Principles of Economics I
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Problem Set 5 (Due October 22, 2021)

1. Governments use various instruments to influence the market outcomes. This question asks you to consider some of these.

   (a) In order to help the producers, a minimum price may be set for the market. Can a minimum price above the competitive equilibrium price increase total producers' surplus in the market? Does it always increase producers' surplus?

   (b) A price cap or a price ceiling (or a maximum price) is often meant to help the consumers in a competitive market. Does a price cap below market price always help the buyers? How are you evaluating the buyers' welfare?

   (c) Suppose that in the absence of international trade, the domestic competitive equilibrium price for a good is EUR 60 per unit. The good is also available in the world market at price EUR 40 with a perfectly elastic (horizontal) supply curve. Draw the diagram for changes in domestic consumer and producer surplus after allowing free trade with the world market (assume no transportation costs). How do the surpluses change if a 10 EUR per unit import tariff is set for foreign production?

   (d) Instead of imposing a tariff, an import quota can be set for products produced in foreign countries. A quota just sets an upper bound for imports of the good in question. The goods within the quota are sold in the market together with domestic products. Assume that consumers view foreign and domestic products as perfect substitutes. Which of the two methods for restricting imports would you use? (Hint: for a tariff of x EUR per unit of import, consider a quota of y units in such a way that the total quantity sold in the market is equalized. Compare the outcomes).

2. A chain of sushi bars considers entering a small town. As the only sushi bar in its market, it would have market power, i.e. to sell larger quantities, it would have to set lower prices.

(a) The demand curve for sushi portions is $P = 20 - \frac{1}{10}Q$ for $Q \leq 200$ and $P = 0$ for $Q > 200$ where P denotes number of portions sold per day. Draw the demand curve for the sushi bar in the (Q, P) co-ordinates (Q on horizontal axis). How many portions of sushi can be sold at $P = 13$?

(b) The ingredients for a single sushi portion cost EUR 10 and it costs EUR 150 per day to hire a sushi chef. The chef can prepare up to 100 portions per day. Draw the marginal cost curve, and the average cost curve of the sushi bar.

(c) Draw the marginal revenue curve in the picture and determine the optimal price of portions to sell in this market.

(d) Suppose the chef offers to work for another labor contract: the price of EUR 3 per portion with no fixed daily fee. Which contract should a profit maximizing sushi chain take? Compare the optimal prices and quantities in the two cases.

3. Finland and Sweden both produce milk in a competitive market. Because of a warmer climate in Southern Sweden, production is cheaper in Sweden than in Finland and the resulting equilibrium market price of milk is 40% lower in Sweden than in Finland when trade is not allowed. Answer the following questions using appropriate diagrams.

(a) Suppose that Finland and Sweden sign a trade agreement and start trading in milk in a common market consisting of the two countries. What happens to equilibrium milk prices in the two countries? What happens to producer surplus and consumer surplus in the two countries?

(b) By popular demand, the Swedish government imposes an export tariff of 20% on all of its milk exports. What happens to milk prices in Finland and Sweden?

(c) What happens if Norway that is that has the same demand and production as Finland joins the agreement (with no tariffs between any countries). Analyze the changes in surpluses.

4. In this problem, we return to the problem of consumption and saving that we saw in Problem Set 1. There are two types of individuals: students and trust fund kids. Students work hard and earn 100 in period 2 when they are old. Unfortunately since they study in period 1, they have no income in that period. Trust fund kids get an inheritance

of 200 and they conclude that they do not have to study. As a result, they have no labor income in period 2. Denote consumptions in the two periods by c_1 and c_2.

(a) Since both types of individuals like to consume on both periods, they realize that a market for borrowing and loans might be a good idea. Suppose that there is a market rate for lending and borrowing at r so students can borrow c_1 for consumption when young in exchange of paying $(1+r)c_1$ back when old. We require that $(1+r)c_1 \leq c_2$ so that any amount borrowed can be paid back. Similarly the trust fund kids may save s when young to get back $(1+r)s$ when old. Draw the budget sets for the two types of individuals.

(b) Draw indifference curves to the two types of buyers that reflect the fact that the MRS between consumption in period 1, c_1 and consumption in period 2, c_2 is given by the ratio of the two consumptions: $MRS = \frac{c_2}{c_1}$. (Actually you can graph such indifference curves explicitly as $c_2(c_1) = \frac{u}{c_1}$ and the indifference curves corresponding to higher u give consumption pairs that are better than consumption pairs on indifference curves with lower u). Find the optimal savings s for the trust fund kids and optimal borrowing c_1 for the students in the graphs.

(c) Use the budget constraint and the requirement that MRS = MRT to solve algebraically the optimal savings and borrowings.

(d) Determine the effect of an increase in r on the optimal savings and borrowings graphically. Show the income and substitution effects in the graphs.

(e) (Extra credit) In any credit market, borrowing must equal lending since each transaction has these two sides. For our model, this means that the borrowing by students must equal lending by trust fund kids. Using the algebraic solutions that you found in c., determine the equilibrium rate r that makes borrowing equal to lending whet 10% of the population are trust fund kids. How does the equilibrium rate vary as we change the fraction x of trust fund kids in the model and what are the implications of this to the welfare of the two types of individuals?