

Homework 2

(I) Consider two identical firms (Firm 1 and Firm 2) that produce an homogenous product . The demand for their product is :

$$P = 200 - Q, \quad \text{where } Q = q_1 + q_2.$$

Each firm has a cost function: $C(q_i) = 20 q_i$ (i.e. the Mc_i is 20 and there are no fixed costs)

Calculate the Stackelberg equilibrium assuming that Firm 1 is the Leader and Firm 2 the Follower (i.e. calculate the SPNE assuming that Firm 1 moves first).

(II) Differentiated Products

Two firms compete by choosing price. Their demand functions are:

$$q_1 = 20 - p_1 + p_2$$

$$q_2 = 20 - p_2 + p_1,$$

where p_1 and p_2 are the prices charged by each firm, and q_1 and q_2 the resulting quantities demanded. Marginal costs are zero.

Suppose the two firms set their prices at the same time. Find the resulting Nash Equilibrium in prices. Calculate prices, quantities and profits for each firm.

(III) Consider two firms (Firm 1 and Firm 2) from two different countries (Country 1 and Country 2) that produce a homogeneous product for export to a third country.

Marginal costs are zero for both firms and the demand for their product is :

$$p = 120 - q_1 - q_2$$

Firms behave as Cournot duopolists choosing output simultaneously. Suppose that countries can give their firms an export subsidy of s_1 and s_2 dollars per unit respectively before both firms choose their output.

In other words, countries and firms are engaged in a sequential game. In stage 1, countries choose simultaneously their subsidy levels in order to maximize social welfare. In stage 2, after the subsidy choices are known, both firms choose their output level simultaneously.

Calculate the subsidy levels that countries will choose at the SPNE (you are calculating the Nash Equilibrium subsidy levels).