

**Industrial Organization 2<sup>nd</sup> Midterm Exam Sample**  
Spring 2019 (See also: the [presentation](#))

**Megjegyzés [bz1]:** This sample exam is more difficult than what you can expect from the real exam.

**A. Multiple choice questions**

**Instructions:** Please fill in the table! Each question in section A is worth 2 points. Choose the one alternative that **best** completes the statements or answers the question! (If there is seemingly more than one correct answer – the answer should be d.)

A/1	A/2	A/3	A/4	A/5	A/6	A/7	A/8
<b>E</b>	<b>C</b>	<b>C</b>	<b>C</b>	<b>A</b>	<b>D</b>	<b>D</b>	<b>B</b>

1. Which of the following factors/conditions is likely to facilitate collusion?

- A) Lack of a sufficient profit motive.
- B) The demand curves facing the firms are relatively elastic.
- C) The firms are unable to restrict market entry.
- D) All of the above.
- E) **None of the above.**

**Megjegyzés [bz2]:** False: Presence

**Megjegyzés [bz3]:** False: inelastic

**Megjegyzés [bz4]:** False: able

2. Which of the following would *not* constitute “predatory conduct”?

- A) The making of and implementing threats to drive existing rivals out of a market.
- B) Setting prices strategically to deter potential entrants from entering the market.
- C) **Increasing cost efficiency or promoting the firm’s product.**
- D) Capacity expansion with the sole aim of pre-empting a rival firm’s market entry.
- E) None of the above could be characterized as “predatory conduct”.

**Megjegyzés [bz5]:** Predatory pricing: predatory conduct

**Megjegyzés [bz6]:** Limit pricing: predatory conduct

**Megjegyzés [bz7]:** Capacity expansion that would not be useful unless it deters entry: predatory conduct

3. In a Stackelberg duopoly model with a linear demand curve and constant and equal marginal costs,

- A) both the leader and the follower firm produces as much as a monopolist would.
- B) nor the leader, neither the follower firm produces as much as a monopolist would.
- C) **the leader, but not the follower firm produces as much as a monopolist would.**
- D) the leader firm earns as much profit as a monopolist would.
- E) None of the above.

**Megjegyzés [bz8]:** The leader produces more (twice as much)

**Megjegyzés [bz9]:** The leader produces just as much as a monopolist would

**Megjegyzés [bz10]:** They wouldn’t, because even though they produce just as much, their margin is eroded by competition.

4. The “Chain store paradox” suggests that ...

- A) in a dynamic (repeated) game with a finite, known number of rounds, an incumbent firm can always prevent market entry in the last market.
- B) in a single period game an incumbent firm can always prevent market entry.
- C) **in a dynamic (repeated) game with a finite, known number of rounds, an incumbent firm may not be able to prevent market entry in any of the markets.**
- D) in a dynamic (repeated) game with a finite, known number of rounds, an incumbent firm can always prevent market entry in all markets.
- E) None of the above.

**Megjegyzés [bz11]:** Selten’s theorem can be invoked to solve the problem.

5. Transaction costs of reaching a “cooperative agreement” are low if ...

- A) **The number of firms is small and the industry is highly concentrated.**
- B) The number of firms is large and the industry is highly concentrated.
- C) The number of firms is large and the industry is not at all concentrated.
- D) The number of firms is large and the products are differentiated.
- E) None of the above.

**Megjegyzés [bz12]:** See lecture note 6 for all the factors

6. In an industry where firms initially compete according to the rules of the Cournot model, the “merger paradox” might be resolved if as the result of the merger ...

- A) the merged firm can become a Stackelberg leader (can credibly pre-commit to an output level).
- B) the variable costs of an inefficient firm can be significantly reduced.
- C) the fixed costs can be significantly reduced.
- D) **All of the above.**
- E) None of the above.

**Megjegyzés [bz13]:** All of these could help resolve the merger paradox.

See lecture note 7 for the details.

7. If a vertical merger eliminates the “double marginalization” problem in a supply chain where the “upstream” and the “downstream” firms were both monopolists,

- A) producer surplus will increase, but the consumer surplus would be reduced.
- B) consumer surplus will always increase, but the producer surplus is reduced.
- C) producer surplus and consumer surplus will always decrease.
- D) **producer surplus and consumer surplus can both increase.**
- E) None of the above.

**Megjegyzés [bz14]:** See lecture note 7 (vertical mergers) for the details

8. In the Bertrand model with differentiated products, if  $t$  (the transportation/utility cost)

- A) is high, price competition is very intense between firms.
- B) **falls, prices get closer to marginal cost.**
- C) falls, firms would always earn higher profits.
- D) All of the above.
- E) None of the above.

**Megjegyzés [bz15]:** False: less intense

**Megjegyzés [bz16]:** False: lower profits

**B. Each exercise in section B is worth 6 points.**

**9. A potential entrant considers entering an industry that is currently served by a monopolist.**

The demand curve is characterized by the equation  $P=2025-10Q$ , while the total cost of the incumbent is given by the equation:  $TC(q_I)=40q_I+500$ , and the total cost of the entrant by the equation  $TC(q_E)=25q_E+25000$ .

*Determine the limit price and quantity that the incumbent firm could set to pre-empt entry!  
Would preventing the entry be profitable for the incumbent in the long run?*

$$MC_E(q_E) = dTC_E/dq_E = 25 = TC_E/q_E = AVC_E(q_E);$$

$$P = 2025 - 10Q = 2025 - 10q_E - 10q_I \rightarrow MR_E(q_E) = 2025 - 10q_E - 20q_I$$

Entrant's profit maximization problem (best response function):

$$MC_E = MR_E: 25 = 2025 - 10q_E - 20q_I \rightarrow q_E = 100 - 0,5q_I$$

Incumbent's limit price problem: Make sure that  $\pi_E = 0$ , utilizing that  $q_E = 100 - 0,5q_I$

$$0 = \pi_E = TR_E - TC_E = (P - AVC_E)q_E - FC_E = (2025 - 10q_E - 10q_I - 25)q_E - 25000$$

$$q_E = 100 - 0,5q_I \rightarrow q_I = 200 - 2q_E \rightarrow (2025 - 10q_E - 10(200 - 2q_E) - 25)q_E - 25000 = 0$$

$$\text{Solving for } q_E: q_E = 50 \text{ (negative roots are irrelevant)} \rightarrow q_I = 100 \rightarrow P = 1025$$

$$\pi_I = (P - AVC_I)q_I - FC = (1025 - 40)100 - 500 = 98000$$

This profit could be compared to the normal Stackelberg result  $q_I = 98.5$ ;  $\pi_I = 48011.25$

(clearly indicating that the limit pricing strategy is **profitable**)

**Megjegyzés [bz17]:** See the presentation for the formulae

**10. Three firms that compete according to the rules of Cournot competition would like to form a cartel to increase their profits.**

The demand curve is characterized by the equation  $P=16000-2Q$ , while the total cost for all firms are given by the equation:  $TC(q)=1000q$ .

*Is it possible to sustain this cartel, if they would like to collectively earn as much profit as one monopolist and use trigger strategy to prevent deviations from the agreement, if the interest rate will be 25% and the probability of the collusion continuing for one more round is 80% in all rounds?*

$$\pi_N^1 = \frac{(A-c)^2}{(N+1)^2 B} = \frac{(16000-1000)^2}{(3+1)^2 \cdot 2} = 7031250$$

$$\pi_M^1 = \frac{(A-c)^2}{4NB} = \frac{(16000-1000)^2}{4 \cdot 3 \cdot 2} = 9375000$$

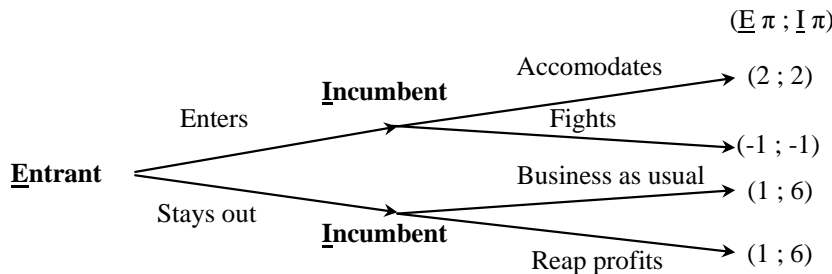
$$q^D = \frac{A-c}{2B} - \frac{(N-1)}{2} q^M \Rightarrow q^D = \frac{(N+1)(A-c)}{4NB} = \frac{(3+1)(16000-1000)}{4 \cdot 3 \cdot 2} = 2500;$$

$$Q^D = \frac{(3N-1)(A-c)}{4NB} = \frac{(3 \cdot 3 - 1)(16000 - 1000)}{4 \cdot 3 \cdot 2} = 5000$$

$$\pi^D = (A - BQ - c)q^D = (16000 - 2 \cdot 5000 - 1000) \cdot 2500 = 12500000$$

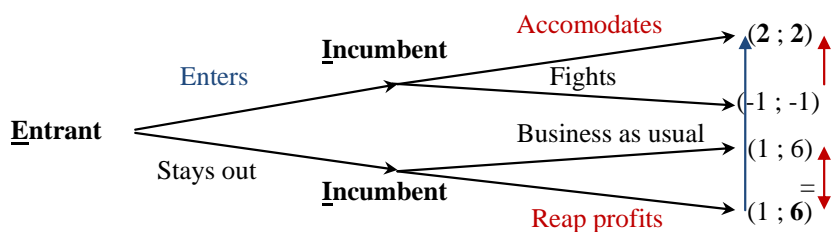
Cartel is **sustainable**, since  $\Gamma > \frac{\pi_D^1 - \pi_M^1}{\pi_D^1 - \pi_N^1} = \frac{4}{7}$ , where  $\Gamma = \rho R = \frac{\rho}{1+r} = \frac{0.8}{1.25} = 0.64$

11. There is currently one incumbent firm in a market, where a potential entrant considers entering the market.



Identify all subgame perfect Nash equilibria! Would the game have a different end result if the incumbent firm faced a similar "threat" (=a potential entrant) in 42 other markets?

The only subgame perfect Nash Equilibrium is: **Entrant = Enters; Incumbent = Accommodates**; since



The dynamic game has a unique subgame perfect Nash Equilibrium and a finite (pre-determined) number of rounds, which means that Selten's theorem can be invoked and all rounds would have the same result as the single-period game.

**Megjegyzés [bz18]:** The game could be solved backwards, from round 43.

12. Eleven out of nineteen firms in an industry with Cournot competition would like to merge into one with a view to increasing their profits.

The demand curve is characterized by the equation  $P=25000-Q$ , while the total cost for all firms in the industry are given by the equation:  $TC(q)=5000q+500000$ .

Would the merger increase the profits of the merging companies compared to the pre-merger state of affairs if we assume that their costs would be characterized by the same cost function and they would still compete with the non-merged firms according to the rules of the Cournot model?

The pre-merger profits for all firms ( $N=19$ ):

$$\pi^c = \frac{(A-c)^2}{(N+1)^2 B} - FC = \frac{(25000-5000)^2}{(19+1)^2 \cdot 1} - 500000 = 500000$$

The post-merger profits for all firms ( $N=19$ ;  $M=11$ ):

$$\pi_m = \pi_{nm} = \frac{(A-c)^2}{(N-M+2)^2 B} - FC = \frac{(25000-5000)^2}{(19-11+2)^2 \cdot 1} - 500000 = 3500000$$

The merger would **not be profitable**, since  $11 \cdot 500000 = 5500000 > 3500000$