

# Exercise Sheet 8 (Internal Economies to Scale)

## Exercise 1

Suppose the world consists of two countries, country A and country B. Both countries can produce cars. Production costs for  $Q$  units of cars are given by  $C(Q) = 100 + Q$ . (Car firms in both countries have the same production costs). Let  $P$  be the price a car firm charges for its cars. Car firms in both countries face a demand function given by  $Q(P) = S \left[ \frac{1}{n} - 2(P - \bar{P}) \right]$ .  $S$  denotes total market size,  $\bar{P}$  denotes the average price of cars in market, and  $n$  denotes the number of car firms in the market. Market size in country A and country B respectively is given by  $Q^a = 1800$  and  $Q^b = 3200$ .

- a) Suppose the two countries live in autarky, meaning that each country constitutes a separate market for cars. Determine the number of car firms and the price of a car in each country. Here is a hint you need to proceed. You need to apply the usual conditions for a market equilibrium:
- 1) Firms set prices to maximize profits (what is the profit function? What is the first order condition for profit maximization?). Since all firms are assumed to be identical (i.e. they have the same cost function and face the same demand function), we know that all firms do exactly the same thing.
  - 2) In equilibrium, firms make zero profits. This condition pins down the number of firms in equilibrium.

Note: The prices of the cars will be "strange" numbers (for instance 1.16). For the number of firms you always should get "nice" numbers (like 3 or 4).

- b) Suppose the two countries allow for free trade in cars (meaning the two countries form one, single market for cars). Determine the number of car firms and the price of cars with trade. Do you think consumers are worse off or better off with trade, compared to the situation in autarky?