

Problem Set 3 Suggested Solution

1. Apple is the only company that can produce the iPhone. Suppose the demand for iPhones in 2011 is:

$$Q = 60,000,000 - 50,000 \times \$P.$$

For what prices is the elasticity of demand for iPhones greater than one? For what prices is the elasticity of demand for iPhones less than one? At what price is the elasticity of demand for iPhones equal to one? What can you say about the price (i.e., adding up what the purchaser pays Apple and what the phone company pays Apple) Apple should have charged for iPhones in 2011 to maximize its year-2011 profit? Suppose that you learn that it only costs Apple \$50 to purchase and ship an additional iPhone to the U.S. Does this allow you to sharpen your answer?

A: $Q = 60000000 - 50000P$ is the same equation as $P = 1200 - 50000Q$

When the price goes from 1101 to 1099 quantity goes from 4950000 to 5050000—a percentage change of $10000/5000000 = 2\%$ for a price change of 0.18% for an elasticity of 11.1

When the price goes from 1001 to 999 quantity changes by a percentage change of 1% for a price change of .2% for an elasticity of 5.

When the price goes from 901 to 899 quantity changes by a percentage change of 0.67% for a price change of .22% for an elasticity of 3.

When the price goes from 801 to 799 quantity changes by a percentage change of 0.5% for a price change of .25% for an elasticity of 2.

When the price goes from 701 to 699 quantity changes by a percentage change of 0.4% for a price change of .29% for an elasticity of 1.4.

When the price goes from 601 to 599 quantity changes by a percentage change of 0.333% for a price change of .333% for an elasticity of 1.

And when the price is below 600, the elasticity will be less than one: demand will be inelastic.

A profit-maximizing monopolist should never charge a price where the price-elasticity of demand is less than one. It could raise its costs and produce less, and so have higher revenue and lower costs. So the price of the iPhone (to customers plus how much the phone companies pay on the customer's behalf) should be above \$600

If you are told that the marginal variable cost of an iPhone is \$50, you know that practically all of the extra revenue earned by selling extra iPhones goes straight to the

bottom line, so that the profit-maximizing price will be close to the revenue-maximizing price. Therefore you can sharpen your answer and conclude that the profit-maximizing price for iPhones is close to \$600.

2. Consider the following two demand curves for yoga lessons in Sunnydale: $Q = 120 - 3P$; and $PQ^2 = 20000$. Consider the market-day supply curve $Q = 20$. What is the price for each demand curve? Suppose that on one day the market day supply curve is $Q = 15$. What is the price for each demand curve?

**A: For the first demand curve and the first supply curve set the quantity from the demand curve equal to the quantity from the supply curve, $120 - 3P = 20$; $P = 33 \frac{1}{3}$; $Q = 20$.
For the second demand curve and the first supply curve substitute the supply curve expression for quantity into the demand curve, $P/400 = 20000$; $P = 50$ $Q = 20$.
For the first demand curve and the second supply curve set the quantity from the demand curve equal to the quantity from the supply curve, $120 - 3P = 15$; $P = 35$; $Q = 15$.
For the second demand curve and the second supply curve substitute the supply curve expression for quantity into the demand curve, $P/225 = 20000$; $P = 88.89$ $Q = 15$.**

3. Consider the following two demand curves for yoga lessons in Sunnydale: $Q = 120 - 3P$; and $PQ^2 = 20000$. Consider the short-run supply curve $Q = 3 \times P$. What is the price for each demand curve? What is the quantity? Suppose that the short-run supply curve is $Q = 3 \times P + 10$. What is the price for each demand curve? What is the quantity?

**A: For the first demand curve and the first supply curve set the quantity from the demand curve equal to the quantity from the supply curve, $120 - 3P = 3P$; $6P = 120$; solving $P = 20$; $Q = 60$.
For the second demand curve and the first supply curve substitute the supply curve expression for quantity into the demand curve, $P(9P^2) = 20000$; $9P^3 = 20000$; taking the cube root: $P = 13.04$ $Q = 39.12$.
For the first demand curve and the second supply curve set the quantity from the demand curve equal to the quantity from the supply curve, $120 - 3P = 3P + 10$; solving $P = 18.33$; $Q = 65$.
For the second demand curve and the second supply curve substitute the supply curve expression for quantity into the demand curve, $P(3P + 10)^2 = 20000$; $9P^3 + 60P^2 + 100P = 20000$; solving the cubic: 10.93 $Q = 42.79$.**

4. Consider the following two demand curves for yoga lessons in Sunnydale: $Q = 120 - 3P$; $PQ = 750$. Consider the very long run supply curve $P = 20$. What is the quantity for each demand curve? Suppose that improvements in technology lead the very long run supply curve to shift down to $P = 15$. What is the quantity for each demand curve?

A: For the first demand curve, $Q=60$. For the second demand curve, $Q=37.5$. With the new very long-run supply curve $P=15$, $Q=45$ for the first demand curve and $Q=50$ for the second.

5. In your estimation, what are the four most important reasons Partha Dasgupta believes are responsible for the fact that Becky's life options are broader than Desta's?

A: A possible list:

- a) Household's decision making is spread in Desta's world, limiting the ability of one member to take an optimal decision based on his or her situation.**
- b) Allocation of resources, here it is food, leisure, basic necessities, is distributed unequally in Desta's world. This is a problem if those need them the most is given less than what is required to be productive.**
- c) Gender inequality and fertility: high fertility in Desta's world lead to high rate of illiteracy among women, less women in the workforce and low paid jobs for women.**
- d) Property right and fertility: in Desta's world, the opportunity cost of rearing a child is low, thus many children were born. In addition, in the sub-Saharan Africa, large family was given more land, and this serves as a reward for parents to have more children.**
- e) Desta doesn't have access to insurance, making themselves vulnerable to shocks.**
- f) Desta doesn't have access to capital market for borrowing/saving/investing opportunity. This also makes them vulnerable to shocks.**
- g) Lack of institutions that facilitate market operations such as financial institution or limited liability joint stock companies where Becky can invest and pool risk.**

6. Professor DeLong has claimed that the experience of the twentieth century teaches us that what share of our prosperity rests on the foundations of the market economy? Why has he said this? Do you find his argument convincing? Why or why not? Limit your answer to, at most, 150 words.

A: Prof. DeLong mentioned several times in his note that there is a five-fold difference in efficiency between a centrally-planned and a market economies. Why do we need to know this, and perhaps, study economics? A market economy can deal well with the very problem facing the world: resource scarcity. Price signal guides the market towards producing goods that are most desired by the society. Market economy allows specialization and trade and creates a win-win situation in which everyone is better off. Market economy eliminates the cost of coordination or cost of governing the market in a centrally planned economy. However, one may raise a counter argument about the fairness of income distribution, and the fairness of international trade and those suffer the most are always poor and less developed countries.

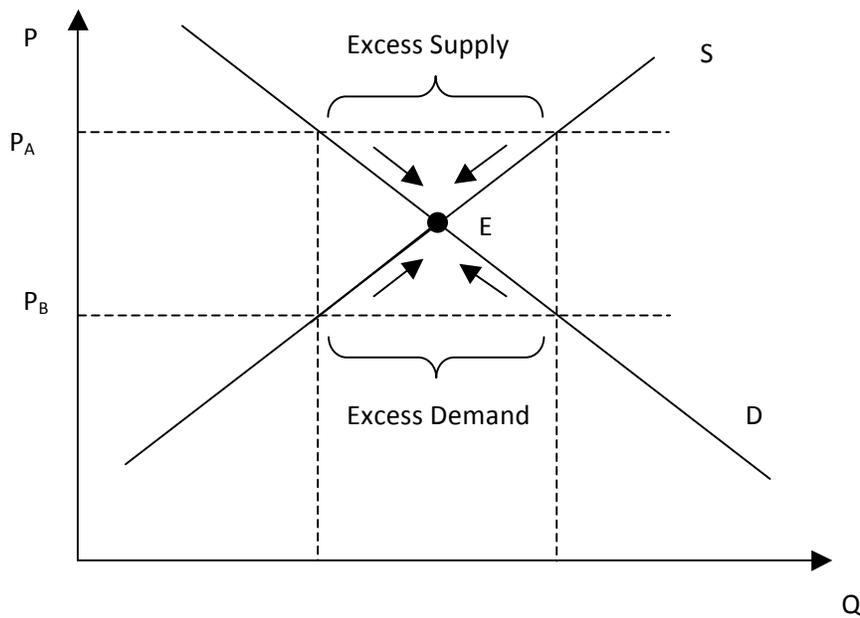
7. Describe how a market system efficiently allocates scarce resources. Limit your answer to, at most, 100 words.

There are two approaches. The first one is relatively straightforward from the material at the beginning of the class. Perhaps, the second method is more relevant.

First, we may want to know how using the concept of opportunity cost and gain from trade can explain why everyone is better off than in autarky. By specializing in what each person has comparative advantage in and allow them to trade, we can consume at point outside of the PPF – points which were unattainable if people were not allowed to trade.

Second, a market system does allow us to achieve both productive and allocative efficiency. A comprehensive answer may need to go a little bit further to explain these two concepts. Productive efficiency (PE): produce with the least cost method (in term of opportunity cost) and allocative efficiency (AE): produce what the society wants. While PE can be achieved by a centrally planned economy, only a laissez-faire market will allow us to achieve AE through price signal.

8. Describe how market forces reach an equilibrium where the quantity demanded exactly equals the quantity supplied. Limit your answer to, at most, 100 words.

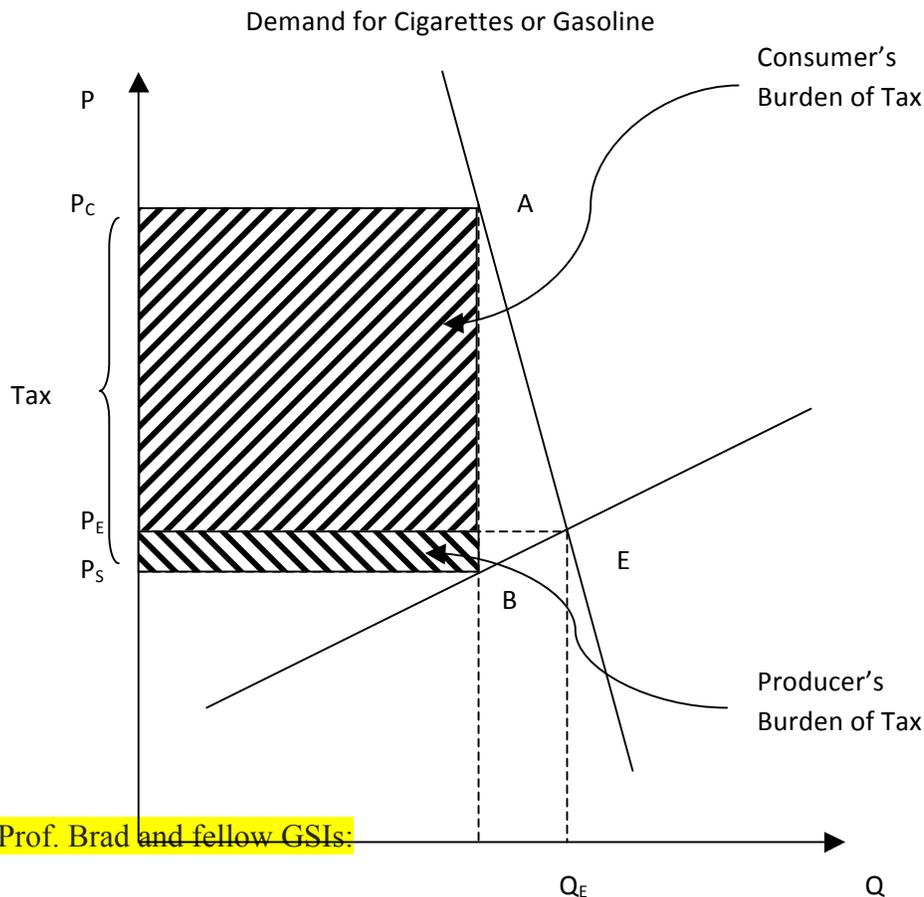


A: A graph will make the answer a lot more intuitive. Suppose that for some reason, the market is not yet at equilibrium (point E, the intersection between Demand and Supply). If the current market price is at P_A greater than the equilibrium price, quantity demanded is less than quantity supplied, resulting in excess supply (or demand shortage). Some sellers may not be able to sell their goods. To clear the market, the sellers have to reduce price. At the same time, as price falls, quantity demanded increases. We move along the supply and demand curve until equilibrium is reached.

The opposite is when the initial price is less than the equilibrium price. Then quantity demanded is greater than quantity supply, or we have an excess demand (or supply shortage) situation. Some buyers may not be able to buy the goods at low price. Thus, buyers bid up the price to get a chance to get the goods. We move back to equilibrium at point E where quantity demanded is equal to quantity supplied.

9. Why are producers able to pass on most of a tax on goods like cigarettes and gasoline onto consumers? Why would producers bear most of a tax on agricultural goods?

A: For most addictive goods like cigarettes, alcohol, and in the extreme case drugs, the demand is very inelastic. For goods with no alternative like gasoline, the demand is also inelastic, at least in the short term. Note that the word “inelastic” I used here means that the demand doesn’t change much as we increase the price, or the demand schedule of such goods is very steep. When we talk about the *price elasticity of demand*, “inelastic” means that the absolute value of the coefficient is less than 1. For such goods, the burden of the tax is born mostly by the consumers, as shown in the graph. A tax results in higher prices (thus tax revenue for the government), and in little change in the quantity demanded.



* Note to Prof. Brad and fellow GSIs:

For agricultural goods, my take is that due to so many alternatives, any producer raising price risk losing business. Thus, we may expect a steep supply curve and perhaps, flatter demand curve. If it is the case, then most tax burden is passed to the producers.

However, I am unimpressed to force this argument. Agricultural demand curve is also very steep, especially when we talk about the demand for foods and related products. Another complication is that agricultural goods producers are working on a small profit margin (real life issue), imposing tax on agricultural goods only passes to the consumers through a higher price (same thing when we talk about market structure, entry and exit in the LR and SR).

4. With two new demand function $Q=120-3P$ and $PQ=750$. Rewrite it as

$$P=40-13Q \text{ and } P=750/Q$$

For two supply curve $P=20$ and $P=15$, let supply=demand, then we have

$$40-13Q=20 \text{ then } Q=60$$

Similarly,

$$40-13Q=15 \text{ then } Q=75$$

And

$$750/Q=20 \text{ then } Q=37.5$$

and

$$750/Q=15 \text{ then } Q=50$$

5. In your estimation, what are the four most important reasons Partha Dasgupta believes are responsible for the fact that Becky's life options are broader than Desta's?

This list may not be enough:

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6. Professor DeLong has claimed that the experience of the twentieth century teaches us that what share of our prosperity rests on the foundations of the market economy? Why has he said this? Do you find his argument convincing? Why or why not? Limit your answer to, at most, 150 words.

(Just what I think)

Prof. DeLong mentioned several times in his note that there is a five-fold difference in efficiency between a centrally-planned and a market economies. Why do we need to know this, and perhaps, study economics? A market economy can deal well with the very problem facing the world: resource scarcity. Price signal guides the market towards producing goods that are most desired by the society. Market economy allows specialization and trade and creates a win-win situation in which everyone is better off. Market economy eliminates the cost of coordination or cost of governing the market in a centrally planned economy. However, one may raise a counter argument about the fairness of income distribution, and the fairness of international trade and those suffer the most are always poor and less developed countries.

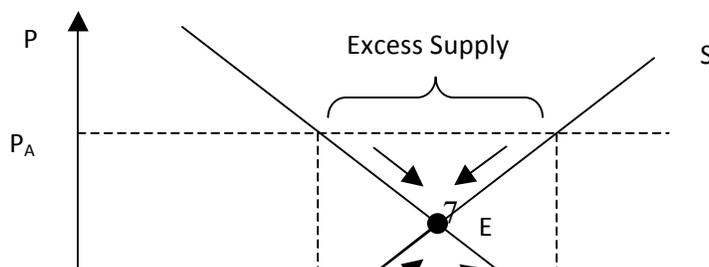
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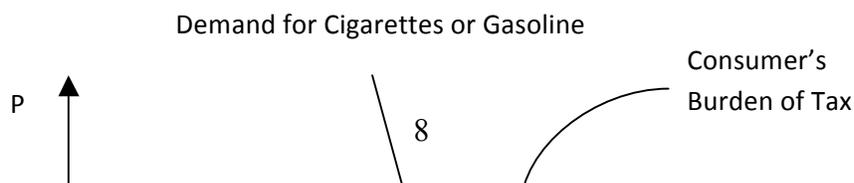
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To explain this part better, students also need to draw good graphs.

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