

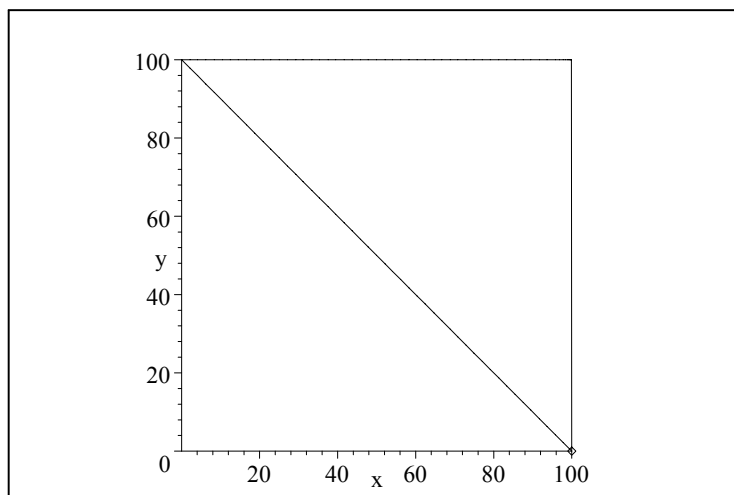
Econ 3070-004: solutions to some sample final questions

December 14, 2007

Question 3

Consider an economy with two individuals (Adam, Eve) each endowed with 100 units of different goods (Adam has 100 tomatoes, x and Eve has 100 pounds of goat cheese, y). Eve's utility is $U^E(x^E, y^E) = x^E + y^E$ and Adam's utility is $U^A(x^A, y^A) = x^A y^A$

1. Depict the endowment in an Edgeworth box



2. Draw the indifference curves through the initial endowment. Is this allocation Pareto efficient? No, any allocation below the diagonal (IC)

of Eve and above the IC of Adam, which coincides with his axis is preferred by both.

3. Calculate the set of Pareto Efficient allocations.
4. A Pareto Efficient allocation satisfies the following conditions:

$$(a) \quad MRS^A(x^A, y^A) = MRS^E(x^E, y^E),$$

$$(b) \quad x^A + x^E = 100; y^A + y^E = 100$$

Condition a implies $\frac{y^A}{x^A} = 1$, so $y^A = x^A$.

Condition b restricts y^A, x^A to be between zero and 100. So the set of Pareto efficient allocations in this case is a diagonal connecting the bottom-left corner and the upper-right one.

5. Assume after an exchange (with an auctioneer announcing prices) Eve has 30 tomatoes and 70 pounds of cheese, while Adam has 70 tomatoes and 30 pounds of cheese. Can this be a ‘competitive market allocation’ with both Adam and Eve taking prices as given? Why?

$MRS^E(x^E, y^E) = 1$ for all x^E, y^E . On the other hand, $MRS^A(70, 30) = \frac{3}{7} < 1 = MRS^E(x^E, y^E)$ and that is why the allocation is not efficient: Adam values tomatoes relatively less than Eve.

6. Extra credit (10%) Compute Walrasian equilibrium (allocation and prices) for this economy.

Walrasian equilibrium is an allocation and prices such that

- (a) Consumers choose the best affordable bundle taking prices as given

- (b) Prices are such that the markets clear.

Eve’s preference is linear, so her best affordable bundle is just tomatoes $\left(100\frac{p_y}{p_x}, 0\right)$ if the price of tomatoes is smaller than that of cheese, or just cheese $(0, 100)$ if the opposite is true. If $\frac{p_x}{p_y} = 1$, then any combination of cheese and tomatoes satisfying $x^E + y^E = 100$.

Adam:

$$\begin{aligned} \max_{x^A, y^A} x^A y^A \\ p_x x^A + p_y y^A = 100 p_x \end{aligned}$$

Optimality conditions:

$$\frac{y^A}{x^A} = \frac{p_x}{p_y}$$
$$p_x x^A + p_y y^A = 100p_x$$

Solution: $y^A = \frac{50p_x}{p_y}$, $x^A = 50$.

So, markets will only clear if the price ratio, $\frac{p_x}{p_y}$, is unity, then the allocation is (50, 50) to Eve and (50, 50) to Adam.

Question 4

a. 13.14, p. 517. Use the information about cobalt industry from this problem to answer additional questions.

b. Assume there are only two firms competing against each other in Cournot fashion. Compute the equilibrium quantity offered by each firm and the price prevailing in such a market.

c. Consider now the same market is operating under perfect competition. What is the equilibrium price then? How much cobalt is sold in the market? Compare this result with the previous two (a., b.) and use it to conjecture that ‘more competition enhances efficiency’. Use graphical analysis to illustrate your answer.

d. How high should be the price of cobalt for you to claim the firms collude and act as a cartel?

If the firm acts as a cartel (monopoly), then profit maximization leads to $MR(q) = MC$ condition which is equivalent to: $200 - 2q = 40$, Solution is: $\{q = 80\}$, so the price will be $200 - 80 = 120$. Thus, if the price reaches this level, there is a case against the firm.