

Tutorial 1. *Efficiency and Competitive Markets Solutions*

Problem 1. Market demand for books is given by $Q = 300 - 2P$, where Q is total quantity purchased by consumers at each price and P is price in dollars. Supply of books is given by $P = 30 + Q$. Suppose market for books satisfies the assumptions of competitive market.

- (a) Plot demand and supply curves on a diagram. Find equilibrium price and quantity of books, denote Q^* and P^* .

In order to plot the curves bring P to the left hand side of the equation, the constant is the vertical intercept and the coefficient in front of Q is the slope. The supply curve is ready to plot. In order to plot the demand you have to obtain $P=150-.5Q$.

*In **equilibrium**: price is such that quantity supplied is equal to the quantity demanded. On the diagram supply and demand curve intersect. If we equate S and D we obtain:*

$$\begin{aligned} 150 - .5Q &= 30 + Q \\ 120 &= 1.5Q \\ Q^* &= 80 \end{aligned}$$

In order to find equilibrium price substitute 80 into either S or D equation. $P^ = 110$*

- (b) In your own words explain the concept of marginal value (MV), does MV represent marginal private benefits from consumption? Calculate marginal and total value of books in the equilibrium outcome. How much money is spent on books in equilibrium? In your own words explain what is consumer surplus (CS). Calculate CS and show on your diagram.

***Marginal value** measures the enjoyment a consumer receives from consumption of an additional (one more) unit of a good. Since the problem specifies that the market is competitive: no externalities (impact of third parties who do not directly consume or produce the goods), public goods (can be consumed by many people simultaneously) etc., MV is exactly the same as marginal private benefits from consumption. MV is equal to the height of the D curve at a corresponding unit. To find MV in equilibrium, simply plug quantity into demand to find that $MV=P=110$. Recall that consumers maximize their utility by choosing quantity so that marginal value of the last unit purchased is equal to the price.*

***Total value** TV measures the enjoyment consumer gets from the entire quantity consumed. Recall that TV is sum of MVs of individual units and is represented by the area under the demand curve. TV also is equal to the maximum amount of money the consumer would pay in order to get the quantity of the good rather than to have none at all. TV of 80 units is 10,400. Total value in this case is also total private benefits from consumption.*

Expenditure on books is of course $P \cdot Q = 8,800$.

Consumer surplus measures the net benefits from consumption: how much the quantity is worth to consumers (TV) minus what was paid to purchase the quantity (expenditure): $CS=TV-PQ$. On diagram it is a triangle below D and above P . $CS=1,600$.

- (c) What is the marginal cost (MC) of books in competitive equilibrium¹? Calculate and show on your diagram producer surplus (PS).

A firm will produce a unit of output if price is at least as high as the marginal cost of production, therefore supply curve not only shows the quantity supplied at each price, but also the height of the supply curve measures the MC of producing respective units. the idea behind PS is similar to that behind the CS. On diagram PS is triangle above S below P. $PS=3,200$.

- (d) Is equilibrium outcome efficient? What is net marginal social benefit in the competitive equilibrium? Is $Q = 75$ efficient? Is $Q = 100$ efficient?

*Efficiency can be interpreted in several ways: all mutually beneficial exchanges are exhausted; gains from trade are maximized, there is no waste and of course Pareto efficiency criterion that we will examine in the next question. Alternatively, efficient outcome means that social welfare is maximized. Recall the optimality conditions. We **need** $MSB=MSC$ for social welfare to be maximized. In competitive equilibrium consumers and producers maximize their own individual well-being and arrive to the outcome in which $MV=P=MC$, in other words, we **have** $MPB=P=MPC$. Question: does $MPB=MPC$ mean that $MSB=MSC$? In a competitive market the answer is YES. When assumptions of the competitive markets are satisfied, social and private marginal costs and benefits are the same. Also in competitive equilibrium net marginal benefits are zero: the output is at the optimal level. Producing less or more output than Q^* is not efficient and under/over production is associated with welfare loss.*

$Q=75$ is not efficient. Since marginal benefits are greater than marginal costs and net marginal benefits are positive, increasing the activity (production of books in this case) will increase social well being. Another way to look at it: since at this point MV of books is above MC gains from trade are available if more books are produced.

$Q=100$ is not efficient. Marginal benefits are lower than marginal costs (which literally means that the product is not worth the production costs: at this level of output consumers' enjoyment from the last 20 units produced is lower than the marginal costs of production of those units); net marginal benefits are negative, meaning that lowering production of books will increase social welfare.

Discussion Questions:

1. What is Pareto efficiency (efficiency criterion)? Suppose your TA brings as many candies as there are students to the tutorial; suppose all students like candies and are not allowed to trade or exchange candies they are given.

Pareto efficiency - a situation is efficient if it is impossible to increase well being of any person without making some other person worse off.

In simple words: a situation is efficient if it is impossible to make anybody happier without hurting somebody else.

Determine which situations satisfy efficiency criterion:

- TA gives one candy to each student

Efficient: since all candies are allocated to students, if we want to increase well being of

¹Recall that supply curve reflects the marginal cost of production

any one student we have to take away a candy from somebody else - it is not possible to benefit any student without hurting some other student. The criterion is satisfied.

- TA splits candies equally among girls

Efficient: it is not possible to benefit any student without hurting one of the girls. The criterion is satisfied. This example demonstrates that efficiency has nothing to do with equity or fairness.

- TA gives all candies to one of the students

Efficient: if we want to increase well being of any of the students who did not get a candy we have to take away a candy from the student who got all candies and 'hurt' him. The criterion is satisfied.

- TA gives one candy to each girl and throws away the remaining candies *Not efficient: we pick one candy from the trash bin and give it to a male student - that way we make the male student happier without hurting anyone else in class. Criterion not satisfied. Also you could guess that throwing away the candy is a waste, so the situation cannot be efficient. Whenever waste is utilized, extra welfare can be created and we can benefit somebody without hurting anybody else.*

2. Suppose that the total social benefits of a public library exceed total social costs of the library. Does this mean that the library should be expanded? *NO.*
3. Competitive markets are efficient because people make decisions that maximize social well-being. Is this true or false? Explain. *FALSE. I would really like you to figure this one out on your own. Your answer should start with: in competitive market there are many buyers and sellers each of whom is acting in his own self interest and is doing the best in order to maximize his or her personal well being. Meaning that in competitive market we have many selfish people acting in their own self interest. Your task is to explain why selfish behavior results in the equilibrium outcome that is **socially** optimal.*