantity. What will the market outcome be?*

Bertrand

Suppose firms A and B operate under conditions of constant marginal and average cost but that

$MC_A = 10$ and $MC_B = 8$.

The demand for the firms' output is given by

$Q = 500 - 20P$.

a. If the firms practice Bertrand competition, what will the Nash-equilibrium market price be?
b. What will the profits be for each firm?

Stackelberg

Firms choose quantities, with firm A moving first, and then firm B.

The market demand is given by $Q = 120 - P$ and production is costless.

a. Find the best response function for firm B.
b. Find the profit maximising level of production for firm A
c. Find the equilibrium
d. How does the Stackelberg equilibrium compare to Cournot equilibrium?

Kreps-Scheinkman

Sonny and Cher compete in a market where the demand is given by $Q = 120 - P$ and production is costless.

a. Assume they compete by setting prices. What is the equilibrium?
b. Assume they decide on their capacities first before engaging into 'price war'. What is the equilibrium?
c. Assume they compete by setting prices while each of them can produce maximum of 25 units of product. What is the equilibrium?

Tacit Collusion

Cartels

Fact

In order to make extra-normal (half monopoly level) profit, the producers may collude on price.

Example

	Honour Agreement		Cheat	
Honour Agreement	£1000	£1000	£ 200	£1200
Cheat	£1200	£ 200	£ 500	£ 500

- Simultaneous game
- Sequential game

Mixed strategy

Matching pennies

		Player 2: Heads	Player 2: Tails
Player 1	Heads	1,-1	-1,1
	Tails	-1,1	1,-1

There is no (pure strategy) Nash equilibrium in this game. If we play this game, we should be "unpredictable." That is, we should randomise (or mix) between strategies so that we do not get exploited.

Ching-chang-chong

Problem 11 (Rock, scissors, paper) Find mixed strategy Nash equilibrium

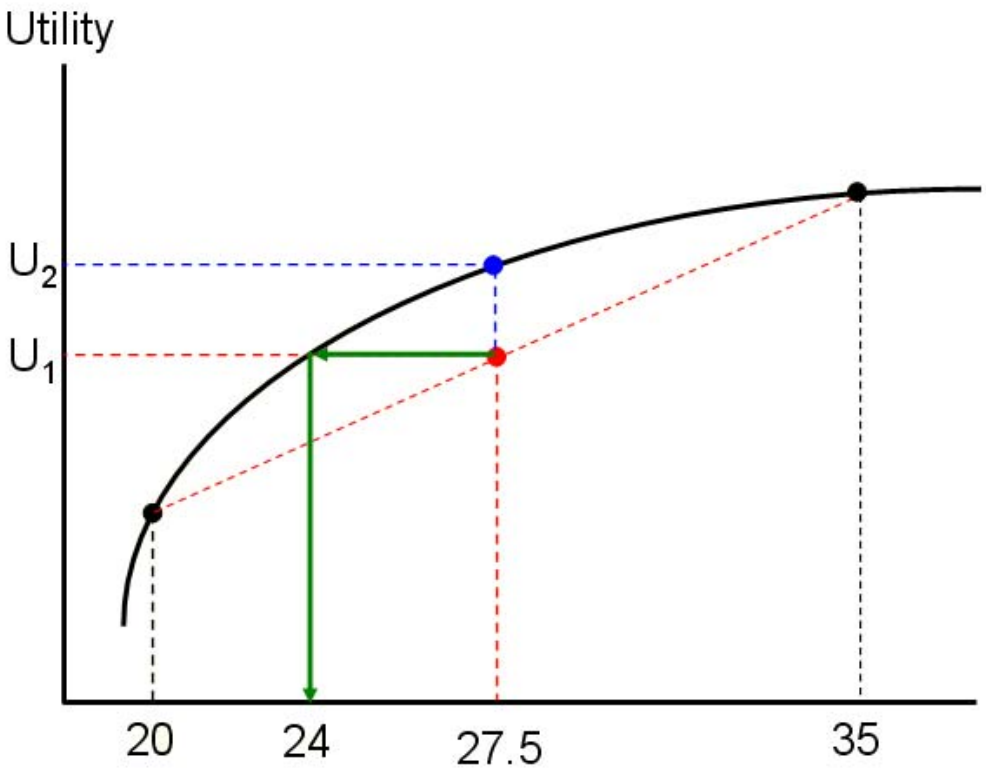
	r	s	p
R	$0, 0$	$1, -1$	$-1, 1$
S	$-1, 1$	$0, 0$	$1, -1$
P	$1, -1$	$-1, 1$	$0, 0$

Mixed Equilibrium and Dominated Strategies

		Player 2		
		l	m	r
Player 1	U	3,2	2,1	1,3
	M	2,1	1,5	0,3
	D	1,3	4,2	2,2

		Player 2	
		l	r
Player 1	U	3,2	1,3
	D	1,3	2,2

Expected Utility and Risk



This person would be willing to pay up to $11,000 to get insurance.

This gives them the same utility, U_1, that they would get without insurance