Worked Solutions 3

Lecture 5.

Question	Lecture
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2.	L5
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6.	L5
7.	L5

Exercise 1

When a parched man drinks a free beer on a hot day, he is apt to consider it a bargain' (Stigler 1990).

Interpret this statement using the consumer surplus idea.

Answer

On a hot day the parched man has a high willingness to pay for a beer. If it is given to him for free, then there is a large gap between his willingness-to-pay and the cost of the beer. It is a bargain because he gets lots of consumer surplus under these circumstances.

Exercise 2

When demand is estimated to be $p = 50 - 0.5x$, calculate the loss in consumer surplus when a tax drives price from \$1 to \$5.

Answer

To determine this you need first to plot the demand curve and then calculate the required consumer surplus change. The demand curve is linear, so its position is determined by its intercepts with p and x axes. When $x = 0$ then $p = 50$, determining the vertical intercept. When $p = 0$ then $x = 100$, determining the horizontal intercept. The demand curve is a straight line that must pass through these points. When $p = 1$, $x = 98$ and when $p = 5$, $x = 90$.
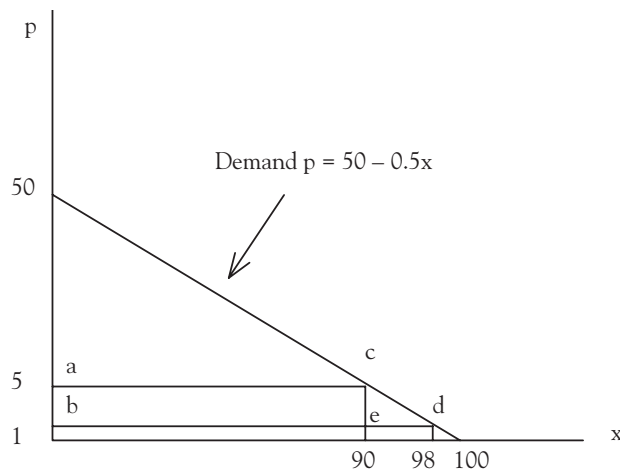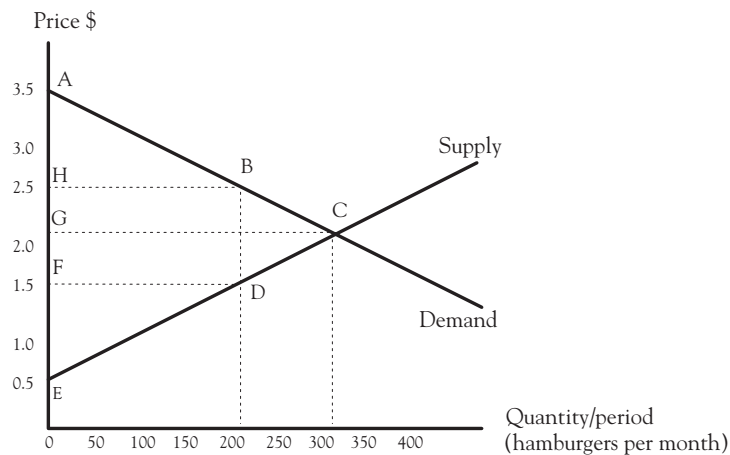

In the figure the loss in consumer surplus equals the area acdb, which is the area of the rectangle aceb ($90 \times 4 = \$360$), plus the area of the triangle ced ($(98 - 90) \times 4 \times \frac{1}{2} = \$16$), or \$376.

Exercise 3

Assume that the demand and supply of hamburgers can be represented in the following diagrammatic model.

Figure 3.12 *Hamburger supply and demand*

1. What is the equilibrium price and quantity?

2. Calculate consumer surplus, producer surplus and social surplus.

3. Suppose the quantity supplied is restricted by government regulation to 200 units per month. Calculate the new price, the consumer surplus, producer surplus and social surplus.

Answers

1. Initial equilibrium price = $2.00

   Quantity = 300 hamburgers per month.

2. Producer surplus = Area ECG = 225

   Consumer surplus = Area ACG = 225

   Social surplus = 450

3. Restriction of supply to 200 means that the market price is now $2.50.

   Producer surplus = Area EDBH = 300

   Consumer surplus = Area ABH = 100

   Total surplus = 400

Note: The competitive market equilibrium (the initial equilibrium) gives the price and quantity at which total surplus is maximised.

Exercise 5

1. Assume the market for rental accommodation can be represented using the competitive market model. Represent this market diagrammatically.

2. Use your model to analyse the effect of:

   a. An increase in people seeking rental accommodation due to increased migration.

   b. An increase in the general level of interest rates in the economy.

   c. A government decision to increase the quantity of public housing available.

   d. A change in tax legislation to allow deductability against income for owner occupiers.

   e. The imposition of a legislated maximum rent ('rent control').

   f. The granting of a government subsidy to the construction of rental accommodation.

   g. The provision of a government subsidy to renters.

Answers

1. This diagram is the same as that illustrated by Figure 3.17 in the text with 'price' replaced by 'rental'. A rent control corresponds to setting a price below the equilibrium level and creating an excess demand.

2. a. The demand curve shifts right, resulting in an increase in the equilibrium price and an increase in the equilibrium quantity of rental accommodation.

   b. The supply curve shifts left (higher cost of investing for landlords), resulting in an increase in the equilibrium price and a decrease in the equilibrium quantity of rental accommodation. (There may be some increase in demand if higher cost of finance shifts some potential homebuyers into the rental market).

   c. The supply curve shifts right, resulting in an decrease in the equilibrium price and an increase in the equilibrium quantity of rental accommodation.

   d. The demand curve shifts left (home buying is more attractive), resulting in an decrease in the equilibrium price and an decrease in the equilibrium quantity of rental accommodation.

Price controls

Maximum price schemes are often called **price controls** and are typically developed to protect consumers. Here the main concern is that prices are too high. We can show that price controls set to protect consumers by pegging prices below market equilibrium levels impose deadweight loss on society in terms of lost social surplus. Consider Figure 3.17, where a maximum price p_{max} is set below the market equilibrium price p^*.

Figure 3.17 *Price controls inflict deadweight loss*
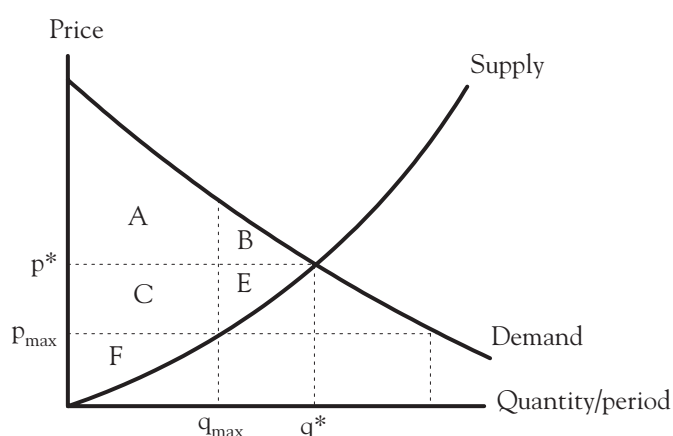
Here the quantity sold is determined by supply. Sellers under this policy definitely lose compared to a free market. Their surplus declines from $(C + E + F)$ to F, so sellers lose $C + E$.

Consumer surplus changes from $A + B$ to $A + C$, a net change of $C - B$, which can be positive or negative. The difference $C - B$ appears positive in the figure, but this need not be so. Consumers gain from the lower price on the items sold, but now fewer items are sold, and this is costly.

Again, social surplus here unambiguously declines under this policy. The change in social surplus is the change in consumer surplus plus the change in producer surplus, or $(C - B) - (C + E)$, which is $-(B + E)$, which is negative, indicating a loss. This fall in social surplus indicates that gains (if any) to consumers are more than offset by losses to producers, so deadweight losses arise again, equal to the area $(B + E)$.

A widely practised form of price control in many economies has been rent control. Because governments seek to provide access to rental accommodation for low-income families who cannot afford high city rentals, they have in the

e. No shifts in D or S curves. If the maximum price is below the market clearing equilibrium price, there will be an excess demand for rental accommodation.

f. The supply curve shifts right, resulting in an decrease in the equilibrium price and an increase in the equilibrium quantity of rental accommodation.

g. The demand curve shifts right, resulting in an increase in the equilibrium price and an increase in the equilibrium quantity of rental accommodation.

Exercise 6

1. Construct a supply/demand diagram with a relatively flat (elastic) supply curve and a relatively steep (inelastic) demand curve. Represent the imposition of a per-unit indirect tax and shade in the areas representing the losses in consumer and producer surplus.

2. Now repeat the exercise with a relatively flat (elastic) demand curve and a relatively steep (inelastic) supply curve.

3. Compare the relative burden of the tax on consumers and producers in each case by comparing the sizes of the areas representing losses in consumer and producer surpluses.

Answers
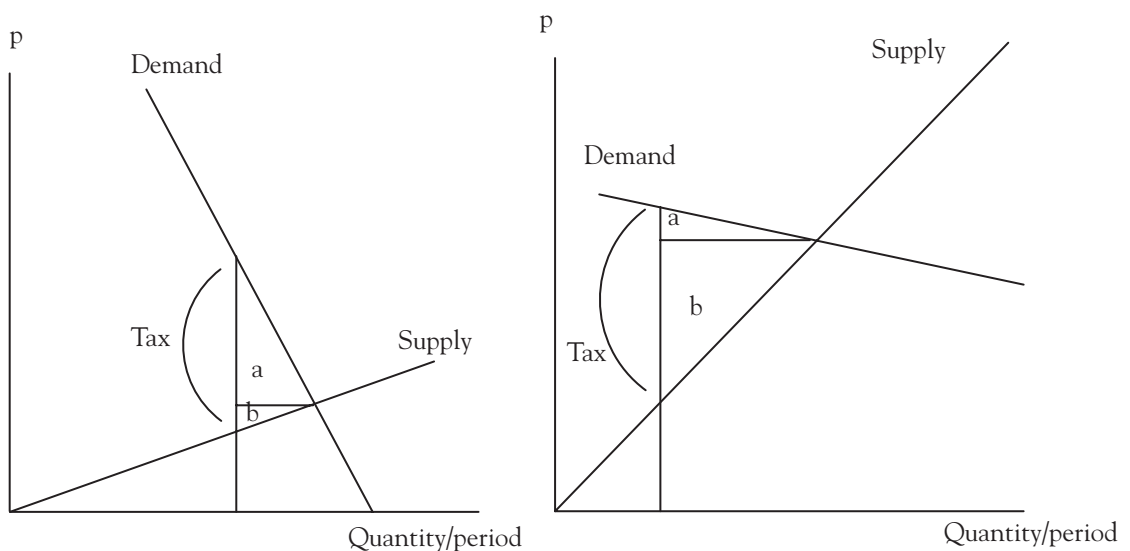
Demand inelastic
supply elastic

Demand elastic
supply inelastic

In each of these figures losses of consumer surplus are given by area a, while losses of producer surplus are given by b. Consumer losses are big when demand is inelastic. Producer losses are large when supply is inelastic.

Answering this should convince you of the general principle outlined above: the side of the market with lower elasticity bears the greater burden of a tax. It should also have convinced you that when government revenue is greater, and the deadweight loss is smaller after the imposition of a tax, the elasticity of demand must be less elastic.

Exercise 7

1. If basic food items were not exempt from the goods and services tax (GST) in Australia, what would the impact of the tax on consumer price and producer profile have been? What would the size of the tax revenue and the deadweight loss have been? Is such a tax on food 'good' or 'bad', and in what sense? Explain.

2. Suppose the government wants to raise as much tax as possible with as little deadweight loss as possible. Can you imagine examples of such an 'ideal' tax? Describe them.

Answers