

Exercises Questions

1. The El Nino in 2015/16 made last winter in Guangdong Province colder than before, which makes watermelons not as sweet as before. Explain what happens to consumer surplus in the market for watermelons. Explain what happens to consumer surplus in the market for watermelon juice. Illustrate your answers with diagrams.

The El Nino affects both producers and consumers, hence the demand and supply curve will shift.

The answer on consumer surplus could be different as the shift of supply curve is uncertain: lower production may shift the curve left, but worse taste may shift it right.

2. A recent study found that the demand and supply schedules for Frisbees are as follows:

Price per Frisbee	Quantity Demanded	Quantity Supplied
\$11	1 million Frisbees	15 million Frisbees
10	2	12
9	4	9
8	6	6
7	8	3
6	10	1

- a. What are the equilibrium price and quantity of Frisbees?

The equilibrium price of Frisbees is \$8 and the equilibrium quantity is six million Frisbees.

- b. Frisbee manufacturers persuade the government that Frisbee production improves scientists' understanding of aerodynamics and thus is important for national security. A concerned Congress votes to impose a price floor \$2 above the equilibrium price. What is the new market price? How many Frisbees are sold?

With a price floor of \$10, the new market price is \$10 because the price floor is binding. At that price, only two million Frisbees are sold, because that is the quantity demanded.

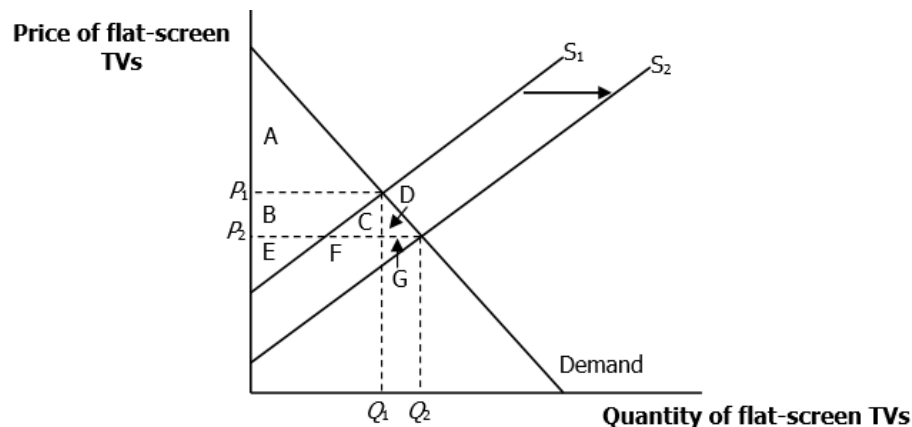
- c. Irate college students march on Washington and demand a reduction in the price of Frisbees. An even more concerned Congress votes to repeal the price floor and impose a price ceiling \$1 below the former price floor. What is the new market price? How many Frisbees are sold?

If there is a price ceiling of \$9, it has no effect, because the market equilibrium price is \$8, which is below the ceiling. So the market price is \$8 and the quantity sold is six million Frisbees.

3. The cost of producing flat-screen TVs has fallen over the past decade. Let's consider some implications of this fact.

- a. Draw a supply-and-demand diagram to show the effect of falling production costs on the price and quantity of flat-screen TVs sold.

The effect of falling production costs in the market for flat-screen TVs results in a shift to the right in the supply curve, as shown in Figure below. As a result, the equilibrium price of flat-screen TVs declines and the equilibrium quantity increases.

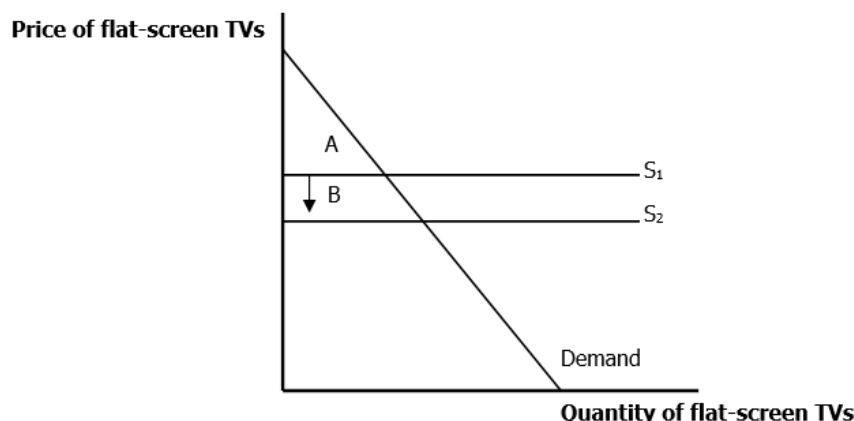


- b. In your diagram, show what happens to consumer surplus and producer surplus.

The decline in the price of flat-screen TVs increases consumer surplus from area A to $A + B + C + D$, an increase in the amount $B + C + D$. Prior to the shift in supply, producer surplus was areas $B + E$ (the area above the supply curve and below the price). After the shift in supply, producer surplus is areas $E + F + G$. So producer surplus changes by the amount $F + G - B$, which may be positive or negative. The increase in quantity increases producer surplus, while the decline in the price reduces producer surplus. Because consumer surplus rises by $B + C + D$ and producer surplus rises by $F + G - B$, total surplus rises by $C + D + F + G$.

- c. Suppose the supply of flat-screen TVs is very elastic. Who benefits most from falling production costs—consumers or producers of these TVs?

If the supply of flat-screen TVs is very elastic, then the shift of the supply curve benefits consumers most. To take the most dramatic case, suppose the supply curve were horizontal, as shown in Figure below. Then there is no producer surplus at all. Consumers capture all the benefits of falling production costs, with consumer surplus rising from area A to area $A + B$.



4. Kawmin is a small country that produces and consumes jelly beans. The world price of jelly beans is \$1 per bag, and Kawmin's domestic demand and supply for jelly beans are governed by the following equations:

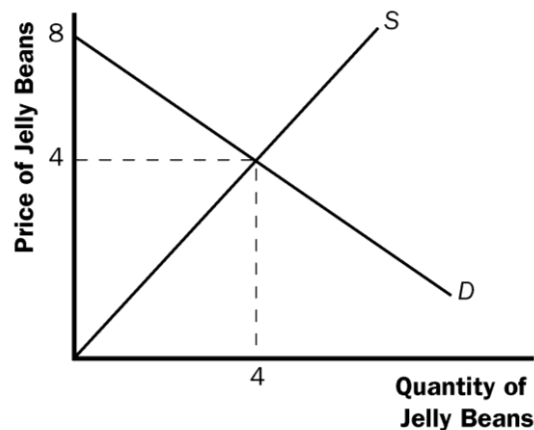
Demand: $Q^D = 8 - P$,

Supply: $Q^S = P$,

where P is in dollars per bag and Q is in bags of jelly beans.

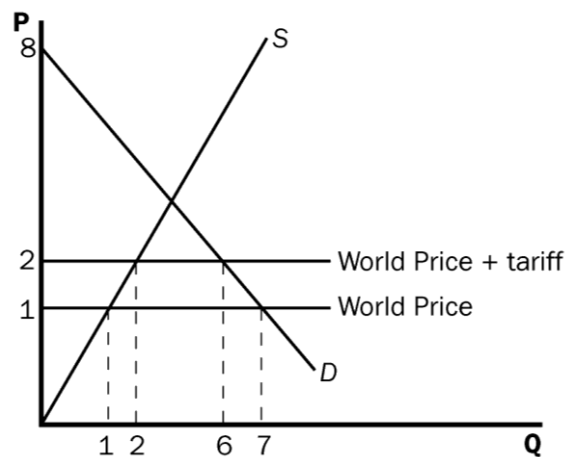
- a. Draw a well-labeled graph of the situation in Kawmin if the nation does not allow trade. Calculate the following (recalling that the area of a triangle is $\frac{1}{2} \times \text{base} \times \text{height}$): the equilibrium price and quantity, consumer surplus, producer surplus, and total surplus.

The figure below shows the market for jelly beans in Kawmin if trade is not allowed. The market equilibrium price is \$4 and the equilibrium quantity is 4. Consumer surplus is \$8, producer surplus is \$8, and total surplus is \$16.



- b. Kawmin then opens the market to trade. Draw another graph to describe the new situation in the jelly bean market. Calculate the equilibrium price, quantities of consumption and production, imports, consumer surplus, producer surplus, and total surplus.

Since the world price is \$1, Kawmin will become an importer of jelly beans. Figure below shows that the domestic quantity supplied will be 1, quantity demanded will be 7, and 6 bags will be imported. Consumer surplus is \$24.50, producer surplus is \$0.50, so total surplus is \$25.



c. After a while, the Czar of Kawmin responds to the pleas of jelly bean producers by placing a \$1 per bag tariff on jelly bean imports. On a graph, show the effects of this tariff. Calculate the equilibrium price, quantities of consumption and production, imports, consumer surplus, producer surplus, where P is in dollars per bag and Q is in bags of jelly beans. government revenue, and total surplus.

The tariff raises the world price to \$2. This reduces domestic consumption to 6 bags and raises domestic production to 2 bags. Imports fall to 4 bags (see Figure above). Consumer surplus is now \$18, producer surplus is \$2, government revenue is \$4, and total surplus is \$24.

d. What are the gains from opening up trade? What are the deadweight losses from restricting trade with the tariff? Give numerical answers.

When trade was opened, total surplus increases from \$16 to \$25. The deadweight loss of the tariff is \$1 (\$25 – \$24).

5. Suppose a technological advance reduces the cost of making computers.

a. Use a supply-and-demand diagram to show what happens to price, quantity, consumer surplus, and producer surplus in the market for computers.

b. Computers and adding machines are **substitutes**. Use a supply-and-demand diagram to show what happens to price, quantity, consumer surplus, and producer surplus in the market for adding machines. Should adding machine producers be happy or sad about the technological advance in computers? (You need to find out the definition of substitute on your own)

c. Computers and software are **complements**. Use a supply-and-demand diagram to show what happens to price, quantity, consumer surplus, and producer surplus in the market for software. Should software producers be happy or sad about the technological advance in computers? (You need to find out the definition of complement on your own)

d. Does this analysis help explain why Bill Gates, a software producer, is one of the world's richest men?

- a. The effect of falling production costs in the market for computers resulted in a shift to the right in the supply curve, as shown in Figure 1. As a result, the equilibrium price of computers declined and the equilibrium quantity increased. The decline in the price of computers increased consumer surplus from area A to $A + B + C + D$, an increase in the amount $B + C + D$.

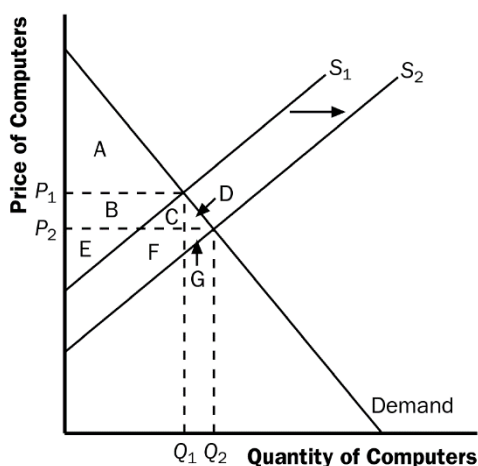


Figure 1

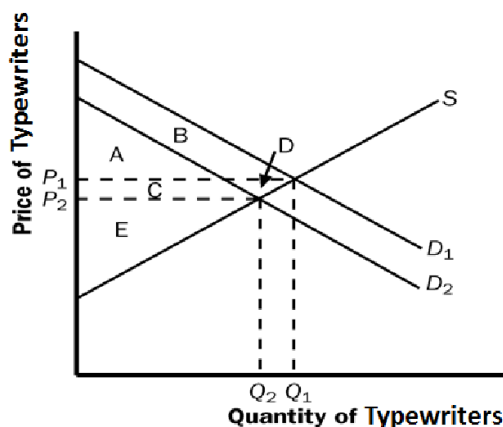


Figure 2

Prior to the shift in supply, producer surplus was areas $B + E$ (the area above the supply curve and below the price). After the shift in supply, producer surplus is areas $E + F + G$. So producer surplus changes by the amount $F + G - B$, which may be positive or negative. The increase in quantity increases producer surplus, while the decline in the price reduces producer surplus. Because consumer surplus rises by $B + C + D$ and producer surplus rises by $F + G - B$, total surplus rises by $C + D + F + G$.

- b. Typewriters and computers are substitutes. The decline in the price of computers means that people substituted computers for typewriters, shifting the demand for typewriters to the left, as shown in Figure 3. The result is a decline in both the equilibrium price and equilibrium quantity of typewriters. Consumer surplus in the typewriter market changes from area $A + B$ to $A + C$, a net change of $C - B$. Producer surplus changes from area $C + D + E$ to area E , a net loss of $C + D$. Typewriter producers are sad about technological advances in computers because their producer surplus declines.
- c. Software and computers are complements. When the price of computers decreases, the demand for software increases. The demand for software shifts to the right, as shown in Figure 3. The result is an increase in both the price and quantity of software. Consumer surplus in

the software market changes from $B + C$ to $A + B$, a net change of $A - C$. Producer surplus changes from E to $C + D + E$, an increase of $C + D$, so software producers should be happy about the technological progress in computers.

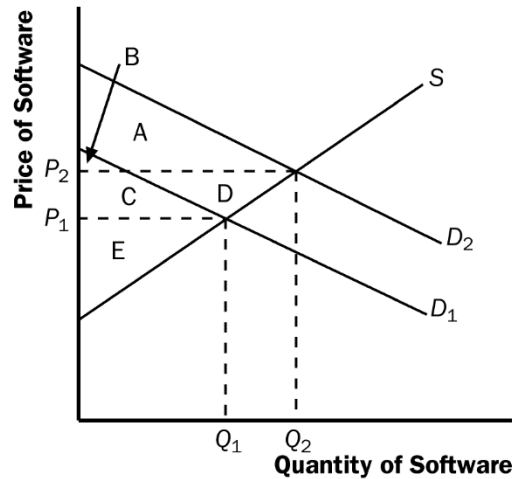
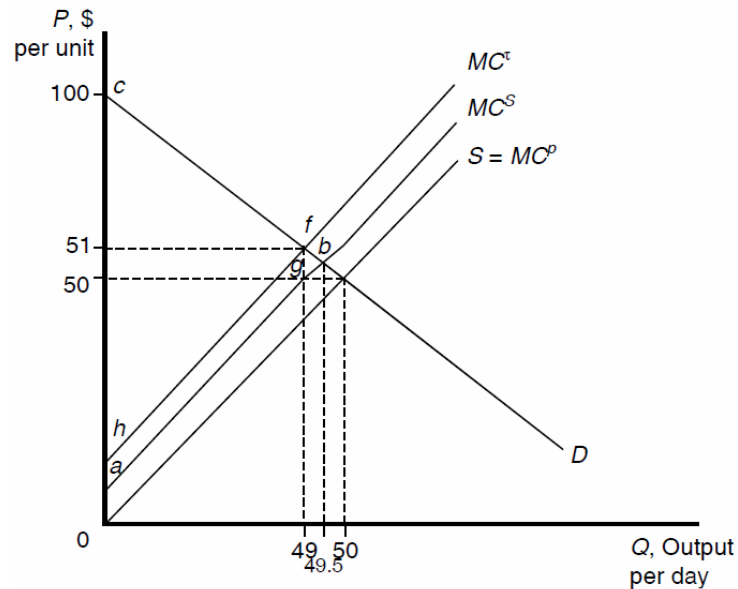


Figure 3

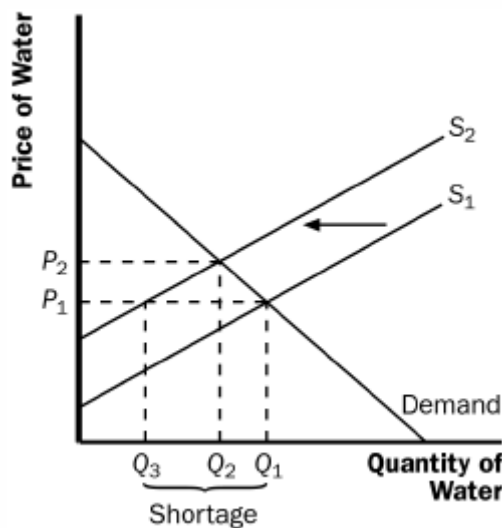
- d. Yes, this analysis helps explain why Bill Gates is one the world's richest people. His company produces a lot of software and the producer surplus in the software market increased with the technological advance in computers.
6. Market supply in a competitive industry is $p = Q$. Demand is $p = 100 - Q$. Production creates pollution with a social cost of \$1 per unit of output. In response to environmentalists, the government creates a tax of \$2 per unit. Is overall welfare improved or reduced by the tax?

Find the figure below. Without gov. intervention, the equilibrium quantity is 50, and price is \$50, and total welfare is 2450, less DWL of \$50. The social optimal output level is 49.5. The social optimal level of production results in total welfare ($CS + PS^S$) of 2450.25, which is area abc. When the gov. imposes the tax, output falls below the social optimal level. With the tax, consumer surplus plus produce surplus falls to 2401 = cfh. Area gfb is the DWL created by the excessive tax. The gov. collects \$98 in tax revenue and \$49 externality cost. Thus, total welfare with the tax is 2450, which is equal to total welfare without the tax.



7. Many parts of California experienced a severe drought in the late 1980s and early 1990s.
- a. Use a diagram of the water market to show the effects of the drought on the equilibrium price and quantity of water.

Figure below illustrates the effect of the drought. The supply curve shifts to the left, leading to a rise in the equilibrium price from P_1 to P_2 and a decline in the equilibrium quantity from Q_1 to Q_2 .



- b. Many communities did not allow the price of water to change, however. What is the effect of this policy on the water market? Show on your diagram any surplus or shortage that arises.

If the price of water is not allowed to change, there will be a shortage of water, with the shortage shown on the figure as the difference between Q_1 and Q_3 .

- c. A 1991 op-ed piece in The Wall Street Journal stated that “all Los Angeles

residents are required to cut their water usage by 10 percent as of March 1 and another 5 percent starting May 1, based on their 1986 consumption levels.” The author criticized this policy on both efficiency and equity grounds, saying “not only does such a policy reward families who ‘wasted’ more water back in 1986, it does little to encourage consumers who could make more drastic reductions, [and] . . . punishes consumers who cannot so readily reduce their water use.” In what way is the Los Angeles system for allocating water inefficient? In what way does the system seem unfair?

The system for allocating water is inefficient because it no longer allocates water to those who value it most highly. Some people who value water at more than its cost of production will be unable to obtain it, so society’s total surplus is not maximized.

The allocation system seems unfair as well. Water is allocated simply on past usage, rewarding past wastefulness. If a family’s demand for water increases, say because of an increase in family size, the policy does not allow them to obtain more water. Poor families, who probably used water mostly for necessary uses like drinking, would suffer more than wealthier families who would have to cut back only on luxury uses of water like operating backyard fountains and pools. However, the policy also keeps the price of water lower, which benefits poor families, because more of their family budget would have to be used to purchase water if the price was allowed to rise.

d. Suppose instead that Los Angeles allowed the price of water to increase until the quantity demanded equaled the quantity supplied. Would the resulting allocation of water be more efficient? In your view, would it be more or less fair than the proportionate reductions in water use mentioned in the newspaper article? What could be done to make the market solution more fair?

If the city allowed the price of water to rise to its equilibrium price P_2 , the allocation would be more efficient. Quantity supplied would equal quantity demanded and there would be no shortage. Total surplus would be maximized.

Whether the market allocation would be more or less fair than the proportionate reduction in water under the old policy is difficult to say, but it is likely to be fair. Notice that the quantity supplied would be higher (Q_2) in this case than under the water restrictions (Q_3), so there is less reduction in water usage. To make the market solution even fairer, the government could provide increased tax relief or welfare payments for poor families who suffer from paying the higher water prices.