

Problem Set 1

1. Show that a monopolist would never choose a price-quantity combination on the inelastic part of the market demand.

2.5 points

2. Can the leader ever get a lower profit in a Stackelberg equilibrium than it would get in the Cournot equilibrium? Explain!

2.5 points

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3. In 1784 the British import tariff on tea was 119% and 5 million pounds of it were imported. The accountant of the East India Company reckoned that no more than a third of the whole British consumption was imported legally, the rest being smuggled. He was apparently correct, for tea was inelastically demanded, and in 1785 after the reduction of the tariff to a mere 12.5%, the amount of legal tea imported increased to 16 million pounds.

- (a) In light of the implied elasticity of demand for *legal* tea, and using a straight-line “demand curve” (after smuggling), what was the revenue-maximizing tariff rate?

2.5 points

As reading this story and this question in a microeconomics problem set might have surprised you, let me guide you through the problem with the following questions.

- First of all, note that setting an import tariff by a state can be considered as setting a price by a monopolist. An import tariff of 119% is like a unit price collected for each unit (imported and) sold. For simplicity, let us assume that the direct costs associated with import tariffs are negligible. For that reason, the goal of this monopolist is to maximize revenue.
- Based on the information provided by the exercise above, write an equation that describes the demand for tea. You can assume that demand is linear, so all you need to do is to “connect” two points mentioned above.
- Use the demand curve to find the revenue-maximizing price.



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4. Consider an oligopolistic market with $N \geq 2$ identical firms that compete *à la Cournot*. The cost function of each firm can be written as $c(q_i) = 20q_i - 2.5q_i^2$, where q_i denotes the firm's output level.

The inverse demand function of the market is $p = 100 - 4Q$, where p is the unit price of the output and Q is the aggregate output level produced by the N firms together.

- (a) Find the typical firm's reaction function.
(Hint: It will be a function of the other firms' production level.)

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- (b) Find the equilibrium level of aggregate output, Q , as a function of the number of firms, N .

2.5 points

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5. Read the following quotes.

“A number of misunderstandings have long accompanied the static Nash equilibrium concept. Many commentators on the Cournot duopoly solution – the first and most famous example of a Nash equilibrium – criticized the supposedly myopic and rather irrational behaviour of firms. However, Cournot-Nash behaviour only appears irrational if one says that each firm chooses its best output given its rival’s output and if, at the same time, one adds to the static model a kind of dynamic adjustment process (as is too often done in intermediate microeconomic textbooks). In fact it is quite consistent with rational behaviour.”

Montet, C. (2014) “Game theory and strategic behaviour,” in: (Eds.) Bleaney, M., Greenaway, D., Stewart, I. Dr., Stewart, I., *Companion to Contemporary Economic Thought*, Routledge, 1st edition (p.348)

“Were the number of firms small, [...] any manager would be crazy to make a Cournot assumption. This fact rather spoils the prettiness of Cournotesque arguments. The manager is supposed to treat the actions of others as given. But the actions of others change.”

McCloskey, D.M. (1985) *The applied theory of price*, Macmillan Publishing Company (p.428)

“The Cournot solution, then is irrational. A Cournot duopolist can always do better by not acting like one, and by taking advantage of the simplemindedness of his competitor who goes on acting like one. But his competitor, too, is no fool. He too will recognize that his competitor does *not* keep selling the same quantity regardless of the quantity sold by his competitor.”

McCloskey, D.M. (1985) *The applied theory of price*, Macmillan Publishing Company (p.433)



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Now construct a simple numerical (!) example based on a linear (!) demand function and two (!) firms with identical, constant (!) marginal costs.

- (a) Use your model to illustrate that a Cournot duopolist can do “better” by producing the monopoly output, assuming that its competitor reacts and adjusts its output optimally.

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(b) How does this outcome compare to the one predicted by the Stackelberg model?

2.5 points